

**KALLIS'**

# SAT

## PATTERN STRATEGY

*FULL*

**6 PRACTICE TESTS**

*OVER*

**1000 PRACTICE QUESTIONS**

**101 QUESTION TOPICS**

**DETAILED ANSWER EXPLANATIONS**

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**2016  
REDESIGNED**

**KALLIS'  
No. 1  
SAT STUDY  
GUIDE**

**KALLIS'**

**2016  
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STRATEGY

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**KALLIS' 2016 REDESIGNED**  
**SAT<sup>®</sup> PATTERN**  
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## KALLIS' Redesigned SAT Pattern Strategy

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ISBN: 9-780991-165735

Our **Redesigned SAT Pattern Strategy** gives students the tools to approach each SAT topic with confidence and provides a variety of practice exercises to help students master test-taking skills. Each chapter is divided into numerous **Question Topics** that break down each concept tested on the official exam, giving students a simple, systematic approach to even the most difficult concepts. Practice includes **Quick Practices** and **Practice Activities** for focusing on particular question types as well as six full-length **Practice Tests**.

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# Table of Contents

<b>GETTING STARTED</b> .....	9
Introducing the Redesigned SAT .....	10
<b>CHAPTER 1: MASTERING THE READING TEST</b>	
Reading Test Basics .....	18
Reading Test Quick Reference Chart .....	19
Section A: Vocabulary .....	20
Section B: Textual Analysis .....	22
Section C: Author Analysis .....	30
Section D: Synthesis .....	36
Answers & Explanations .....	41
<b>CHAPTER 2: MASTERING THE WRITING AND LANGUAGE TEST</b>	
Writing and Language Test Basics .....	46
Writing and Language Test PATTERN Approach .....	48
Structuring Sentences .....	49
Correcting Grammar Mistakes .....	81
Improving Style and Structure .....	103
Answers & Explanations .....	113
<b>CHAPTER 3: MASTERING THE ESSAY TEST</b>	
Essay Test Basics .....	122
Essay Test Skills .....	123
Approaching the Passage .....	124
Annotating the Passage .....	127
Outlining and Writing Your Essay .....	129
How to Practice .....	131
Answers & Explanations .....	147

## CHAPTER 4: MASTERING SAT ALGEBRA

Fundamental Concepts and Techniques	156
Word Problems	168
Chapter 4 Quick Practice	174
Answers & Explanations	177

## CHAPTER 5: ADVANCED TOPICS IN MATH

Fundamental Concepts and Techniques	182
Chapter 5 Quick Practice	196
Answers & Explanations	201

## CHAPTER 6: MASTERING SAT GEOMETRY

Fundamental Concepts and Techniques	206
Chapter 6 Quick Practice	224
Answers & Explanations	229

## CHAPTER 7: MASTERING DATA ANALYSIS

Fundamental Concepts and Techniques	236
Chapter 7 Quick Practice	250
Answers & Explanations	255

SAT Practice Test #1	261
----------------------	-----

SAT Practice Test #2	307
----------------------	-----

SAT Practice Test #3	345
----------------------	-----

SAT Practice Test #4	383
----------------------	-----

SAT Practice Test #5	423
----------------------	-----

SAT Practice Test #6	461
----------------------	-----

SAT Practice Test #1 Answers & Explanations.....	500
SAT Practice Test #2 Answers & Explanations.....	523
SAT Practice Test #3 Answers & Explanations.....	545
SAT Practice Test #4 Answers & Explanations.....	568
SAT Practice Test #5 Answers & Explanations.....	590
SAT Practice Test #6 Answers & Explanations.....	612
References.....	636







Getting Started

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# Introducing the Redesigned SAT

## What is the SAT?

The SAT has been the go-to standardized test for assessing a student's college readiness for nearly a century. When the test was first administered in 1926, it was called the "Scholastic Aptitude Test," but over the years it has come to be called just the "SAT."

One reason the SAT intimidates students and parents alike is that it is so "big." For one, it is "big" in terms of sheer length: the SAT takes three hours to complete unless you decide to write the optional essay, in which case it clocks in at around four hours. The SAT is also "big" in terms of its perceived impact on a student's academic future. According to many students, your SAT score dictates which colleges you can hope to get in to, which scholarships you can apply for, and whether your parents will keep or disown you. Okay, maybe not so much the last part, but the fact remains—the SAT gets treated as a big deal.

But size alone is not what makes the SAT so intimidating—the SAT intimidates because it seems so unknowable. To appreciate the SAT's air of mystery, look no further than its name. To most students and parents, the abbreviation "SAT" does not stand for anything—it simply is. For many, "SAT" is a title without meaning, and the contents of the SAT remain equally unknowable. That the writers of the SAT have now redesigned it may only add to the anxiety that students feel.



**This study guide will remove the mystery from the SAT.** After all, just by reading this introduction you probably learned that "SAT" once stood for "Scholastic Aptitude Test." You will likely find that the redesigned SAT focuses on fundamental skills that you have already been working on in school for years. As you continue reading this study guide, you will find that the SAT is far from unknowable. Reviewing the approaches and practicing the strategies outlined in this study guide will transform the SAT from "the test" to "just another test."

## Why Should I Take the SAT?




Usually, this would be the part of the study guide that tells you, “The SAT tests your level of college preparedness...” But let’s approach this question from a different angle. The SAT is a big standardized test that assesses your knowledge of several broadly defined academic fields (reading, writing, and math). Throughout your academic career (and probably during your actual career) you will have to take other standardized tests. By nature of being “standardized,” the formats of standardized tests are fairly similar to one another. So in a sense, preparation for the SAT doubles as preparation for the ACT, GRE, LSAT, and many other standardized tests known by three- and four-letter abbreviations.

## Out with the Old, in with the New

Starting in 2016, the College Board™ is introducing the Redesigned SAT. Thus, any student who graduates in 2017 or later takes the Redesigned SAT. This section briefly outlines the differences between the old SAT and the Redesigned SAT.

### 2014 - 2015 SAT

### 2016 Redesigned SAT

 Testing Time	<ul style="list-style-type: none"><li>• 3 hours and 45 minutes</li></ul>	<ul style="list-style-type: none"><li>• 3 hours (plus 50 minutes for the optional Essay Test)</li></ul>
 Test Breakdown	<ul style="list-style-type: none"><li>• Critical Reading Test (scored on a 200 – 800 point scale)</li><li>• Writing Test (with Essay) (scored on a 200 – 800 point scale)</li><li>• Math Test (scored on a 200 – 800 point scale)</li></ul>	<ul style="list-style-type: none"><li>• Evidence-Based Reading and Writing<ul style="list-style-type: none"><li>- Reading Test</li><li>- Writing Test</li></ul>(scored on a 200 – 800 point scale)</li><li>• Math Test (scored on a 200 – 800 point scale)</li><li>• Essay Test (separate reading, writing, and analysis scores ranging from 2–8 points)</li></ul>
 Score Breakdown	<ul style="list-style-type: none"><li>• Score Range: 600 – 2400</li></ul>	<ul style="list-style-type: none"><li>• Score Range: 400 – 1600 (plus separate reading, writing, and analysis scores for the optional Essay Test)</li></ul>

## How do I register for the SAT?



The SAT is offered year-round in the United States and internationally. The vast majority of students take the SAT during their junior and senior years of high school. The majority of students take the SAT more than once, and most students receive a better score the second time they take it.

Most students register for the SAT online. To do so, just go to College Board's "Register" page on its website, select a convenient test date and location, print your "Admission Ticket," and take it with you on the day of the test.

However, you must register for the SAT by mail if you:

- choose to pay for the test using a check or money order.
- are less than 13 years old.
- are unable to submit a digital photo during the online registration process.
- need to register for Sunday testing because of a religious observance.
- take the test in Nigeria, Ghana, or Cameroon.
- are requesting that a testing center be opened nearer to your home.

*The Student Registration Guide for the SAT* includes an SAT registration form and a return envelope. See your school's counselor for a registration guide and any additional information necessary for SAT mail registration.

If you are unable to pay the fee for the SAT, there are many resources available that may allow you to take the test at no cost, as well as provide assistance throughout the college application process. More information is available on the College Board's website.

# An Overview of the Redesigned SAT

The Redesigned SAT consists of a Reading Test, a Writing and Language Test, a Math Test, and an optional Essay Test. Below you will find an outline of the number of questions and time allotted for each test section of the SAT.

Test Name	Test Components	Number of Questions	Time Allotted (minutes)
Reading Test	<ul style="list-style-type: none"><li>• Four reading passages</li><li>• One pair of reading passages</li><li>• One to two visual components (such as graphs, tables, or diagrams)</li></ul>	52	65
Writing and Language Test	<ul style="list-style-type: none"><li>• Four reading passages containing grammatical and stylistic errors</li><li>• One to two visual components (such as graphs, tables, or diagrams)</li></ul>	44	35
Math Test	<ul style="list-style-type: none"><li>• <b>No-Calculator portion</b><ul style="list-style-type: none"><li>- Multiple-choice section</li><li>- Student-produced response section</li></ul></li></ul>	20	25
	<ul style="list-style-type: none"><li>• <b>Calculator portion</b><ul style="list-style-type: none"><li>- Multiple-choice section</li><li>- Student-produced response section</li></ul></li></ul>	38	55
Essay Test (Optional)	<ul style="list-style-type: none"><li>• One reading passage with a corresponding writing prompt</li></ul>	1	50

# Scoring the Redesigned SAT

## Scoring at a Glance

The Redesigned SAT employs a multi-level scoring system. The score report will contain an overall score, individual sub-scores for each of the three sections (Reading, Writing, and Math), a breakdown of your performance in each of the test's subtopics, and a score for the optional Essay Test.

The overall, or composite, score ranges from 400 – 1600. Thus, 400 points are awarded just for showing up and taking the test, and 1600 points are awarded for answering every question on the test correctly.

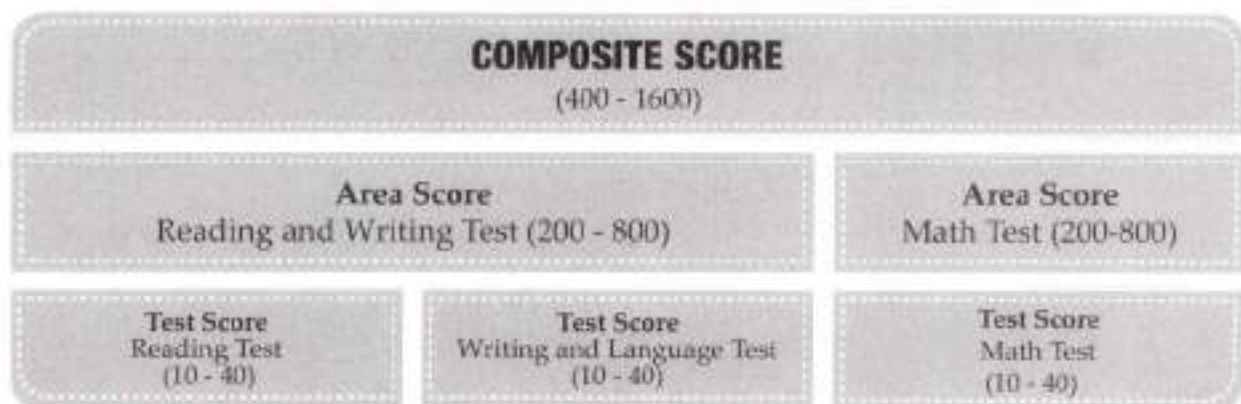
The composite score is broken into two sub-scores: a 200 – 800 point Reading and Writing Test score and a 200 – 800 point Math Test score. Each of these sub-scores are broken down further. The Reading Test score, Writing and Language Test score, and Math Test score will be reported individually and on a 10 – 40 point scale. Additionally, the Redesigned SAT score report will show test takers' skills in a number of Reading, Writing and Language, and Math Test subtopics.

Optional student essays will be reviewed by two graders, each of whom will assign an essay a reading score, a writing score, and an analysis score ranging from 1 to 4 points. The graders' scores will then be added together, meaning each essay will receive three scores, with each score ranging from 2 to 8 points. These Essay scores are not calculated into a student's composite score, but they provide academic institutes with a comprehensive overview of a student's writing abilities.



**There is no penalty for wrong answers on the Redesigned SAT.** Only correct answers will contribute toward a test taker's score; incorrect and unmarked answers will **not** negatively affect a test taker's score. This means that you should never leave a question blank, even if it means you have to guess your answer.

## Scoring Flowchart



# Preparing for the Redesigned SAT

Each student will develop different strategies and approaches when preparing for the SAT. The tips below can help you focus your studies, but ultimately, you must determine what study methods work best for you.



**Create a study schedule** so you have at least two study sessions devoted to the SAT per week.



**Review the chapters of this book and complete the quizzes** at the ends of the chapters.



**Take the practice tests** in a quiet place under timed conditions.



**Focus on areas that you have difficulty with** by reviewing the relevant sections in this book.

The practice sections in this book have been aligned to the rubrics published by the College Board. Therefore, if you see it here, you are likely to see something like it on the actual test. Use the indexes of your text books to reference difficult concepts. Ask your teachers when you need extra help. Be proactive.

Do not study yourself into exhaustion. Take time to sleep, eat healthy food, exercise, and socialize with family and friends. A refreshed, happy brain will be much more nimble. After all, the SAT is just another test.





## Mastering

*The Reading Test**Section A***VOCABULARY**

Words in Context	20
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*Section B***TEXTUAL ANALYSIS**

Inferences, Implications, and Suggestions	22
Summaries	24
Analogies	26
Citations	28

*Section C***AUTHOR ANALYSIS**

Purpose	30
Organization	32
Tone and Attitude	34

*Section D***SYNTHESIS**

Graphics and Text Synthesis	36
Multiple-Text Synthesis	38

# Reading Test Basics

## A. Breaking Down the Reading Passages

The SAT Reading Test consists of four reading passages and one pair of passages. Each passage (or passage pair) is accompanied by ten to eleven multiple-choice questions. Two of the four reading passages will include supplementary materials, such as charts, diagrams, or tables, that contain information relevant to the passage's topic.

The SAT Reading Section will always contain the following:

- One literature passage
- One or two history/social science passages
- One or two science passages
- One passage pair (history, social science, or science)

## B. Understanding the Reading Questions

Each multiple-choice question will have four answer choices with one correct answer. You will not be penalized for incorrect answers.

Certain types of questions will appear in nearly every set of questions. Generally, a question set will include two words in context questions and two citation questions. Additionally, passages containing a chart, diagram, or table, as well as passage pairs will always include several synthesis questions. By mastering the three types of questions just mentioned, you will be prepared for nearly half of the questions on the Reading Test.

## C. Reading with Purpose

Although it does not require physical exertion or even movement, reading is an active task. When you read academic material—especially when being timed, as is the case with the SAT—you should set certain reading “goals” for yourself. Doing so will immerse you in what you are reading. At the very least, it will keep your mind from wandering. Such goals may already be second nature to you. As you read, try to answer the following questions:

- **What is/are the main topic(s) of the passage(s)?**
- **How is/are the passage(s) structured?**
- **How does the author feel about the topic he or she is discussing?**  
(Is he/she excited? Impartial? Critical? Supportive?)

If the answers to these basic questions are not clear to you by the time you finish, it may be a good idea to read the questions and then quickly reexamine parts of the passage before answering.

# Reading Test Quick Reference Chart

Question Type	Description	Specific Topics (SAT)	Common Question Formats
Vocabulary (approximately 15 – 20% of questions)	Use the context of a sentence, paragraph, or passage to determine the meaning of a word.	Words in Context	<ul style="list-style-type: none"> <li>As used in line xx, " _____ " most nearly means...</li> </ul>
Textual Analysis (approximately 50% of questions)	Make a reasonable, supportable deduction based on information presented in the text. In other words, summarize what the author says or tries to say.	Inferences, Implications, and Suggestions	<ul style="list-style-type: none"> <li>The author suggests that...</li> <li>The author indicates that...</li> <li>It can most reasonably be inferred that...</li> <li>The author most strongly implies which of the following about...</li> </ul>
		Summaries	<ul style="list-style-type: none"> <li>The author's main point about _____ is...</li> <li>The author uses _____ and _____ as examples of...</li> </ul>
		Analogies	<ul style="list-style-type: none"> <li>Which situation is most similar to the one described in lines xx – xx?</li> </ul>
		Citations	<ul style="list-style-type: none"> <li>Which choice provides the best evidence to the previous question?</li> </ul>
Author Analysis (approximately 20% of questions)	Explain why or how the author does something.	Purpose	<ul style="list-style-type: none"> <li>The main purpose of the passage is to...</li> <li>The discussion of _____ in lines xx – xx primarily serves to...</li> </ul>
		Organization	<ul style="list-style-type: none"> <li>Which choice best describes the structure of the paragraph/passage?</li> </ul>
		Attitude and Tone	<ul style="list-style-type: none"> <li>The passage is written from the perspective of someone who is...</li> <li>The author's attitude is primarily characterized by...</li> <li>What main effect does _____ have on the tone of the passage?</li> </ul>
Synthesis (approximately 15% of questions)	Explain a relationship between two passages or between a passage and its supplementary material.	Graphics and Test Synthesis	<ul style="list-style-type: none"> <li>Which information best summarizes the information presented in the graph?</li> <li>According to the graph, which statement is true about _____?</li> <li>What information presented in paragraph xx is represented by the graph?</li> <li>Which statement about _____ is best supported by the graph?</li> </ul>
		Multiple-Text Synthesis	<ul style="list-style-type: none"> <li>How would the author of Passage 1 most likely respond to the claim (lines xx – xx) made in Passage 2?</li> <li>Which choice best states the relationship between the two passages?</li> </ul>

## Section A: Vocabulary

### *001* Question Topic

#### WORDS IN CONTEXT

##### APPROACH

Being able to discern the meaning of a word through context is an important skill. In fact, up to 20 percent of SAT Reading Test questions ask you to do just that. The words used for “Words in Context” questions may be relatively common; in these cases, the difficulty lies in determining the word’s nuanced meaning in the sentence. Use the context of the phrase, sentence, or paragraph in which the word appears to determine its meaning.

##### Example

Although the envelope containing the classified documents appeared unopened, the government agent feared that the documents had been doctored.

As used in the sentence above, “doctored” most nearly means

- |                  |              |
|------------------|--------------|
| (A) adulterated. | (B) treated. |
| (C) repaired.    | (D) altered. |



##### Explanation:

“Doctored” is a relatively common word that, when used as a verb, has multiple meanings. Because all the answer choices provide an accurate definition of “doctored,” we must use the context of the sentence to decide which synonym is best suited to the sentence. The process of “doctoring” is something done to the documents, and a process the agent fears. From this, we can infer that “altered” is the best choice because a government agent would fear that important (“classified”) documents had been altered.

##### Question Formats

Although question formats vary from test to test, the most common format for a words in context questions is

- As used in line xx, “\_\_\_\_\_” most nearly means...

## Focus Questions

What kinds of words does the author choose to use in the passage?  
What are the nuances of meaning in the passage?

This passage is adapted from Arvind Suresh (Editor) & Sharman Apt Russell (Author), "Nature's Notebook: Through the Eyes of a Citizen Scientist," *Scistarter Blog*, published in 2015.

*line* Here in the Chihuahuan Desert of southwestern New Mexico, I am intimate now with three trees in my backyard: a box elder, a desert willow, and a honey mesquite. I know when these plants become luminous with the green of new leaves, when they flower, when their flowers turn to fruit, and when their fruit falls. I also have a warm relationship with a male  
3 four-winged saltbush, having rubbed his yellow pollen sensuously between my fingers, and with a female four-winged saltbush, admiring her extravagant and seasonal cloak of papery seeds. Perhaps my greatest new friend, however, is a soaptree yucca, whose single stalk grows up quickly and prominently in late spring, its buds producing a mass of scented creamy-white flowers—like a six-foot-high candle glowing in the dusk.  
10 This spring is my third year with my selected plants. Phenology is too dull a word for what is happening here. For how I must search along a stem for the smallest of leaves, peer into the heart of a bud, and rub my fingers against a catkin. This is one-to-one, a real conversation, me and this catkin, me and this honey mesquite.

- 1) As used in line 1, "intimate" most nearly means
  - (A) confidential.
  - (B) private.
  - (C) familiar.
  - (D) devoted.
- 2) As used in line 4, "warm" most nearly means
  - (A) friendly.
  - (B) charitable.
  - (C) hot.
  - (D) snug.
- 3) As used in line 8, "prominently" most nearly means
  - (A) proudly.
  - (B) importantly.
  - (C) obtrusively.
  - (D) noticeably.
- 4) As used in line 10, "dull" most nearly means
  - (A) blunt.
  - (B) unimaginative.
  - (C) somber.
  - (D) dreary.

## Section B: Textual Analysis

Questions in this category ask you to make reasonable, supportable deductions based on the information presented in the passage. In other words, you must summarize or analyze what the author says or implies.

### 002 Question Topic

### INFERENCES, IMPLICATIONS, AND SUGGESTIONS

#### APPROACH

The Reading Test will often ask you to make an inference, identify an implication, or determine what an author is suggesting in a passage. When you encounter a question that asks you to do any of these, you must choose an answer that is not explicitly stated. In other words, you must interpret meaning. At the same time, the correct answer will be entirely supported by the text. If an answer choice contains a detail or idea that seems logical and yet overreaches the implications in the passage, rule it out.

#### Example

Andrew and Alice have been close friends for years. But lately, whenever Andrew has tried to talk to Alice, she pointedly ignores him.

What can reasonably be inferred based on the sentences above?

- (A) Andrew lied to Alice.                      (B) Andrew said something to offend Alice.  
(C) Alice is upset with Andrew.              (D) Alice has found a new friend.



#### Explanation:

*In this case, we do not have enough evidence to assume that "Andrew lied to Alice," or even that he "said something to offend" her. After all, he could have offended her with his actions and not his words. Ultimately, we do not know why Alice is ignoring him. Moreover, there are no hints that "Alice has found a new friend." Thus, the safest and most supportable choice is (C) because it includes an inference that is much harder to disprove than the other choices.*

#### Question Formats

Although question formats vary, the most common formats for inference, implication, and suggestion questions are

- The author suggests/indicates that...
- It can most reasonably be inferred that...
- The author most strongly implies which of the following about \_\_\_\_?
- Which choice best reflects the narrator's view of \_\_\_\_?

## Focus Questions

- Does a direct explanation of the text's meaning seem to be missing?
- Does the author provide hints and clues that might lead to a conclusion?
- Does the author use words such as "may," "might," and "probably?"

The following is adapted from V.S. Vernon Jones, *Aesop's Fables*, originally published in 1912.

A thirsty Crow found a Pitcher with some water in it, but so little was there that, try as she might, she could not reach it with her beak, and it seemed as though she would die of thirst within sight of the remedy. At last she hit upon a clever plan. She began dropping pebbles into the Pitcher, and with each pebble the water rose a little higher until at last it reached the brim, and the knowing bird was enabled to quench her thirst.

1) The fable suggests which of the following?

- (A) Necessity inspires ingenuity.
- (B) Patience is often rewarded.
- (C) It is better to be hungry than thirsty.
- (D) Intelligence is preferable to wealth.

A dispute arose between the North Wind and the Sun, each claiming that he was stronger than the other. At last they agreed to try their powers upon a traveler, to see which could soonest strip him of his cloak. The North Wind had the first try; and, gathering up all his force for the attack, he came whirling furiously down upon the man, and caught up his cloak as though he would wrest it from him by one single effort: but the harder he blew, the more closely the man wrapped it round himself. Then came the turn of the Sun. At first he beamed gently upon the traveler, who soon unclasped his cloak and walked on with it hanging loosely about his shoulders: then he shone forth in his full strength, and the man, before he had gone many steps, was glad to throw his cloak right off and complete his journey more lightly clad.

2) What is implied by the Sun's victory over the North Wind?

- (A) Most people would rather be too hot than too cold.
- (B) Excessive pride always results in failure.
- (C) Persuasion is a stronger motivator than force.
- (D) Nature seeks to make man as uncomfortable as possible.

There were two Cocks in the same farmyard, and they fought to decide who should be master. When the fight was over, the beaten one went and hid himself in a dark corner; while the victor flew up on to the roof of the stables and crowed lustily. But an Eagle espied him from high up in the sky, and swooped down and carried him off. Forthwith the other Cock came out of his corner and ruled the roost without a rival.

3) Which of the following morals is suggested by the fable?

- (A) Few animals will challenge an eagle.
- (B) Pride comes before a fall.
- (C) Time makes losers of us all.
- (D) Fighting leads to chaos and disorder.



## 003 Question Topic

## SUMMARIES

## APPROACH

When recalling something you have read, you probably do not remember it word-for-word. You most likely remember the main idea and a few details or examples. What you are doing in your mind is summarizing. Often, the best strategy for answering summary questions is to reread the relevant part(s) of the passage, paying close attention to the author's main points and corresponding details.

## Example

Kayla and Brittany nervously paced up and down the street, glancing at the unremarkable house each time they passed it. Finally, they each took a deep breath and went to ring the doorbell.

Which choice best summarizes the passage?

- (A) Two friends spent a long time staring at a house.
- (B) Kayla and Brittany eventually found the courage to approach the house.
- (C) Two friends cannot find the house that they are trying to locate.
- (D) Kayla and Brittany fear whoever lives in the "unremarkable house."



## Explanation:

When answering summary questions, avoid choices that include implications or inferences. Choices (A) and (C) are incorrect because they identify Kayla and Brittany as friends, which is neither mentioned nor suggested in the example sentences. Moreover, they "glance" rather than "stare" at the house, and the example does not indicate that they are lost. (D) is incorrect because, although the example states that Kayla and Brittany are nervous, there is no indication that they fear the resident of the house they approach. (B) accurately summarizes Kayla and Brittany's transformation from nervousness to confidence by saying they "eventually found the courage to approach the house," leaving out non-essential detail and description.

## Question Formats

Although question formats vary from test to test, the most common formats for summary questions are

- The author's main point about \_\_\_\_\_ is...
- The author uses \_\_\_\_\_ and \_\_\_\_\_ as examples of...
- Which choice best summarizes the passage?
- The central claim in the passage is that...
- The central problem that the author describes in the passage is...
- In the passage, the author contends that...
- The passage identifies which of the following as \_\_\_\_\_?

## Focus Questions

What is the main topic of the passage?      What details contribute to the main topic of the passage?

This passage is adapted from Steve Silberman, "Music to Write By: 10 Top Authors Share Their Secrets for Summoning the Muse," *Neurotribes*, published in 2012.

*line*      Writing is a hell of a way to make a living. It only seems easy to those who haven't tried it. I've somehow managed to survive that way for the past 20 years or so—for richer and for poorer—and still don't know how my favorite authors, journalists, and bloggers manage to pull it off with such verve and panache. Sometimes, being a writer feels like getting paid to  
3 pull a rabbit out of a hat over and over again—but each time it has to be a new breed of rabbit, "miraculously" emerging from a different style of hat.

Days under the spotlight that I reach into the fraying dark with sweaty fingers, and feel warm fur, are good days. Other days, it's nothing but hat in there; but I say "Voilà!" with a practiced flourish anyway and hope the audience doesn't notice that the alleged rabbit is just a  
10 tattered old stuffed thing, a patchwork made to twitch by sleight-of-hand

But writers have their secrets and rituals for courting the fickle favor of the Muse. For some, it's sitting in a certain chair at the right time of day—or getting out of familiar surroundings to type busily away in a café filled with people that might someday be readers. For others, it's a brisk walk in the open air. Or it's potions; woe to the poet who finally decides to undertake her  
15 epic sestina sequence only to discover that her cupboard is bare of aged Sumatra.

- 1) The author's main point about pulling "a rabbit out of a hat over and over again" (line 5) is that  
(A) most professional writers believe in miracles.  
(B) most people who enjoy writing also enjoy magic.  
(C) professional writers must consistently produce unpredictable and varied work.  
(D) some people feel that writers mainly trick and deceive their readers.
- 2) The author uses "sitting in a certain chair..." (line 12) and "getting out of familiar surroundings..." (line 12) as examples of  
(A) superstitious traditions that the author rejects.  
(B) practices that help writers produce high-quality work.  
(C) actions that help the author focus on his writing.  
(D) pieces of advice given to the author by his friends.

## 004 Question Topic

## ANALOGIES

## APPROACH

Analogy questions require you to relate a situation from the passage to a situation described in the answer choices. Analogy questions require you to understand the implications of a relationship or situation in the passage, and then to recognize which choice contains similar implications, even though the situation itself may seem completely different.

## Example

Jesse taught his parrot to meow like a cat.

Which of the following situations is most like the one in the sentence?

- (A) An art teacher agrees to teach an advanced math class.
- (B) An older brother teaches his younger brother to beat him at chess.
- (C) A zookeeper teaches ballroom dancing in her spare time.
- (D) A television show teaches children American Sign Language (ASL).



## Explanation:

All of the choices contain a mild element of the unexpected or unusual, as does the sentence; it is a bit unusual to teach a parrot to sound like a cat. However, only (D) can serve as an accurate analogy to the situation of Jesse and his parrot. We can imagine people's surprise when they hear Jesse's parrot meowing, just as we can imagine many non-signing parents being surprised when they see their children communicating in ASL. Like the parrot, the children will surprise others. In all the other choices, it is the teacher who is defying stereotypical expectations.

## Question Formats

Although question formats vary from test to test, the most common formats for an analogy question are

- Which situation is the most similar to the one described in lines xx-xx?
- The author uses the figurative phrase " \_\_\_\_\_ " mainly to emphasize what he/she sees as \_\_\_\_\_.

## Focus Questions

What are the main ideas and relationships in the passage? What images does the passage create?

This passage is adapted from **Jane Austen**, *Persuasion*, originally published in 1818.

10e Captain Frederick Wentworth who being made commander in consequence of the action off St. Domingo, and not immediately employed, had come into Somersetshire, in the summer of 1806; and having no parent living, found a home for half a year at Monkford. He was, at that time, a remarkably fine young man, with a great deal of intelligence, spirit, and brilliancy; and  
3 Anne: an extremely pretty girl, with gentleness, modesty, taste, and feeling. Half the sum of attraction, on either side, might have been enough, for he had nothing to do, and she had hardly anybody to love; but the encounter of such lavish recommendations could not fail. They were gradually acquainted, and when acquainted, rapidly and deeply in love. It would be difficult to say which had seen highest perfection in the other, or which had been the happiest: she, in  
10 receiving his declarations and proposals, or he in having them accepted.

15 A short period of exquisite felicity followed, and but a short one. Troubles soon arose. [Anne's father] Sir Walter, on being applied to, without actually withholding his consent, or saying it should never be, gave it all the negative of great astonishment, great coldness, great silence, and a professed resolution of doing nothing for his daughter. He thought it a very degrading alliance; and [Anne's late mother's friend] Lady Russell, though with more tempered and pardonable pride, received it as a most unfortunate one.

20 Anne Elliot, with all her claims of birth, beauty, and mind, to throw herself away at nineteen; involve herself at nineteen in an engagement with a young man, who had nothing but himself to recommend him, and no hopes of attaining affluence, but in the chances of a most uncertain profession, and no connexions to secure even his farther rise in the profession, would be, indeed, a throwing away, which she grieved to think of!

1) Which situation is most similar to the one described in lines 11 – 16?

- (A) A researcher excitedly submits plans for an experiment, but her university will not approve it.
- (B) A student needs homework help, but his dad and stepmom refuse to help him.
- (C) An artist spends a year painting canvasses, but they are all burned in a fire started by the landlord.
- (D) A ship enjoys perfect sailing weather for awhile, but after a terrible storm, it loses its way.

2) Which situation is most similar to the one described in lines 17 – 21?

- (A) Deciding to quit your job so you can travel around the world.
- (B) Ending a relationship because the other person lacks commitment.
- (C) Attending a community college when your parents want you to attend a private university.
- (D) Avoiding your parents because you think they are upset with you.

## 005 Question Topic

## CITATIONS

## APPROACH

Citation questions test your ability to recognize relationships within a passage. These questions will ask you to select a quote that supports (or, as the SAT says, “provides the best evidence for”) the answer to the preceding question. Double check any relevant information in the passage before answering a citation question. When answering, choose the sentence or phrase that has the most substantial and direct relationship to the previous question.

## Example

Paul heard the teacher call his name, and he knew it was time. His heart pounding in his chest, Paul reviewed what he would say as he approached the front of the class.

Which choice best provides evidence for the idea that Paul is feeling nervous?

- (A) “Paul heard the teacher call his name...”
- (B) “...he knew it was time.”
- (C) “His heart pounding in his chest...”
- (D) “Paul reviewed what he would say...”



## Explanation:

Although the example above is formatted differently than most SAT citation questions, the gist of the question is the same. Here, we might ask ourselves, “What makes me think that Paul is feeling nervous?” One of the most common signs of nervousness is an increased heart rate. “His heart [is] pounding in his chest” provides direct evidence for Paul’s nervousness, making (D) the correct answer.

## Question Formats

Although question formats vary from test to test, the most common formats for summary questions are

- Which choice provides the best evidence for the answer to the previous question?
- Which choice best supports the author’s claim that \_\_\_\_\_?
- A student claims that \_\_\_\_\_. Which of the following statements from the passage best supports/contradicts the student’s claim?
- Which statement from the passage best supports the information presented in the graph/table/diagram?

## Focus Questions

How is the author trying to convince me?

Which part of the passage proves that?

This passage is adapted from **Kate Chopin**, *The Awakening and Selected Short Stories*, originally published in 1899.

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- "One of these days," Edna said, "I'm going to pull myself together for a while and think—try to determine what character of a woman I am; for, candidly, I don't know. By all the codes which I am acquainted with, I am a devilishly wicked specimen of the sex. But some way I can't convince myself that I am. I must think about it."
- "Don't. What's the use? Why should you bother thinking about it when I can tell you what manner of woman you are?" Arobin's fingers strayed occasionally down to her warm, smooth cheeks and firm chin, which was growing a little full and double.
- "Oh, yes! You will tell me that I am adorable; everything that is captivating. Spare yourself the effort."
- "No; I shan't tell you anything of the sort, though I shouldn't be lying if I did."
- "Do you know Mademoiselle Reisz?" she asked irrelevantly.
- "The pianist? I know her by sight. I've heard her play."
- "She says queer things sometimes in a bantering way that you don't notice at the time and you find yourself thinking about afterward."
- "For instance?"
- "Well, for instance, when I left her to-day, she put her arms around me and felt my shoulder blades, to see if my wings were strong, she said. 'The bird that would soar above the level plain of tradition and prejudice must have strong wings. It is a sad spectacle to see the weaklings bruised, exhausted, fluttering back to earth.'"
- "Whither would you soar?"
- "I'm not thinking of any extraordinary flights. I only half comprehend her."

- 1) In the context of the passage, Edna's attitude is best described as
- (A) fearful.
  - (B) pensive.
  - (C) distraught.
  - (D) witty.
- 2) Which choice provides the best evidence for the answer to the previous question?
- (A) Line 1 ("I'm going to...and think")
  - (B) Line 8–9 ("You will...the effort.")
  - (C) Line 13 ("She says...at the time")
  - (D) Line 21 ("I'm not thinking...comprehend her.")

## Section C: Author Analysis

Generally, when speaking with someone face-to-face, you subconsciously perceive the person's goals. You make inferences about the person's overall intention based on social cues as well as the context and content of the conversation. Author analysis questions require you to employ many of the same skills. The cues that you absorb as you read will help you select the choice that best articulates the author's intentions.

### 006 Question Topic

#### PURPOSE

##### APPROACH

When inferring an author's purpose in using a particular word, sentence, idea, or structure, it helps to consider the overall intent of the passage. Ultimately, context is everything when answering purpose questions, so quickly take a second look at the section in question before answering.

##### Example

Isabella was apparently unaware that not everyone loved science fiction; as she explained the minutiae of interstellar travel to her friend Logan, he could not keep from yawning.

- The author mentions yawning primarily to
- (A) emphasize Logan's boredom.
  - (B) imply that Logan is sleepy.
  - (C) provide evidence that Logan is impolite.
  - (D) criticize Logan's viewpoint on science fiction.



##### Explanation:

The word "yawning" occurs in a sentence that is mainly about Isabella's lack of social awareness. Choice (A) is the only possible answer. The context indicates that the author inserts an instance of yawning to show how much Isabella is boring Logan, not to comment on Logan's character or personality.

##### Question Formats

Although question formats vary from test to test, the most common formats for purpose questions are

- The main purpose of the (sentence, paragraph, passage, etc.) is to...
- The discussion of \_\_\_\_\_ in lines xx – xx primarily serves to...
- The (first, second, third, etc.) paragraph is primarily concerned with establishing a contrast between...

## Focus Questions

Why did the author write the passage? How do details contribute to the main topic of the passage?

This passage is adapted from Caren Cooper, "Coop's Scoop: Speak for the Trees on next #CitSciChat," *CitizenSci*, published in 2015.

*line* In the mid-1800s, when J. Sterling Morton moved to the Nebraska Territory, he soon was homesick for trees. Maybe he missed the sound of leaves rustling in the breeze. Or maybe the pine-fresh scent. In 1872, as secretary for the Territory, Morton established Arbor Day, and 1 million trees were planted on that first Arbor Day in the Nebraska Territory.

3 Most fundamentally, trees provide fresh air. Not only do they take in carbon dioxide and release oxygen, they reduce pollutants in the air, improving overall air quality. The benefits include the shade of full-grown trees, which can lower heating bills. Trees are also habitat (food and shelter) for wildlife, they provide privacy, and places for tire swings and tree houses. Being outside is revitalizing, and being in a landscape with trees and greenery helps people cope with chronic stress.

10 Because trees provide so many benefits to people, tree-planting events continue, particularly for city trees. Cities have programs for residents to help with the care and stewardship of city trees, as with the million tree initiative in New York City. In Philadelphia, residents map planting sites and newly planted trees in PhillyTreeMap in order to visualize and keep track of the positive impacts of the city's trees.

15 Many species of trees face blights of insect pests and diseases. Citizen science efforts monitor tree health. For example, in OakMapper, participants in California can report suspected cases of Sudden Oak Death, which is caused by a pathogen. Seventh and eighth graders in Ohio discovered the emerald ash borer parasitoid in woods adjacent to their school. As millions of ash trees across Europe are killed by a fungus, citizen scientists participate in a Facebook game, Fraxinus, to help align DNA sequences to assess variability in different strains of the pathogen. 20 The results can help researchers understand the genetic code behind the disease.

- 1) The main purpose of the passage is to
  - (A) explain how J. Sterling Morgan ushered in a new age of environmentalism.
  - (B) describe the ways in which trees and humans benefit one another.
  - (C) weigh the benefits imparted by trees against the high cost of planting them.
  - (D) encourage young people to plant trees in their neighborhoods.
- 2) The discussion of "citizen science efforts" to monitor tree health in paragraph 4 (lines 16 – 22) primarily serves to
  - (A) illustrate that conservation efforts are international and available to non-scientists.
  - (B) imply that America takes environmentalism more seriously than Europe does.
  - (C) explain how tree-planting efforts have caused the spread of parasites and diseases.
  - (D) warn readers of the imminent extinction of numerous species of trees.



## 007 Question Topic

## ORGANIZATION

## APPROACH

Organization questions ask you how the author structures and presents information in a passage. An organization question may ask you how one piece of information relates to another piece of information, or how that piece of information contributes to the passage's main idea(s). You may be asked to identify the rhetorical strategies that the author uses and recognize how they are arranged. As examples, an author might describe a cause and effect relationship, present events in chronological order, or contrast two sides of an issue.

## Example

The forest was very dense. The first night of the camp, they left their flashlights and cell phones on and used up the batteries. The second night, rain soaked all the firewood that they had brought. So on the third night they were sitting in the dark when they thought they heard footsteps.

The last sentence in the passage serves mainly to

- (A) introduce a character.
- (B) describe a consequence.
- (C) summarize events.
- (D) provide explanations.



## Explanation:

The last sentence suggests that a new character is about to walk into the scene. (A) cannot be the answer because we are not being asked to infer meaning. Likewise, the passage as a whole lists reasons why the campers ended up sitting in the dark, which could divert attention to words like "explanations." However, we are being asked about the function of the last sentence, not the passage as a whole. One clue that the answer is (B) is that it begins with "so," which indicates consequence. To paraphrase the last sentence, "As a consequence of the reasons just listed, the campers were sitting in the dark..."

## Question Formats

Although question formats vary from one test to another, the most common formats for organization questions are

- Which choice best describes the structure of the paragraph/passage?
- What function does the paragraph serve in the passage as a whole?
- The paragraph is primarily concerned with establishing a contrast between...
- During the course of passage, the narrator's focus shifts from...

## Focus Questions

What is the main topic of the passage? How does the author structure information in the passage?

This passage is adapted from Henry Lee, *Sea Monsters Unmasked*, originally published in 1883.

*line* Here let me say—and I wish it to be distinctly understood—that I do not deny the possibility of the existence of a great sea serpent, or other great creatures at present unknown to science, and that I have no inclination to explain away that which others have seen, because I myself have not witnessed it. “Seeing is believing,” it is said, and it is not agreeable to have to  
5 tell a person that, in common parlance, he “must not trust his own eyes.” It seems presumptuous even to hint that one may know better what was seen than the person who saw it. And yet I am obliged to say, reluctantly and courteously, but most firmly and assuredly, that these perfectly credible eye-witnesses did not correctly interpret that which they witnessed. In these cases, it is not the eye which deceives, nor the tongue which is untruthful, but the imagination which is led  
10 astray by the association of the thing seen with an erroneous idea. I venture to say this, not with any insolent assumption of superior acumen, but because we now possess a key to the mystery which Archdeacon Deinbolt and his neighbours had not access to, and which has only within the last few years been placed in our hands. The movements and aspect of their sea monster are those of an animal with which we are now well acquainted, but of the existence of which the  
15 narrators of these occasional visitations were unaware; namely, the great calamary, the same which gave rise to the stories of the Kraken, and which has probably been a denizen of the Scandinavian seas and fjords from time immemorial.

- 1) Which choice best describes the structure of the passage?  
(A) A polite disclaimer is followed by a firm assertion.  
(B) A general description is followed by a specific instance.  
(C) A historical event is described and then given a broader context.  
(D) A problem is presented and then a solution is suggested.
- 2) The passage is primarily concerned with establishing a contrast between  
(A) Archdeacon Deinbolt and the author.  
(B) presumption and courtesy.  
(C) the great calamary and the Kraken.  
(D) past and present knowledge.

## 008 Question Topic

## TONE AND ATTITUDE

**APPROACH**

When you call a friend, you can usually determine how your friend is feeling right away. You listen to what your friend says and how he or she says it. It is not so different when you are asked to identify tone and attitude in a text. A quick look back at the first few lines of the text, as well as the segment in question, will help you absorb clues such as word choice, sentence structure, and content.

**Example**

Horses evolved to live in herds, constantly close enough to swish flies off each other with their tails. Today's horses still *hate* to be alone. But for one reason or another, they cannot always be with other horses. And while the occasional barn cat or chicken might become a friend, many horses have been known to deeply cherish goat companions. Goats are social and see eye-to-eye with horses on the topic of solitude: they oppose it.

The author's attitude toward horses and goats can best be described as

- (A) practical. (B) sentimental.  
(C) affectionate. (D) ambivalent.

**Explanation:**

*The author is explaining sociability from the horses' point of view. The diction is not overly tender or sweet, and thus could not be described as "sentimental." Rather, the author describes negative emotions of both horses and goats ("hate to be alone") in a bemused way, while also noting that many horses "deeply cherish" their goat friends. Overall the author expresses understanding of the two species, so "affectionate" is a fitting description, and choice (C) is correct.*

**Question Formats**

Although question formats vary, the most common formats for tone and attitude questions are

- The author's attitude toward \_\_\_\_\_ is best described as...
- What main effect does \_\_\_\_\_ have on the tone of the passage?
- How do the words "\_\_\_\_" and "\_\_\_\_" in paragraph xx help establish the tone of the paragraph?
- The author uses the word "\_\_\_\_" throughout the passage mainly to...
- Over the course of the passage, the narrator's attitude shifts from...
- The passage is written from the perspective of someone who is...

## Focus Questions

If the author were reading this out loud to me, how would he or she sound?

This passage is adapted from H.P. Lovecraft, "The Shunned House," originally published in *Weird Tales*, October 1937.

*line*      What I heard in my youth about the shunned house was merely that people died there in alarmingly great numbers. That, I was told, was why the original owners had moved out some twenty years after building the place. It was plainly unhealthy, perhaps because of the dampness and fungous growths in the cellar, the general sickish smell, the drafts of the hallways, or the  
5 quality of the well and pump water. These things were bad enough, and these were all that gained belief among the persons whom I knew. Only the notebooks of my antiquarian uncle, Doctor Elihu Whipple, revealed to me at length the darker, vaguer surmises which formed an undercurrent of folklore among old-time servants and humble folk; surmises which never travelled far, and which were largely forgotten when Providence grew to be a metropolis with a  
10 shifting modern population.

The general fact is that the house was never regarded by the solid part of the community as in any real sense "haunted." There were no widespread tales of rattling chains, cold currents of air, extinguished lights, or faces at the window. Extremists sometimes said the house was "unlucky," but that is as far as even they went. What was really beyond dispute is that  
15 a frightful proportion of persons died there; or more accurately, had died there, since after some peculiar happenings over sixty years ago the building had become deserted through the sheer impossibility of renting it. These persons were not all cut off suddenly by any one cause; rather did it seem that their vitality was insidiously sapped, so that each one died the sooner from whatever tendency to weakness he may have naturally had. And those who did not die  
20 displayed in varying degree a type of anemia or consumption, and sometimes a decline of the mental faculties, which spoke ill for the salubrity of the building. Neighboring houses, it must be added, seemed entirely free from the noxious quality.

- 1) The author's attitude toward "the shunned house" can most accurately be characterized as one of  
(A) justifiable fear.  
(B) open hostility.  
(C) scholarly fascination.  
(D) unhealthy obsession.
- 2) The passage is written from the perspective of someone who  
(A) is considering purchasing a particular house.  
(B) has taken an academic interest in a mysterious subject.  
(C) lets his superstitious tendencies guide his research.  
(D) is determined to disprove a controversial theory regarding a house.
- 3) What effect does the phrase in lines 6–8 ("Only the notebooks...humble folk") have on the tone of the passage?  
(A) It adds an element of superstition regarding the reputation of the house.  
(B) It interjects an element of nostalgia to a passage otherwise concerned with the present.  
(C) It attempts to add humor to an otherwise somber account.  
(D) It reveals the author's fear of "the shunned house."

## Section D: Synthesis

Synthesis questions require you to understand the relationship between two passages, or between a passage and a graphical representation of data, such as a table, chart, or graph.

### 009 Question Topic

#### → GRAPHICS AND TEXT SYNTHESIS

##### APPROACH

You have studied graphs, tables, and charts in math; on the Reading Test, graphics questions require you to apply your knowledge. Take a careful look at the title and at the “x” and “y” axes of the graphic to insure that you have a firm grasp of what is (and what is not) represented. The graphic information might support or contradict the text, or it might not apply to the text at all.

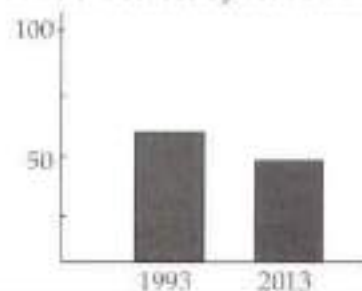
##### Example

Hey mom  
Homecoming game is over! We lost, as usual :/  
Can you pick me up from the high school?  
I NEED food like now : |

What information in the text message is suggested by the graph?

- (A) Many teens text while driving.
- (B) Many teens do not know how to drive.
- (C) Many teens cannot afford to buy cars.
- (D) Many teens do not have driver's licenses.

Percent of people in U.S. with drivers' licenses by 18th birthday



##### Explanation:

The graph presents information only about driver's licenses, ruling out all choices except (D). The writer of the text message asks to be picked up from “the high school,” so we can assume that the writer is a teen and is not in a situation to drive independently. The graph indicates simply that such a situation is fairly common for teens.

##### Question Formats

Although question formats vary from test to test, some common formats for graphics and text synthesis questions are

- Which claim about \_\_\_\_\_ is supported by the graph?
- What information presented in paragraph xx is represented by the graph?
- It can be reasonably inferred from the passage and the graph that \_\_\_\_\_.
- Which choice best summarizes the information presented in the graph?
- According to the graph, which statement is true about \_\_\_\_\_?

## Focus Questions

Why has the graphic been paired with the passage? What information do the works share?

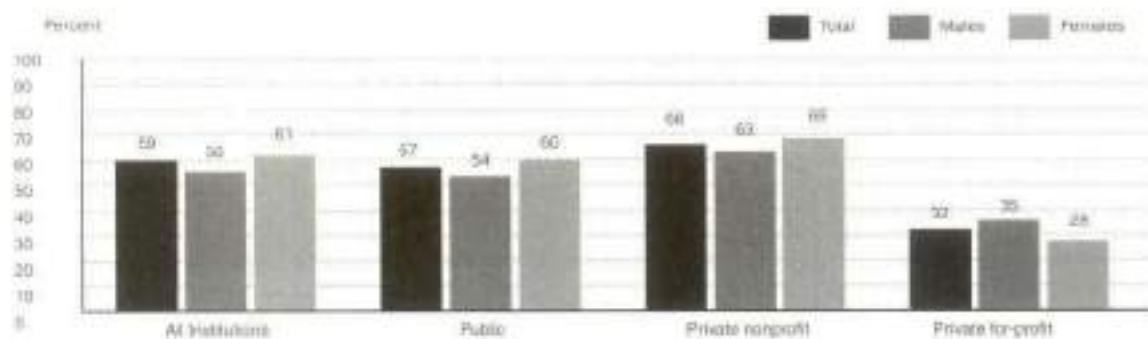
Passage 1 is adapted from John Bound, Michael Lovenheim, et al, "Understanding the Decrease in College Completion Rates and the Increased Time to Baccalaureate Degree," published in 2007.

The graph is from the U.S. Dept. of Education, National Center for Education Statistics "The Condition of Education," published in 2013.

line Enrollment is relatively elastic among public universities outside of the most selective few. Here, we expect increased demand to lead to increased enrollment and consequent reductions in resources per student.

That aggregate increases in time to degree are not tied directly to changes in characteristics of students suggests that the underlying rate at which students complete college studies may be impeded by limited availability of courses and institutional resources more generally at public colleges...The evidence that we have put together points strongly towards declines in the resources, both monetary and non-monetary, available to students at public colleges and universities playing a central role in explaining the decrease in completion rates and the increased time it is taking college students within the U.S. to obtain BA degrees.

Percentage of students seeking a bachelor's degree at 4-year degree-granting institutions who completed a bachelor's degree within 6 years, 2006



- Which claim about graduation rates is supported by the graph?
  - A greater total number of people graduate from public colleges than private nonprofit ones.
  - About two-thirds of students who start at nonprofit institutions tend to graduate within six years.
  - A majority of people who start college do not have a bachelor's degree at the end of six years.
  - It is easier to graduate from private nonprofit colleges than private for-profit ones.
- From the passage and the graph, it can be reasonably inferred that
  - the only way to graduate within a reasonable amount of time is to attend private colleges.
  - a public college or university has to waste a lot of money educating students who drop out.
  - public institutions need more money to make it easier for students to graduate in a timely manner.
  - smaller enrollment means that private nonprofit institutions can provide a better education.

## 010 Question Topic

## MULTIPLE-TEXT SYNTHESIS

## APPROACH

When you see a movie and it reminds you of another movie, you are recognizing similarities between them. When you compare which is better, you are recognizing differences between them. When you wonder, “What would so-and-so do in a situation like this?” you are extrapolating based on what you know about so-and-so. All of this thinking constitutes synthesis, and you can use the same skills to answer questions about the paired texts on the Reading Test.

## Example

(The following sources and passages are fictitious.) Ingredients List 1 is from the label of Soup Playground’s “Condensed Tomato Soup”; Ingredients List 2 is from Jackson Yee, *Simplest Soups*.

**Ingredients List 1:** Tomato puree (water, tomato paste), high fructose corn syrup, wheat flour, water, salt, potassium chloride, flavoring, citric acid, sea salt, ascorbic acid, monopotassium phosphate.

**Ingredients List 2:** 2 cups vegetable broth, 1 cup chopped onion, 1 cup chopped celery, 1 tablespoon fresh basil, 1 tablespoon tomato paste, 2 pounds fresh tomatoes (cut into wedges),  $\frac{1}{2}$  teaspoon salt, dash of pepper. Combine ingredients, simmer for 30 minutes. Serve hot, topped with spoonfuls of plain yogurt.

How would the author of List 2 most likely respond to the recipe in List 1?

- (A) With curiosity, because it does not include preparation instructions
- (B) With admiration, because its ingredients are low in calories
- (C) With nostalgia, because he ate Soup Playground soups as a child
- (D) With criticism, because it does not include an allergy warning



## Explanation

Essentially, you are being asked to infer how one author would react to another’s work. The best way to do so is to find the differences and similarities between the two works. One of the most noticeable differences between the two lists above is that List 2 includes preparation instructions whereas List 1 does not. Thus, (A) is the clearest, most supportable inference that can be made from the choices provided.

## Question Formats

Although question formats vary, some common formats for multiple-text synthesis questions are

- How would the author of Passage 1 most likely respond to the claim about \_\_\_\_\_ made in Passage 2?
- Which choice best states the relationship between the two passages?
- Is the principle described in Passage 1 consistent with the situation described in Passage 2?
- One difference between the \_\_\_\_\_ in Passage 1 and the \_\_\_\_\_ in Passage 2 is...
- On which of the following would the authors of both passages most likely agree?

## Focus Questions

Why have the passages been paired? How are they similar, and how are they different?

Passage 1 is adapted from **John Locke**, *Essay Concerning Human Understanding*, originally published in 1689. Passage 2 is adapted from **William Henry Pyle**, *The Science of Human Nature*, originally published in 1917.

## Passage 1

*line* Let us then suppose the mind to be, as we say, white paper, void of all characters, without any ideas:—How comes it to be furnished? Whence comes it by that vast store which the busy and boundless fancy of man has painted on it with an almost endless variety? Whence has it all the materials of reason and knowledge? To this I answer, in one word, from experience. In  
3 that all our knowledge is founded; and from that it ultimately derives itself. Our observation employed either, about external sensible objects, or about the internal operations of our minds perceived and reflected on by ourselves, is that which supplies our understandings with all the materials of thinking. These two are the fountains of knowledge, from whence all the ideas we have, or can naturally have, do spring.

## Passage 2

10 Observation of children shows that they are selfish, envious, and quarrelsome. They will fight and steal until they are taught not to do such things. How can we understand this? There is no way of understanding such actions until we come to see that the children and men of to-day are such as they are because of their ancestors. It has been only a few generations, relatively speaking, since our ancestors were naked savages, killing their enemies and eating their  
15 enemies' bodies. The civilized life of our ancestors covers a period of only a few hundred years. The pre-civilized life of our ancestors goes back probably thousands and thousands of years. In the relatively short period of civilization, our real, original nature has been little changed, perhaps none at all. The modern man is, at heart, the same old man of the woods.

- 1) How would Locke respond to Pyle's claim that children's temperaments are shaped by humanity's "original nature"?
- (A) Children are only savage if they learn to be so through experience.
  - (B) Experience teaches children to reject their innate savage nature.
  - (C) Children's lack of logic and reasoning drive them to selfishness.
  - (D) Children only reveal their "original nature" when striving for material goods.
- 2) Which choice best states the relationship between the two passages?
- (A) Passage 2 defends a controversial theory presented in Passage 1.
  - (B) Passage 2 questions the line of reasoning that Passage 1 uses to reach a conclusion.
  - (C) Passage 2 refutes the process describing the role of learning outlined in Passage 1.
  - (D) Passage 2 expands upon the philosophical stance presented in Passage 1.







**ANSWERS  
&  
Explanations**

Question Topics

1-10

# Answers & Explanations...

## Mastering the Reading Test

### Question Topic 001: Word in Context

1) **⇒ C**

Although all choices provide accurate definitions of "intimate," only (C) works in the context of the sentence. After the author claims that she is "intimate" with her plants, she describes some of their physical characteristics, so we can infer that she is familiar with the qualities of plants in her backyard.

2) **⇒ A**

The author clarifies that her "warm" relationship with plants involves familiarity and admiration. These qualities also characterize many friendships, so we can presume she has a friendly relationship with the plants.

3) **⇒ D**

The author gives hints at the soap tree yucca's noticeability. She describes its flower stalk as a "six-foot-high candle glowing in the dusk." Because we can safely assume that a human-sized, glowing candle is *noticeable*, (D) is the correct choice.

4) **⇒ B**

Each of the choices represents a correct meaning of "dull." In the context of the sentence, the author uses "dull" to describe the word "phenology," which is the study of seasonal changes in plants and animals. The author says that watching the plants in her backyard leaf out, produce seeds, and so on, cannot be described by a word as dull as phenology. The best choice is (B), "unimaginative," because the author implies that "phenology" does not begin to encompass her experience with plants.

### Question Topic 002: Inferences, Implications, & Suggestions

1) **⇒ A**

When making an inference, one must ensure that an entire choice is supportable based on the information presented in the text before selecting that choice. For instance, (C) mentions the Crow's thirst, which is an element of the fable, but it also mentions hunger, which is not. Because we can eliminate one part of the choice, we must eliminate the entire choice. (B) and (D) are too general to serve the purpose. Only choice (A) is fully supportable based on the text; the Crow needs water (necessity) and so comes up with a clever solution to get water (ingenuity).

2) **⇒ C**

This question requires you to recognize that the forces of nature (the North Wind and the Sun) represent concepts (force and persuasion, respectively). (C) is correct because the North Wind unsuccessfully uses force to rip the traveler's cloak away, whereas the sun uses persuasion (heat) to convince the traveler to remove his cloak of his own volition.

3) **⇒ B**

The fable suggests that the victorious Cock is ultimately the loser because he was carried off by an Eagle, whereas the beaten Cock keeps his life. The victorious one is carried off because his excessive pride impels him to brag about his victory, drawing the Eagle's attention.

## Question Topic 003: Summaries

1) **⇒** C

The main idea of the passage is that writing for a living is very difficult. Thus, when the author mentions the magic trick of pulling a rabbit from a hat, he is linking this imagery to his main idea: writers must consistently produce new ideas, which “only seems easy to those who haven’t tried it.”

2) **⇒** B

In Greek mythology, Muses are goddesses who are the sources of creativity. Paragraph 3 mainly points out that authors “court the...Muse”; that is, they purposefully engage in rituals that will inspire them. New ideas are necessary for “high-quality work.” Therefore, (B) provides the best summary of the examples.

## Question Topic 004: Analogies

1) **⇒** A

Lines 11–16 describe a situation in which someone wants approval from her superiors regarding a decision, but that approval is withheld. The only choice that describes a situation in which approval is being withheld is (A), wherein the university will not approve of a researcher’s proposal.

2) **⇒** C

Lines 17–21 characterizes Anne Elliot’s decision to marry as a poor one because she and her family will not advance socially or monetarily from the marriage. In other words, Anne is not living up to social expectations. The only choice that describes a similar situation in which someone fails to live up to the expectations laid out for him or her is (C), as a private university is generally held in higher regard than a community college.

## Question Topic 005: Citations

1) **⇒** B

To be pensive is to be thoughtful. We can determine that Edna is primarily thoughtful in the passage because she seems to be pondering her own character and that of Mademoiselle Reisz. This contemplative tone persists throughout the passage, with no indications that she is feeling fearful, distraught, or witty.

2) **⇒** A

The correct choice is (A) because line 1 is the first mention Edna makes about thinking; it is the most appropriate textual evidence to support calling her attitude “pensive.”

## Question Topic 006: Purpose

1) **⇒** B

The passage begins with the origins of Arbor Day, a holiday that celebrates environmentalism through the planting of trees. The following paragraphs discuss how “trees provide so many benefits to people,” and how these benefits encourage “tree-planting efforts,” which is especially important in cities. Thus, the majority of the passage discusses the mutually beneficial relationship between trees and humans, making (B) the correct choice.

2) **⇒** A

Choice (A) is correct because the final paragraph mentions efforts by “seventh and eighth graders in Ohio” and “citizen scientists” in Europe to improve trees’ health by identifying pathogens. Thus, the efforts described are international (they take place in America and Europe) and available to non-scientists (they are performed by students and Facebook users).

### Question Topic 007: Organization

1) **➡** A

The first half of the passage serves as a disclaimer; this is best evidenced in lines 1 – 3 (“I do not deny the possibility of the existence of a great sea serpent...”). But the author then turns to his purpose: “And yet I am obliged to say...most firmly and assuredly,” where he explains “sea monster” sightings.

2) **➡** D

The author introduces the primary contrast of the passage when he writes, “we now possess a key to the mystery which Archdeacon Deinbolt...had not access to.” The author then proceeds to explain the “key to the mystery” (recent knowledge), making (D) the most appropriate choice.

### Question Topic 008: Tone and Attitude

1) **➡** C

The author’s diction indicates a scholarly, level-headed approach when discussing the house. He entertains the possibility that the house’s danger arises from the fact that it is “plainly unhealthy” while also mentioning the “darker, vaguer surmises” of others. He discusses facts and describes “what was really beyond dispute.” Moreover, we can presume that the author is fascinated by the house because of how much research he conducts into the house’s history.

2) **➡** B

The author’s academic interest can be surmised based on how many sources he consulted concerning the house’s history. He mentions claims about the house from when he was young, the research conducted by his uncle, and opinions from members of the community. Moreover, because no one knows why so many people have died in the aforementioned house, we can safely say the author is investigating a mysterious subject.

3) **➡** A

With the exceptions of lines 6 – 8, the author does not mention any instances of people attributing the house’s danger to superstitious or folkloric causes.

Thus, the addition of lines 6 – 8 primarily serves to introduce an element of superstition into the author’s investigation of the house.

### Question Topic 009: Graphics and Text Synthesis

1) **➡** B

The correct choice must be completely supported by the graph. Since two-thirds of 100 is close to 66, the information in (B) is accurate based on the graph. Other choices incorrectly interpret the information. (A) includes information on the total number of people graduating, which cannot be supported because the graph displays percentages of students, not total number of students. (C) is factually incorrect because the “Total” for “All Institutions” is 59 percent, so the majority of college students do earn bachelor’s degrees within 6 years. (D) is incorrect because we cannot determine how easy a type of school is based on graduation rates.

2) **➡** C

The passage claims that a lack of resources “both monetary and non-monetary” at public universities play “a central role in explaining the decrease in completion rates.” This information is supported by the graph, which demonstrates that, other than private for-profit universities, public institutions have the lowest graduation rates.

### Question Topic 010: Multiple-Text Synthesis

1) **➡** A

Locke proposes that people are born with minds like “white paper,” and that all knowledge and characteristics come from experience. Thus, it follows that Locke would maintain that a savage child learned to be so through his or her experiences, making (A) the correct choice.

2) **➡** C

The author of passage 1 claims that humans are completely shaped by experience, whereas the author of passage 2 maintains that humans are driven by an “original nature” that is savage unless taught to be civilized. Therefore, the author of passage 2 presents a different hypothesis on the same topic, refuting the author of passage 1.

**Mastering*****The Writing and Language Test*****1****STRUCTURING SENTENCES**

Section A: Clauses	50
Section B: Phrases	56
Section C: Verb Tense	62
Section D: Mood and Voice	66
Section E: Comparing & Listing	71
Section F: In-Sentence Punctuation	75

**2****CORRECTING GRAMMAR MISTAKES**

Section G: Subject-Verb Agreement	82
Section H: Pronouns	88
Section I: Commonly Confused Words	95
Section J: Additional Topics	100

**3****IMPROVING STYLE AND STRUCTURE**

Section K: Development & Organization	103
Section L: Concision, Style, & Syntax	108



## Writing and Language Test Basics

### A. Breaking Down the Writing and Language Passages

The SAT Writing and Language Test consists of four reading passages. Each passage is accompanied by eleven multiple-choice questions. One or two of the reading passages will include supplementary materials, such as tables, charts, or graphs, that display information relevant to the passage's topic.

The SAT Writing and Language Test will always contain the following:

- One career-related passage
- One science passage
- One history/social science passage
- One literature/humanities passage

### B. Introducing Writing and Language Passages

Each multiple-choice question will have four answer choices, and each question will have only one correct answer. As with other sections of the SAT, you will not be penalized for incorrect answers.

Certain types of questions will appear in nearly every set of questions. Generally, a question set will include two vocabulary questions, and each passage with an associated table, chart, or graph will contain questions regarding the relationship between the passage and the visual. The overall breakdown of questions on the Writing and Language Test is as follows:

- Approximately 55 percent of questions relate to the structure, style, or precision of the passage. These questions do not necessarily ask you to fix grammatical errors; rather, they require you to improve the *quality* and *clarity* of the passage as a whole.
- Approximately 45 percent of questions relate to locating and fixing grammatical errors within the passage. Thus, a strong understanding of English grammar and the ability to spot grammatical mistakes are crucial to mastering the Writing and Language Test.

### C. Getting to the Root of the Problem

As a whole, the Writing and Language Test will test your knowledge of dozens of grammatical and stylistic concepts, but each multiple-choice question will only test one or two concepts. Thus, one of your first priorities when answering Writing and Language Test questions should be determining which *specific* concept or concepts a question is testing. Doing so will allow you to apply an appropriate rule or strategy to each question, taking the guesswork out of answering the question.

---

- **Use the underlined text to determine what is being tested.**

If the underlined text is an entire sentence, the corresponding question will likely be testing your knowledge of sentence structures or your organizational abilities. If the underlined text is a single word or a phrase, it could be testing vocabulary.

- **Use the answer choices to determine what is being tested.**

Before selecting an answer, look carefully at all of your choices. Determine what part or parts of the answers change from choice to choice. For example, if one answer choice contains a comma, and another a semicolon, you can be fairly certain the question is testing punctuation. Or, if one answer choice replaces "it" with "they," you can be fairly certain that the question is testing your knowledge of pronouns.

- **Use the information around the underlined portion.**

Use the passage as a whole and the sentences just before and after underlined portions to double-check your answers. Ensure that the choice you have selected fits the context of the passage and the paragraph.



# CHAPTER 2

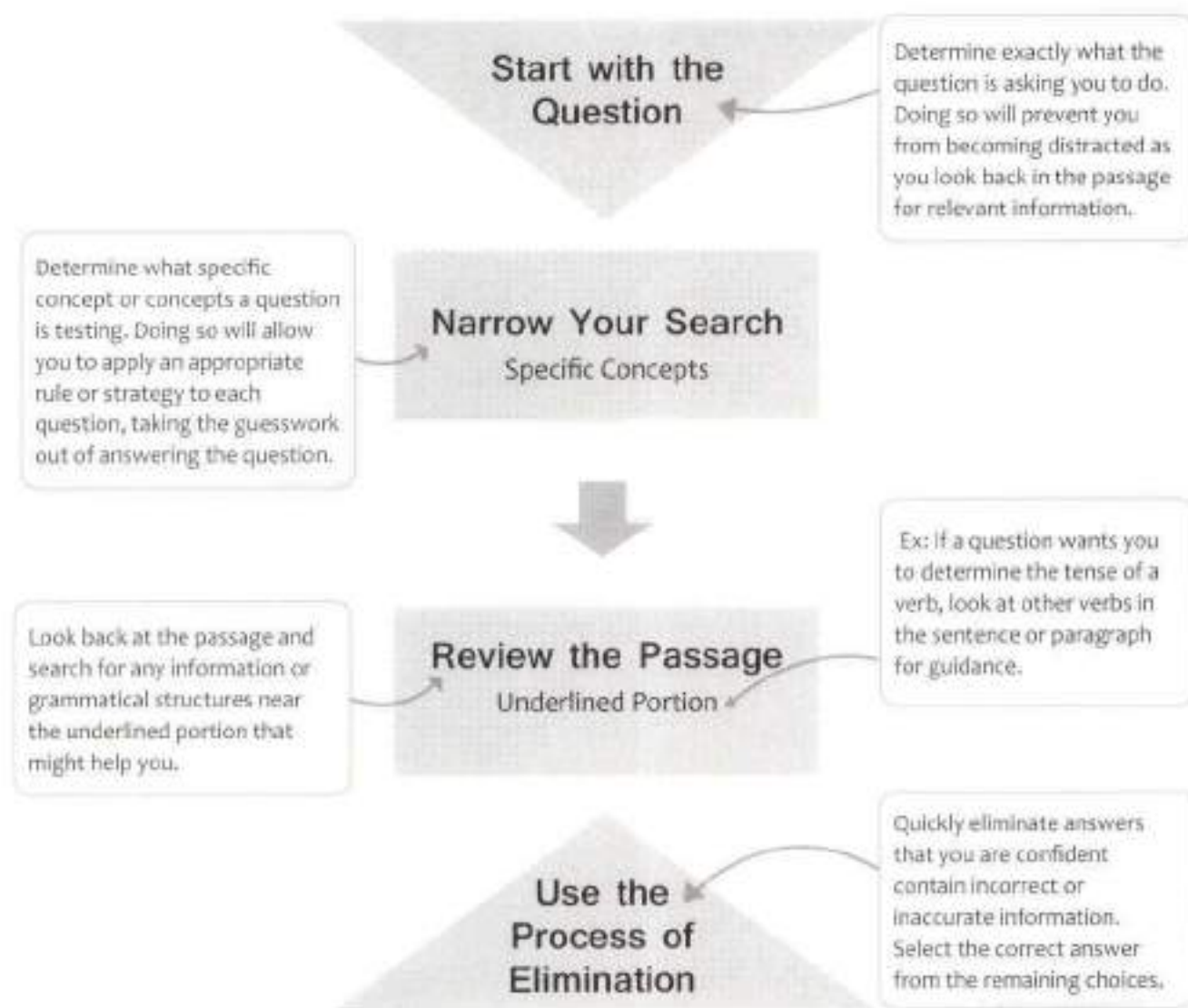
Mastering the Writing and Language Test

## Writing & Language Test PATTERN Approach

Going into any test with a strategy in mind will reduce test anxiety and boost confidence. You can actively develop a strategy using the following pattern approach to fine-tune your effectiveness.



### PATTERN Approach



# Structuring Sentences

## SENTENCE STRUCTURE

- 1 Subjects and predicates are like actors and actions in a film. Subjects are the ones who do something; predicates include the abstract ideas of what they do and what they are like.

Subject	Predicate
The “who” or the “what” that is either doing something or is being described	From the Latin word “proclaim,” the predicate describes what the subject does or what the subject is like

**I believe a leaf of grass is no less than the journey-work of the stars.** –Walt Whitman

Subject (I) + Predicate (believe a leaf of grass is no less than the journey-work of the stars.)

*“I” is the subject because it is doing something. The rest of the sentence is the predicate because it describes what the subject is doing: believing.*

**Suspicion always haunts the guilty mind.** –William Shakespeare

Subject (Suspicion) + predicate (always haunts the guilty mind.)

*“Suspicion” is the subject, because it is doing something. The rest of the sentence is the predicate because it describes what suspicion does: always haunting.*

- 2 Subjects and Predicates can become difficult to sort out when the writer adds clauses, prepositional phrases, adverbs, and so on.

**Change in all things is sweet.** –Aristotle

Subject (Change in all things) + Predicate (is sweet.)

*In this case, the subject includes a prepositional phrase (“in all things”) but is still a single concept. The predicate describes what the subject of the sentence is like. In this case, the subject—“change”—“is sweet.”*

**My aim is to put down on paper what I see and what I feel in the best and simplest way.**  
–Ernest Hemingway

Subject (My aim) + Predicate (is to put down on paper what I see and what I feel in the best and simplest way.)

*Although Hemingway uses “I see” and “I feel” in the predicate, the subject is “My aim.” The rest of the sentence is the predicate and describes “My aim.”*



# CHAPTER 2

Mastering the Writing and Language Test

## Section A: Clauses

Most spoken communication does not consist of simple subject-predicate expressions. Rather, it spans the spectrum from long and complicated to short and elliptical. Yet spoken communication is effective because we supplement our words with natural pauses, facial expressions, and gestures. With our voices, we indicate meaning through tone, volume, and emphasis.

Written language, however, must rely solely on diction, sentence structure, and punctuation. Understanding some of the basic “chunks” of sentences—such as **clauses**—can help you identify and correct confusion and errors.

### INDEPENDENT AND DEPENDENT CLAUSES

- ▶ A **clause** is a group of words containing a subject and a verb. An independent clause can stand on its own as a sentence while a dependent clause cannot. Structurally, the only difference between the two types of clauses is that a dependent clause begins with a subordinate conjunction while an independent clause does not.
- ▶ **Subordinate conjunctions** show that one event is a result of another, or that one event depends on another event. Some of the most common subordinate conjunctions are (al)though, because, if, since, that, when, whether, and while. Let's look at how adding a subordinating conjunction to a clause changes its structure and meaning.

INDEPENDENT CLAUSE	SUBORDINATE CONJUNCTION	DEPENDENT CLAUSE
John is very tired	because	because John is very tired
the dog plays with its owner	while	while the dog plays with its owner
swimming is great exercise	although	although swimming is great exercise
the car is expensive	if	if the car is expensive

Notice how the examples in the Independent Clause column could be complete sentences given proper capitalization and punctuation. The examples in the Subordinate Clause column are all fragments that do not express a complete thought.

### DESCRIPTION

You have probably been hearing about “checking for complete sentences” since elementary school. As you know, a complete sentence includes a subject and a predicate. Incomplete sentences are called “fragments,” and sentences that ignore necessary punctuation are called “run-ons.” Sentence fragments need finishing, and run-on sentences need punctuation.

### Example

I have always loved playing **1** soccer I do not play on a team.

(A) NO CHANGE

(B) soccer, not

(C) soccer when possible, not

(D) soccer, but I do not



### Explanation:

The correct choice is (D) because it is the only choice that provides a natural pause between thoughts, a clear relationship between ideas, and a complete thought.

### Sentence Fragments

- Some sentences are fragments because they lack a subject and/or a verb.

**Fragment sentence:** Right in front of me.

**Complete sentence:** *A ball rolled* right in front of me.

- Other fragments have all the components of a complete sentence, but they begin with a subordinate conjunction, making them incomplete thoughts that require an independent clause to be complete:

**Fragment sentence:** Even though I kicked the ball gently.

**Complete sentence:** Even though I kicked the ball gently, *it bounced down the street.*

### Run-on Sentences

- Many run-on sentences result from mispunctuation and unnecessary wordiness. When possible, rephrase run-ons to reduce wordiness and ensure that punctuation clarifies rather than confuses.

**Run-on sentence:** A child came barreling toward me the child was panting as he said “Hey!”

**Complete Sentence:** A child came barreling toward me, *panting as he said, “Hey!”*

**DESCRIPTION**

Sentences containing an independent clause as well as a dependent clause are called **complex sentences**. When a sentence contains an independent clause and a dependent clause, the order in which the clauses are presented determines whether a comma must come between them.

**Complex Sentence Structures**

Dependent Clause + Comma (,) + Independent Clause + Period (.)

Independent Clause + Dependent Clause + Period (.)

**Example**

Morgan and Andy always enjoy **1** traveling—once they are actually on the road.

(A) NO CHANGE

(B) traveling once

(C) traveling; once

(D) traveling. Once

**Explanation:**

Choice (B) is correct because the example sentence above consists of an independent clause followed by a dependent clause, so no punctuation is needed between clauses.

- ▶ A dependent clause that precedes an independent clause is set apart by a comma.

*Before you speak, take a deep breath.*

*Wherever they looked, they saw lion footprints.*

*As soon as the diamond ring hit the water, he regretted throwing it.*

- ▶ A dependent clause that comes after an independent clause does not need to be set apart by a comma.

*Take a deep breath before you speak.*

*They saw lion footprints wherever they looked.*

*He regretted throwing the diamond ring as soon as it hit the water.*

- ▶ However, in long, convoluted sentences containing the structure outlined above, add a comma between independent and dependent clauses if doing so improves the clarity of the sentence.

*Freed from all obligations, Darla and Connie decided to take a long road trip to an undecided location, even though they hardly had enough money for a full tank of gas.*

**DESCRIPTION**

When a sentence contains more than one independent clause, each with a different subject, it is called a **compound sentence**. As discussed earlier, independent clauses can stand on their own as sentences given proper capitalization and punctuation, but they can also coexist in a sentence provided that they are separated by the proper punctuation.

Sentences containing two independent clauses with the same subject are not generally considered compound sentences, but they are formed using the same punctuation, which is outlined below.

**Compound Sentence Structures:**

Independent Clause + Semicolon (;) + Independent Clause + Period (.)

Independent Clause + Comma (,) + Coordinating Conjunction + Independent Clause + Period (.)

**Example**

We had never seen a waterfall in this **I** canyon, my sister did not believe that one existed.

(A) NO CHANGE

(B) canyon so my sister

(C) canyon; my sister

(D) canyon; and my sister

**Explanation:**

The correct choice is (C) because a semicolon accurately joins two independent clauses. Choice (D), however, is incorrect because semicolons are not customarily followed by coordinating conjunctions (in this case "and").

- ▶ Separate independent clauses that appear in the same sentence with a semicolon when the ideas in the two clauses have a relationship that does not need to be explained with a conjunction:

We stepped into the creek; small fish swam around our feet.

The rocks were slippery; we picked our way carefully.

- ▶ Separate independent clauses that appear in the same sentence with a comma followed by a coordinating conjunction to clarify the relationship between the ideas in the two clauses:

We walked upstream for hours, *for* the creek provided the clearest path. Sunlight filtered through the trees, *and* birds sang.

**TEACHER'S TIP**

If you are having trouble memorizing the coordinating conjunctions, use the acronym FANBOYS:

For And Nor But Or Yet So

**DESCRIPTION**

In some sentences, one subject will perform multiple actions. These sentences are said to have **compound verbs**. How these sentences are punctuated depends on whether the subject is mentioned more than once in the sentence.

**Example**

We scrambled over and around **1** boulders and we reached a bend in the creek.

(A) NO CHANGE

(C) boulders, we

(B) boulder; and then we

(D) boulders and

**Explanation:**

Choice (D) is correct; the subject of the sentence, "we," does not need to be repeated between actions ("scrambled" and "reached"). If it is not repeated, no punctuation is necessary between verbs.

- ▶ If the subject is repeated between verbs, which have been italicized in the examples below, then the sentence contains two independent clauses and must be punctuated with a semicolon or a comma and a coordinating conjunction. It can also be split into two sentences.

**Compound Sentence:** We *spotted* the waterfall; we *decided* it was not within walking distance.

**Compound Sentence:** We *spotted* the waterfall, but we *decided* it was not within walking distance.

**Two Sentences:** We *spotted* the waterfall. We *decided* it was not within walking distance.

- ▶ The examples above can also be written **without repeating the subject**. This produces a shorter, more concise sentence:

**Compound Verbs:** We *spotted* the waterfall but *decided* it was not within walking distance.



Read the passage and answer the corresponding questions.

## PASSAGE

## Shackleton's Journey

In January of 1915, a British ship crossed the South Atlantic Ocean toward Antarctica. It contained a crew of 27 men led by Ernest Shackleton. After becoming stuck when the seawater

**1** froze solid they gave up on their goal of reaching land and crossing the polar continent on foot.

The crew lived in the ship, going out on the ice to hunt seals and penguins. They waited for the ice to melt enough so that their ship could float. It was hugely disappointing when, after nine months, the wooden ship began to crack under the pressure of the ice. By November, the ship had sunk. The men camped on ice floes until April, hoping to drift to an island. When their ice floe **2** cracked in half, they had no choice but to get into three small wooden lifeboats. They were at sea for a **3** week before they managed to reach the tiny Elephant Island, which was uninhabited, barren, and snow-covered.

Leaving most of the men camped under two overturned lifeboats, Shackleton and five other men got back in the third lifeboat and headed out again. **4** After becoming caught in a hurricane. After 16 harrowing days, they managed to land on an island where they knew there was a whaling station on the other side. Three of them hiked through snow without sleeping for 36 hours to reach the whaling **5** station and when they reached it, they sent help back for the men on the other side of the island. Almost immediately, Shackleton made rescue attempts for the rest of the men as well. He borrowed ships to reach the men on Elephant Island three **6** times. He had to turn back because of icy waters. During his fourth attempt, on August 30, 1916, Shackleton reached the men and rescued them. Amazingly, the entire crew survived the ordeal.

1

- (A) NO CHANGE  
(B) froze solid, they gave up

2

- (A) NO CHANGE  
(B) cracked in half they

3

- (A) NO CHANGE  
(B) week, before they managed

4

- (A) NO CHANGE  
(B) They were caught

5

- (A) NO CHANGE  
(B) station. When they

6

- (A) NO CHANGE  
(B) times but had to turn back





## Section B: Phrases

As discussed in the previous section, a clause is a group of words containing a subject and a verb. A **phrase** is a group of words that conveys an idea but does not contain a subject and a verb. Thus, on their own, phrases cannot be complete sentences.

Let's look at how some of the most common types of phrases fit into sentences.

### **015** Question Topic

#### PREPOSITIONAL PHRASES

##### DESCRIPTION

**Prepositional phrases** begin with prepositions and end with their objects. In the sentence, "Brian offered carrots to the horse," the prepositional phrase is "to the horse." A **preposition** helps clarify the relationship between a subject and a verb in a sentence. For example, prepositions such as *over*, *beneath*, *under*, *behind*, *outside*, *in*, *on*, *between*, and *through* indicate **spatial** relationships. Prepositions such as *from*, *before*, *since*, and *after* indicate **temporal** relationships. And prepositions such as *by*, *for*, *with*, *from*, and *to* mainly describe **logical** relationships. Selecting the most precise preposition clarifies meaning.

##### Example

Jade boarded a ship **1** of Shanghai.

- (A) NO CHANGE      (C) to Shanghai.  
(B) into Shanghai.      (D) through Shanghai.



##### Explanation:

The correct choice is (C), because it indicates the direction (a spatial relationship) in which the ship to Shanghai is going.

- ▶ Unless they begin a sentence, prepositional phrases are not usually separated from the rest of the sentence by punctuation. However, longer prepositional phrases that introduce a sentence must be followed by a comma. The following sentence includes three prepositional phrases, but only the introductory phrase needs a comma to avoid confusion.

*After conquering the English Channel, the ocean swim team made plans for a relay swim that involved swimming across the Santa Barbara Channel.*

- ▶ Some authors sometimes choose not to punctuate **introductory** prepositional phrases when they are short—usually four words or less, as in the following sentence.

*In a day an orca may swim 100 miles or more.*

- 
- Prepositional phrases arranged in a list must be separated by commas, as with any list:

Visitors flooded the city for the event, arriving *by car, by train, and by plane*.

The legendary city is located *across the sea, through the swamp, and around the mountain*.

- Prepositional phrases beginning with “of” have two possible functions:

- They show that something is part of a whole.

As the *eye of the storm* passed over the town, the torrential rain became a light drizzle.

*The prepositional phrase tells us that “the eye” is part of “the storm.”*

- They provide information about what comprises something.

The flock *of sparrows* moved as one, darting and weaving on ever-changing wind currents.

*The prepositional phrase tells us that “The flock” is made up “of sparrows.”*

# 016 Question Topic

## APPOSITIVE PHRASES

### DESCRIPTION

An **appositive** is a noun or noun phrase that identifies or describes another noun that appears immediately before or after it. Appositive phrases need to be separated from the rest of a sentence with commas, parentheses, or em dashes. Additionally, as explained in this topic, appositives differ in subtle but important ways from titles.

### Example

A documentary **1** filmmaker Madison Pace decided to try making a fictional film.

(A) NO CHANGE

(C) filmmaker;

(B) filmmaker,

(D) filmmaker such as



### Explanation:

The phrase “a documentary filmmaker” describes Madison Pace, and it begins with the article “a.” Thus, it is an appositive phrase. It must be separated from the rest of the sentence with a comma, so the correct choice is (B).

### Punctuating Appositives

- ▶ Each of the examples below uses appropriate punctuation to separate the appositive phrase from the rest of the sentence.

I would like you to meet my friend, *the finest musician around*.

The teacher (*the only person not sleeping by the end of the lecture*) looked up in surprise.

He held out a flower—*a sweet pea*—as she walked toward him.

### Titles vs. Appositives

- ▶ You must be able to differentiate between a **title** and an **appositive**. If a title appears before the noun it labels with no articles (“a,” “an,” and “the”), the title should not be separated from the noun by any punctuation.

**Title:** The music of *iconic jazz musician* Louis Armstrong remains popular even today.

**Appositive:** The music of Louis Armstrong, *an iconic jazz musician*, remains popular even today.

*In the first example, “iconic jazz musician” acts as Louis Armstrong’s title. Thus, it is not separated from the rest of the sentence by any punctuation. In the second example, the same information is an appositive that comes after the noun it describes, so the information must be set apart from the rest of the sentence with commas.*

- ▶ Remember, the difference between a title and an appositive is as small as an article (“a,” “an,” and “the”).

**Title:** *Famous explorer* Marco Polo introduced aspects of Mongolian and Chinese culture to Europe.

**Appositive:** *A famous explorer*, Marco Polo introduced aspects of Mongolian and Chinese culture to Europe.

**DESCRIPTION**

Participial phrases begin with “participles,” which look like verbs but act as modifiers. Participial phrases can compress information and help create concise sentences. They usually serve to describe the subject of the sentence, but in some cases they describe other nouns.

**Example**

**I** While believing it could win someday, the team continued to enter tournaments.

(A) NO CHANGE

(B) Believed to win

(C) While believing in winning

(D) Believing it could win

**Explanation:**

The correct choice is (D) because “Believing it could win someday” clearly describes “the team,” the subject of the sentence.

**Forming Participial Phrases**

- **Present participles** end in “-ing.” They indicate that a condition or action relates to the subject.

*Sweeping down the canyon of skyscrapers, the wind* turned my umbrella inside-out.

The participle “sweeping” describes an action taken by the wind, which is the subject.

- **Past participles** often end in “-ed” or “-en.” They indicate that the subject is the recipient of a condition or action.

*Isaiah finally arrived home, soaked to the bone.*

The participle “soaked” describes the subject, “Isaiah,” who has been soaked by something, most likely rain.

**Punctuating Participial Phrases**

- In most cases, participial phrases should be separated from the rest of a sentence by commas, especially when they serve as an introductory phrase:

*Determined to tackle the problem first thing in the morning,* the detectives went home.

- If a comma causes confusion about which noun the phrase is modifying, eliminate the comma:

**Confusing:** The waves slid gently toward the children, *wriggling their feet in the sand.*

**Clear:** The waves slid gently toward the children *wriggling their feet in the sand.*

A comma before the participial phrase “wriggling their feet” creates confusion because the phrase seems to apply to the waves. The author clearly wants to indicate that the children are wriggling their feet, not the waves, which is more clearly implied by removing the comma.

# 018 Question Topic

## DANGLING MODIFIERS

### DESCRIPTION

Whether it be a single word or an entire phrase, a modifier provides description. Where a modifier is placed in a sentence determines *what* it modifies. A “dangling modifier” comes at the beginning of a sentence and fails to modify its intended term. Usually, dangling modifiers form when a writer fails to mention the intended subject of the sentence.

### Example

With no warning, **1** the couch became a launching pad to the bookcase.

(A) NO CHANGE

(B) the couch was used as a launching pad

(C) the kitten launched from the couch

(D) the couch launched the kitten



### Explanation:

The phrase “With no warning” is left dangling. It cannot refer to the couch, as couches cannot give warnings. The correct choice is (C), which correctly makes the kitten the sentence’s subject.

- ▶ When a description comes at the beginning of a sentence, make sure the thing being described is the subject of that sentence.

**Incorrect:** Daringly, experiments near the edge of the volcano began.

*Experiments cannot be daring. The sentence must explain who daringly began the experiments.*

**Correct:** Daringly, *graduate students* began experiments near the edge of the volcano.

**Incorrect:** Turning the corner, the imposing bank building came into view.

*Bank buildings cannot turn corners. The subject must explain who was “Turning the corner.”*

**Correct:** Turning the corner, *the bank robber* saw the imposing bank building.



Read the passage and answer the corresponding questions.

## PASSAGE

### The Romance of the Three Kingdoms

The classic Chinese historical novel, *The Romance of the Three Kingdoms*, includes the tale of a particularly wily character who outsmarts powerful men. In the tale,

**1** Zhou Yu, a military general, is searching for a pretext to get rid of his rival, the clever Zhuge Liang. So, he asks Zhuge Liang to pledge to produce 100,000 arrows within 10 days or give his life. To General Zhou Yu's **2** surprise Zhuge Liang replies, "Oh, I only need three days for that."

To ensure Zhuge Liang's failure, Zhou Yu orders that no one should provide Zhuge Liang with any arrow-making supplies. **3** Appeared unconcerned, Zhuge Liang arranges to have 20 boats on the nearby river covered in bunches of straw, but he does nothing else. On the third night, fog sets in. Zhuge Liang and some soldiers row the straw-covered boats upstream to the camps of the **4** enemy—the forces of Cao Cao. Just before daylight, Zhuge Liang orders the soldiers to begin pounding war drums and start shouting. The enemy mistakenly thinks it is a surprise attack, and enemy archers shoot across the dark, misty river. Their arrows **5** stick, in the straw. Zhuge Liang then directs the boats to turn around, and arrows stick in the other sides. Speeding away as daylight breaks, **6** arrows bristle by the thousands. The men aboard chant, "Thanks for the arrows, Cao Cao!" In this way, Zhuge Liang sidesteps the internal plot against him and also depletes the enemy's resources.

1

- (A) NO CHANGE  
(B) Zhou Yu, a military general is searching

2

- (A) NO CHANGE  
(B) surprise, Zhuge Liang

3

- (A) NO CHANGE  
(B) Appearing unconcerned, Zhuge Liang

4

- (A) NO CHANGE  
(B) enemy the

5

- (A) NO CHANGE  
(B) stick in the straw

6

- (A) NO CHANGE  
(B) the boats bristle with arrows

# CHAPTER 2

Mastering the Writing and Language Test

## Section C: Verb Tense

While you may have little need to know the *terms* for verb tenses and aspects (past, present, future, perfect, progressive, conditional, and so on), you should have a clear idea of when and how to use them. On the Writing and Language Test, expect several questions about verb tense and aspect. Common sense will guide you in answering such questions, but let us review a few general rules for tricky situations.

### 019 Question Topic

#### CONSISTENT TENSES

##### DESCRIPTION

Writing with **consistent tenses** means making sure that the verbs clearly indicate *when* something occurs or takes place. Often, sentences must use the same tense throughout in order to make sense.

**Past:** Yesterday I *sat* on the beach and *watched* people surf.

**Present Progressive:** Right now I *am sitting* on the beach and *watching* people surf.

**Future:** Tomorrow I *will sit* on the beach and *watch* people surf.

*In sentences with compound verbs (as in the examples above), auxiliary verbs such as "am" and "will" do not need to be repeated.*

##### Example

Ryan and Kayla sat next to each other in almost every class. He was left-handed and she was right-handed, a difference which, no doubt, **1** has resulted in many bumped elbows.

(A) NO CHANGE

(B) resulted

(C) has been resulting

(D) would result



*Explanation:*

*The correct choice is (B) because "resulted" is consistent with "was." Both are in the simple past tense, which makes sense in this sentence.*

##### Processes and Routines

- ▶ Processes (often scientific facts), routines, and universal truths are generally written using the simple present tense.

**Process:** Humpback whales *migrate* up to 25,000 kilometers each year to breed and find food.

**Process:** The Earth *completes* one orbit around the Sun every 365 days.

**Routine:** On most days, Jacob *wakes* up at 8:00 am and *eats* cereal for breakfast.

**Universal Truth:** The only constant in life *is* change.

### Literary Present

- ▶ Ideas and stories exist in a timeless plane. Descriptions of art and summaries of plot in literature are usually expressed using the simple present tense. Analysis of art and literature and what an author is expressing are described using the simple present tense, as well.

In the play, Aristophanes essentially *voices* his opposition to the war between Athens and Sparta.

- ▶ When writing about an author who is writing history, the literary present is only used when discussing the author:

The author *claims* that the ancient Greeks *loved* comedy.

*The author's claims are in the literary present, but saying that ancient Greeks "love" comedy is paradoxical.*

### Interrupted actions

- ▶ One case in which verbs do not appear to be consistent is when an ongoing activity is interrupted.

I **was sitting** on the beach, **watching** people surf, when I **heard** a shout.

*The past-progressive tense ("was sitting" and "watching") is interrupted by an event ("heard").*

### Conditional Statements

- ▶ Conditional statements describe something that will or would happen under a certain condition. The condition is usually introduced by "if."

- Conditions that are likely to occur are expressed by **present-tense condition + "will"**:

*If x + present tense verb, y will occur. OR Y will occur if x + present tense verb.*

*If the bases are loaded, the pitcher will often throw a fastball.*

*If she is in the choir performance, I will go.*

*An alarm will sound if you open that door.*

*The epidemic will subside if researchers find a vaccination.*

- Conditionals also express what *would* happen in hypothetical situations; in this case, they are expressed by **past tense condition + "would" or "could"**:

*If x + past tense verb, y would occur. OR Y would occur if x + past tense verb.*

*If the bases were loaded now, the infield players would shift in a bit.*

*If she was in the choir performance, I would go.*

*An alarm would sound if you opened that door.*

*The epidemic would subside if researchers found a vaccination.*



## REPORTED SPEECH

## DESCRIPTION

Reported speech tells a reader what someone said without directly quoting the person. Reported speech is usually in the past tense or conditional mood because the information it reports was spoken in the past.

## Example

Yesterday Troy asserted that he **1** is too distracted to do his homework.

(A) NO CHANGE

(B) is feeling too distracted

(C) will be too distracted

(D) was too distracted



## Explanation:

Choice (D) is correct because the “asserting” took place in the past, so the rest of the verbs must be in the past in order to make sense.

- ▶ Reported speech does not require the same punctuation as does quoted speech. As the examples below demonstrate, reported speech is not set apart by commas or quotation marks. However, reported speech is always preceded by the word “that.”

## SPEECH

“I *am* never surprised by anything.”

“The party *will be* noisy.”

## REPORTED SPEECH

She *said* that she *was* never surprised by anything.

He *said* that the party *would be* noisy.

- ▶ However, when reporting speech, use common sense. The sentences below give some exceptions to the rules outlined above:

Just now she *said* that she *is* green with envy.

*She probably still feels that way because she said that “just now.”*

The doctor *said* that vegetables *are* good for health.

*It would sound strange to say that vegetables were good for health. That vegetables are good for health is a universal truth.*



Read the passage and answer the corresponding questions.

## PASSAGE

## SERVICE ANIMALS

When I was in high school, I decided to become a trainer for service animals. My high school counselor called it a meaningful career because service animals, mainly dogs, **1 helped** people with disabilities live more independently. I decided to major in Animal Behavior in college.

For a class assignment, I visited a dog-training center. The trainers patiently **2 coax** the dogs to use their noses and mouths to undertake many tasks. For example, a trainer pointed to a Post-it on a door. She put her finger on it and prompted the curious dog to investigate the Post-it with its nose, at which point she gave the dog a treat. Gradually, the dog learned to touch the Post-it with its nose in order to get a treat, and then the trainer opened the door a bit. The dog began to get treats if it touched the Post-it with a little push of the nose. The trainer said that eventually the dog **3 would** learn to push the door shut without a Post-it.

During my career, I will be excited if service-animal organizations **4 will put** more resources into training capuchin monkeys as service animals. I have read that the little primates **5 are** very helpful to people who are housebound because of weakness or paralysis. Monkeys are intelligent and have opposable thumbs, so they can do many tasks around the house based on verbal skills and laser pointers. For example, they can unscrew lids or caps, turn pages of magazines, and operate televisions and DVD players. They may be able to check that their owners' limbs **6 are supported**. As with dogs, capuchin monkeys also provide good company and affection.

1

- (A) NO CHANGE  
(B) help

2

- (A) NO CHANGE  
(B) coaxed

3

- (A) NO CHANGE  
(B) will

4

- (A) NO CHANGE  
(B) put

5

- (A) NO CHANGE  
(B) were

6

- (A) NO CHANGE  
(B) would be supported

## Section D: Mood and Voice

Language must be flexible enough to express many varieties of meaning. When evaluating text, check to make sure that the text's mood and voice fit the author's purpose and do not create confusion.

### 021 Question Topic

→ **MOOD**

**DESCRIPTION**

Every sentence possesses a quality called **mood**, which refers to an author's intentions when writing a sentence. In addition to conveying intent, a sentence's mood affects the sentence's word order.

**Example**

Joelle said that if she **1** is president for a day, she would give more government funding to NASA.

(A) NO CHANGE

(B) was

(C) was being

(D) were



**Explanation:**

The correct choice is (D) because it correctly conjugates the verb "to be" to show that the sentence's mood is subjunctive (the sentence describes a condition not likely to come true).

INDICATIVE MOOD	IMPERATIVE MOOD	SUBJUNCTIVE MOOD
Provides facts or opinions	Gives a command	Expresses doubts, wishes, demands
Asks questions	Makes a request	Refers to the non-factual
Ex: I think I see an owl.	Ex: Look at that owl!	Ex: I wish the owl were visible.

In English, subjunctive patterns are only discernible in a few specific situations.

- Present-tense phrases about requirements or preferences using "that" are in the subjunctive; the verb must be in the "base form," which means it is the simplest form, with no special ending. For example, the base form of the verb "to speak" is "speak."

- The subjunctive difference is only noticeable when the subject is in the third-person singular because there is no “-s” or “-es” verb ending:

[It is important, etc.] THAT + *[third-person singular noun]* + **[base form of verb]**.

**Indicative sentence:** *Everyone stays* together.

**Subjunctive sentence:** It is preferable that *everyone stay* together.

**Indicative sentence:** *Her son goes* to a tutoring center.

**Subjunctive sentence:** Antonia insisted that *her son go* to a tutoring center.

- ▶ When forming the subjunctive mood, only the base form of the verb “to be” is used, regardless of whether the subject is singular or plural:

[It is important, etc.] THAT + *[singular or plural noun or pronoun]* + **[be \_\_\_\_\_]**.

It is crucial that *all the hikers be* warmly dressed.

Is it essential that *we be* at the meeting?

The producer insisted that *the scene be included* in the film.

I recommend that *violin music be playing* in the background as the guests arrive.

- ▶ Negative statements in the subjunctive mood add “not” to the base form of the verb:

[It is important, etc.] THAT + *[singular or plural noun or pronoun]* + **[not be, not go, not say, etc. \_\_\_\_\_]**.

The source preferred that *we not reveal* his name.

Fans turned to social media to demand that *the show not be cut*.

- ▶ Subjunctive verb forms in conditional statements (“if condition *x*, then *y*”) imply that a condition is not a realistic possibility. The subjunctive is noticeable in the past tense, when it replaces the use of “was” with “were.”

If + *[singular noun or pronoun]* + **[were \_\_\_\_\_]**, [result with “would” or “could”].

If *I were* a bird, I would fly to Hawaii.

If *Shakespeare were* alive today, he would probably make films.

If *my mother were* here, she would know what to say.

- Conditional statements with “should” or “could” and a subjunctive verb sound formal.  
If + *[noun or pronoun]* + **SHOULD + [base form of verb], \_\_\_\_\_**.  
If *she should change* her mind in the next hour, she could still come with us.  
If *anyone should have* a question, please email it to me.
- Inverted conditional statements using the subjunctive eliminate the need for “if.”  
**Should/Were [subject] + [verb], [result]**.  
**Should you notice** any billing discrepancies, please contact the company at once.  
**Should your friend need** a place to stay, he is welcome here.  
**Were the statue to come to life**, we could ask it who made it, and why.
- To speculate about how things might be different now if something had happened differently in the past, it is possible to use the conditional: “If we had sold our invention, we would be rich now.” It is

also possible to express such ideas using the “pluperfect” form of the subjunctive.

Had + [subject] + [past participle], [probable result].

Had we sold our invention, we would be rich now.

Had dinosaurs survived, mammals may not have developed.

Had I done my homework, I would have aced the test.

## 022 Question Topic

### VOICE

#### DESCRIPTION

Every sentence has **voice**. A sentence’s voice primarily communicates the relationship between the subject, verb, and object (if any) of the sentence.

#### Example

1 The college has been attended by thousands of students.

- (A) NO CHANGE
- (B) Thousands of students have attended the college.
- (C) Thousands of students were being attended to by the college.
- (D) The college always has thousands of students in attendance.



#### Explanation:

As written, the statement is in the **passive voice**, which is usually not as desirable as the **active voice**. The three alternative choices are all in the **active voice**, but only (B) conveys the same information, so it is the best answer.

► In English, the subject of a sentence usually comes before the action. That way, the listener or reader knows who performed the action. This structure is called the **active voice**.

**Emily baked** cookies.

*This sentence is active because the subject (Emily) is the one performing the action (baking).*

► The **passive voice** either places the subject after the action or leaves the subject out. Often, using the passive voice makes a sentence unclear, unnecessarily wordy, or both. The following examples demonstrates how to improve some common passive voice sentence structures by making the sentences active:

---

**Passive:** The cookies **were eaten** by Emily's brothers.

*Often, when a sentence claims that something was done by someone, the sentence can be easily restructured into the more concise active voice.*

**Active:** Emily's brothers **ate** the cookies.

**Passive:** The asteroid **was drawn** by the star's strong gravitational pull.

**Active:** The star's strong gravitational pull **drew** the asteroid closer.

- There are cases in which the passive voice is appropriate and sometimes even preferable to the active voice, some of which include:

- When the subject is inanimate.

The massive shipwreck *was discovered* in 1963.

*The shipwreck itself, not the person who discovered it, is the focus of the sentence. The use of the passive voice draws attention to the shipwreck, making it appropriate for this sentence.*

- When the subject is unknown.

Stonehenge *was constructed* approximately 5,000 years ago.

*Because archaeologists are not sure who created Stonehenge, the passive voice is appropriate here.*

- When you want to emphasize the recipient of an action.

Modern calculus *was developed* in part by Isaac Newton nearly 400 years ago. Since then, it has provided the basis for countless scientific and mathematical discoveries.

*The two sentences focus on the impact of calculus. Thus, it is appropriate to make calculus the focus of the first sentence by placing it before Isaac Newton, who would be the subject of the sentence if it were in the active voice.*



Read the passage and answer the corresponding questions.

## PASSAGE

## Power from the Wind: Kinetic Energy

It is possible to understand how wind provides **1** electricity, first focus on kinetic energy. Anything that is in motion possesses kinetic energy. Planets moving through space have kinetic energy, as do the tiniest particles. The bigger and heavier a thing is, the more kinetic energy **2** it has and the more it can transfer. A bowling ball falling into a swimming pool will create a bigger splash than a ping-pong ball because the bowling ball has more kinetic energy to transfer to the water.

Wind consists of moving air molecules that transfer kinetic energy to other air molecules. In order to create electricity, it is crucial that the air **3** contains enough kinetic energy to push against a windmill's blades. The blades then rotate, causing the center shaft to rotate; that sets in motion rotating parts that **4** are used to turn a magnet within a pocket of copper coils.

The magnet's turning electromagnetic poles push or pull on electrons in the atoms of the nearby copper. Electrons are forced from their atoms, but they **5** would be instantly attracted by new atoms. The receiving atoms then have an excess of electrons, and they lose other electrons, which then attach to other copper atoms, and so on. The chain-reaction moving along the copper wire **6** is called an electric charge.

1

- (A) NO CHANGE  
(B) electricity, if one first focuses

2

- (A) NO CHANGE  
(B) will be contained and transferred by it

3

- (A) NO CHANGE  
(B) contain

4

- (A) NO CHANGE  
(B) turn

5

- (A) NO CHANGE  
(B) instantly attract

6

- (A) NO CHANGE  
(B) calls

## Section E: Comparing and Listing

In English, there are multiple ways to make **comparisons**. This section will review some comparative structures and common comparison errors. Additionally, we will focus on **parallel structure**. We will practice ensuring that two or more terms, phrases, or clauses use a parallel word pattern to avoid confusion.

### 023 Question Topic

#### ILLOGICAL COMPARISONS

##### DESCRIPTION

The word “than” indicates that two nouns or noun phrases are being compared. It is logical to compare a person to a person, an object to an object, a concept to a concept, and so on. Yet even a single misplaced word can create an **illogical** comparison. The mistake commonly occurs when there is a possessive form on one side of the comparison.

##### Example

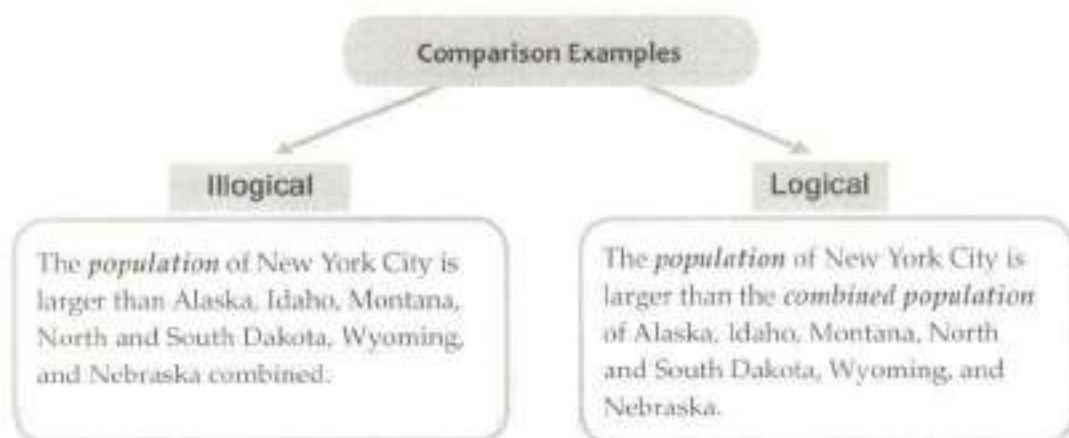
Robotic bees’ tolerance of pesticides is higher than **I** organic bees, but robotic bees do not make honey.

- (A) NO CHANGE  
 (B) organics’ tolerance  
 (C) that of organic bees  
 (D) those of organic bees



##### Explanation:

Choice (C) is correct because it compares levels of tolerance. As written, the sentence illogically compares tolerance (a concept) to organic bees (living creatures).





## DEGREES OF COMPARISON

## DESCRIPTION

Degrees of comparison can take one of two forms: the comparative degree or the superlative degree.

## Example

In wind chimes, the longest hollow tubes produce **1** lower, fuller tones.

- (A) NO CHANGE  
 (B) lowest, most full  
 (C) more lower, fuller  
 (D) the lowest, fullest



## Explanation:

As written, the sentence leaves the reader wondering “lower and fuller than what?” The “longest” tubes produce the “lowest, fullest” sounds of all. (D) is the answer because it correctly maintains the superlative degree.

## Degrees of Comparison

## The Comparative Degree

When ONE noun or noun phrase is being compared to ONE other noun or noun phrase, use the comparative degree.

The bassoon is **harder** to learn than the clarinet.  
 Hip-hop is often **more exciting** than country music.

The first example compares the bassoon to the clarinet only. The second example compares hip-hop to country music only.

## The Superlative Degree

When ONE noun or noun phrase is being compared to TWO OR MORE other nouns or noun phrases, use the superlative degree.

The **largest** brass instrument is the tuba.  
 The **most lucrative** music genre is rock.

The first example compares the tuba to all other brass instruments. The second example compares the earnings in rock music to earnings in all other music genres.

Comparative words are formed based on the number of syllables in the word.

- One-syllable words—such as **hard** and **loud**—end with **-er** or **-est**.
- Most words with two or more syllables—such as **exciting** and **lucrative**—are preceded by **more** or **most**.

## 025 Question Topic

### PARALLEL STRUCTURE

#### DESCRIPTION

Two or more terms, phrases, or clauses have **parallel structure** if they use a consistent word pattern to show that two or more ideas are equally important. Parallel structures are often combined using a coordinating conjunction, such as "and" or "but."

A shopping list that says, "milk, eggs, and avacodos" is clearer and more concise than one that says, "milk, eggs, and check for ripe avacodos." Similarly, in any writing, lists are clearer if items are grammatically consistent.

#### Example

Corey bought headphones, a microphone, and **1** he bought a guitar. He was ready to become a musician.

- (A) NO CHANGE                      (C) a guitar  
(B) additionally a guitar          (D) that guitar



#### Explanation:

The correct choice is (C) because "a guitar" is parallel in structure to the previously listed items, "headphones" and "a microphone."

- For example, a writer might break parallel structure by joining a noun and a participial phrase:

**Incorrect:** Becoming a professional musician requires **dedication** and **being naturally talented**.

**Correct:** Becoming a professional musician requires *dedication* and *natural talent*.

- A writer might list nouns and verbs together:

**Incorrect:** Jamie learned to play **keyboards, drums, and sometimes practiced guitar**.

**Correct:** Jamie learned to play *keyboards, drums, and guitar*.

**Correct:** Jamie learned to play *keyboards and drums, and sometimes he practiced guitar*.

- Another common error is to list gerunds together with infinitives:

**Incorrect:** As a professional musician, Jamie likes **practicing, performing, and to travel**.

**Correct:** As a professional musician, Jamie likes *practicing, performing, and traveling*.

**Correct:** As a professional musician, Jamie likes *to practice, perform, and travel*.



Read the passage and answer the corresponding questions.

## PASSAGE

## Music on the Mind

The final few minutes of Igor Stravinsky's *The Firebird* are one huge crescendo, which comes to a climax with a resounding "boom" from the timpani. That moment, more than **1** any moment in any other song, gives me chills. Indeed, most people know of at least one song that sends shivers down their spines. And these shivers are only the tip of the iceberg.

Medical researchers say that music provokes a host of physiological reactions. Culturally familiar music has more of an impact than **2** people thinking that something sounds strange. Individual subjects in studies have similar reactions to favorite musical pieces: increased heart rates, dilated pupils, and

**3** high levels of dopamine. Dopamine is a substance in the brain associated with feelings of pleasure. One study even found that **4** the most dopamine is released shortly *before* the chill-inducing moment than during. It appears that humans take pleasure in both anticipating and experiencing certain points in music.

Although researchers know how music affects the body, they still do not know why it does so. As is so often the case in neurological research, different theories exist. When it comes to the physical and neurological responses to music that are familiar to an individual—such as *The Firebird's* boom on me—there may be a complex interplay in the brain between expectations, **5** adaptations, and pleasure when expected outcomes occur. In human evolution, individuals who could detect certain patterns among sounds in the environment may have been more likely to sense what would happen next. When sound patterns affected their emotions, they might have been able to react more quickly (as in the ability to run away from a predator). If humans enjoyed listening to crickets, owls, wind, waves, and so on, they would be more likely to do it. In short, the enjoyment of music might be a lucky side-effect of natural selection.

Although other theories exist, they have proven **6** more harder to support because they rely on factors that are difficult to test and quantify, such as individuals' personalities or social dynamics.

1

- (A) NO CHANGE  
(B) Delete the underlined portion

2

- (A) NO CHANGE  
(B) music that

3

- (A) NO CHANGE  
(B) increased levels

4

- (A) NO CHANGE  
(B) more

5

- (A) NO CHANGE  
(B) adapting

6

- (A) NO CHANGE  
(B) Delete the underlined portion

## Section F: In-Sentence Punctuation

Understanding sentence structures requires some familiarity with the types of punctuation used to connect or separate ideas in a sentence. In this section, we will look at some of the fundamental rules for comma, semicolon, colon, em-dash, and parentheses usage.

### 026 Question Topic

#### COMMAS

##### DESCRIPTION

Most types of punctuation serve one or maybe two functions. Take the period, for example: it indicates that a sentence has ended or that a word has been abbreviated. The comma, however, is the overachiever of the punctuation world. Depending on how and where it is used in a sentence, a comma will serve one of many functions.

##### Example

Meilani wanted to become a molecular biologist. 1 Still, she loved philosophy.

(A) NO CHANGE

(B) Still she

(C) Still she,

(D) She, still,



##### Explanation:

The underlined section is correct as written, because transition words such as “still” are usually separated from the rest of the sentence with a comma to represent a natural pause. The correct choice is (A). In this sentence, “still” is being used to mean “nevertheless.”

#### 1. SEPARATING DEPENDENT AND INDEPENDENT CLAUSES

- ▶ A comma separates a dependent clause from an independent clause *if the dependent clause comes first.*

While waiting for the bus, I found a dollar on the ground.  
*(dependent clause)                      (independent clause)*

- ▶ Generally, no comma separates a dependent clause from an independent clause *if the independent clause comes first.*

I found a dollar on the ground while waiting for the bus.  
*(independent clause)                      (dependent clause)*

- ▶ Use a comma followed by a coordinating conjunction to separate two independent clauses.

The bus pulled up to the bus stop ten minutes late, *so* I knew that I would be late for work.

*(independent clause)*

*(independent clause)*

## 2. SEPARATING ITEMS IN A SERIES

- ▶ When listing more than two of anything (nouns, verbs, phrases, etc.), separate each element using a comma.

Every morning Daniel *wakes up, eats breakfast, drinks coffee, and brushes his teeth* before driving to work.

At work, Daniel's responsibilities include *responding to emails, interacting with customers, and training new employees*.

## 3. SEPARATING LENGTHY INTRODUCTORY ELEMENTS FROM THE REST OF THE SENTENCE

- ▶ Long introductory phrases generally need to be separated from the rest of a sentence with commas. Short introductory phrases (usually of four words or less) do not necessarily need to be set off by commas, but when in doubt, it is often best to include a comma.

*Lifting the flat gray rock,* Jordan discovered a world teeming with insect life.

*On top of the antique bookshelf,* the cat stretched lazily.

## 4. SEPARATING TRANSITION WORDS FROM THE REST OF THE SENTENCE

- ▶ Transition words, such as **however**, **therefore**, and **moreover**, clarify the relationship between two or more sentences. Transition words must be separated from the rest of a sentence with a comma.

The giant squid has fascinated and terrified people for centuries. *However,* researchers know very little about the elusive deep-sea denizen.

The tumultuous sea rocked the ship violently for days. *Consequently,* most of the crew became seasick.

## 5. SEPARATING NONESSENTIAL INFORMATION FROM THE REST OF THE SENTENCE

- ▶ If a phrase or clause could be removed from a sentence without changing the sentence's meaning, the information should be bookended by commas. Commonly, nonessential elements appear as appositives and relative clauses.

The book, *an old leather-bound tome,* sat neglected on the top shelf of the bookcase.

Jessica, *who visited the library at least once a week,* decided to check out the old tome sitting high on the bookshelf.

## 6. SEPARATING QUOTES FROM THE REST OF A SENTENCE

- ▶ A comma should come immediately before a quotation. If the quote is a statement and if the sentence continues after the quote, put a comma at the end of the quote, before the quotation marks.

Mark said to Kerry, "Let me help you carry that," after seeing Kerry struggle to haul the box down the hallway.

After much deliberation, Ashley set her pen to the page and wrote, "Nothing causes student writers more trouble than the comma."

## 027 Question Topic

### SEMICOLONS

#### DESCRIPTION

A **semicolon** can connect two complete sentences if the two sentences are closely related and the relationship between them requires no explanation.

#### Example

The surf forecast is calling for mostly sunny skies and a swell of two to three 1 feet. Light offshore winds early in the morning will turn into moderate west winds by the afternoon.

Which choice most effectively combines the two sentences at the underlined portion?

- |                          |                      |
|--------------------------|----------------------|
| (A) feet, and thus light | (C) feet; and light  |
| (B) feet; light          | (D) feet; but, light |



#### Explanation:

Choice (B) is correct because a semicolon is sufficient; the relationship between the sentences is obvious and does not need explanation by "thus," "and," or "but."

- ▶ If the relationship between two independent clauses is not self-evident, it is usually preferable to combine the two ideas with a comma followed by a coordinating conjunction (for, and, nor, but, or, yet, so) to clarify the exact nature of the relationship:

**Unclear:** The surfer swam to the surface unharmed; the force of the wave had cracked his board

**Clear:** The surfer swam to the surface unharmed, *but* the force of the wave had cracked his board.

*Both of the sentences above are grammatically correct, but the second version of the sentence is preferable because, without the conjunction "but," the relationship between the surfer being unharmed and his board being cracked is unclear. With the inclusion of "but," it is clear that the relationship is one of contrast.*

# 028 Question Topic

## COLONS

### DESCRIPTION

Certainly, colons are commonly used in expressions of time (i.e., 5:00 pm). But used as in-sentence punctuation, **colons** most commonly function to introduce explanations or examples. In other words, colons separate statements from elaborations.

### Example

In the 2000 film *Castaway*, the protagonist survives four years of complete isolation by using a unique survival **1** strategy; talking to a volleyball.

(A) NO CHANGE

(B) strategy: talks

(C) strategy by which: he talks

(D) strategy: he talks



### Explanation:

The correct choice is (D) because a colon indicates that what follows will explain what the author means by “unique survival strategy.”

► Elaborations after colons can consist of a single noun:

Fictional archaeologist Indiana Jones faces many dangers during his travels, but he only fears *one: snakes*.

• They can also consist of noun phrases and lists:

A good friend must possess *three qualities: compassion, generosity, and a sense of humor*.

• Elaborations can also be as long as an entire clause:

In recent years, biologists have come to recognize the intelligence of many bird species. *Take crows, for example: scientists have only recently discovered that these remarkable birds can recognize human faces, solve complex puzzles, and maintain complex social groups*.

## 029 Question Topic

### EM DASHES AND PARENTHESES

#### DESCRIPTION

Em dashes (—) and parentheses [( )] both separate nonessential information from the rest of a sentence. As we learned earlier in the section, commas can perform the same role, so the punctuation used to separate nonessential information is a matter of stylistic preference.

#### Example

Evelyn longed to be reunited with her **1** son who—by the way was a war veteran—and searched for him in homeless shelters.

(A) NO CHANGE

(B) son—a war veteran—and

(C) son the war veteran—and

(D) (war-veteran son) and



#### Explanation:

Choice (B) correctly separates out the information about Evelyn's son being a war veteran. Although the information adds to the reader's understanding, it is nonessential because the sentence would make sense without it.

- ▶ Like pairs of commas, pairs of em dashes in the middle of sentences set apart nonessential clauses (clauses that, when omitted, do not change the meaning of the sentence). Em dashes are emphatic and call attention to the information.

On weekends, the group took hot meals—*usually spicy stews*—to the migrant camp.

- Pairs of parentheses serve similar purposes, with a slightly more formal, subtle connotation.

The stranger was clean-shaven and wore clean *(if slightly shabby)* clothes.

- Single em dashes can take the place of a colon, comma, or a pair of parentheses at the end of a sentence if the writer wishes to emphasize the information.

We now have powerful means for finding old friends—*social media*.



## QUICK PRACTICE

## IN-SENTENCE PUNCTUATION



Read the passage and answer the corresponding questions.

## PASSAGE

## Jeju Island

South Korea's Jeju Island was formed by volcanic activity. Much like the **1 Hawaiian Islands, Jeju** contains evidence of its fiery beginning in rocky **2 features, that** are stunning. In the center of the island stands the tallest mountain in South Korea—Halla Mountain. It was once a volcanic **3 inferno; today,** the mountain's topmost peaks form a rim around a lake.

When molten rock was cascading out of the sea to form **4 Jeju Island in** some areas the lava on top of the flow **5 cooled—forming insulation—that** kept hot lava beneath at high temperatures. The sub-surface lava continued its downward path wherever there was an opening. **6 Subsequently, the** lava dispersed to lower elevations as though it were emptying out of giant garden hoses. It left behind a network of caves known as “lava tubes.”

Another intriguing rock formation created by the volcanic activity is Seongsan Peak on the island's east edge. From a bird's-eye view, the peak looks like an elevator button that has been **7 pushed in, a** perfectly round circle with a bowl-like center.

1

- (A) NO CHANGE  
(B) Hawaiian Islands Jeju

2

- (A) NO CHANGE  
(B) features that

3

- (A) NO CHANGE  
(B) inferno, today,

4

- (A) NO CHANGE  
(B) Jeju Island, in

5

- (A) NO CHANGE  
(B) cooled, forming insulation that

6

- (A) NO CHANGE  
(B) Subsequently the

7

- (A) NO CHANGE  
(B) pushed in; a

# Correcting Grammar Mistakes

## PARTS OF SPEECH

Each word used in a sentence fills a particular role. Understanding what some of these roles are will help you as you review common errors in grammar.

Subject	Verb	Object
Expresses the "who" or the "what" that is either doing something or being described.	Expresses action or describes the subject's state of being.	Receives the action of the verb.

*The empty vessel makes the loudest sound.* – William Shakespeare

*Subject* (The empty vessel) + *verb* (makes) + *object* (the loudest sound).

**NOUN:** a person, place, thing, or idea

*My mind is not a bed to be made and re-made.* – James Agate

**VERB:** an action or state of being. "Helper" verbs (auxiliary verbs) include *be, do, have, can, must, may, might, should, could, and will*.

*You can't hold a man down without staying down with him.* – Booker T. Washington

**ADJECTIVE:** describes a noun or noun phrase

*A good book is the purest essence of the human soul.* – Thomas Carlyle

**ADVERB:** describes a verb or an adjective

*O snail / Climb Mount Fuji, / But slowly, slowly!* – Issa

**PRONOUN:** takes the place of a noun (a person, place, or thing); pronouns include *I, you, he, she, it, we, they, us, and mine*.

*Very few of us are what we seem.* – Agatha Christie

**PREPOSITION:** shows the relation of a noun or pronoun to something; prepositions include *in, to, at, for, by, with, under, behind, above, around, over, from, and through*.

*Let me listen to me and not to them.* – Gertrude Stein

**CONJUNCTION:** joins words or groups of words together; conjunctions include *and, but, or, because, although, if, and unless*.

*We may encounter many defeats, but we must not be defeated.* – Maya Angelou



## Section G: Subject-Verb Agreement

Even experienced writers sometimes lose sight of the subject of a sentence and use the wrong verb form. This section reviews irregular verb forms and focuses on a few of the “danger zones” for subject-verb agreement.

### 030 Question Topic

#### PRESENT-TENSE VERBS

##### DESCRIPTION

Verbs **conjugate**, or change form, based on the person and number of the noun or nouns to which they refer. If the action is in the simple present tense, or if it describes a habit, routine, or condition, then the third-person form of regular verbs adds an “-s” or “-es” to the base verb.

##### Irregular Verb Forms

	Singular	Plural
1st Person	I go; I do; I have; I am.	We go; we do; we have; we are.
2nd Person	You go; you do; you have; you are.	You all go; you all do; you all have; you all are.
3rd Person	He goes; she does; it has; it is.	They go; they do; they have; they are.

##### Example

Under normal conditions the flight to the United States **1** take two hours, but it has been delayed today.

- (A) NO CHANGE                      (C) is taking  
(B) takes                              (D) took



##### Explanation:

Choice (B) is correct because it provides a verb that corresponds with the third-person singular subject “flight.” The verb should be in the present tense because it is describing a routine action.

- ▶ Sentences that begin with “There is” or “There are” must match the subject of the sentence in number:

**Incorrect:** *There is tables* loaded down with tasty dishes over there; please help yourself.

**Correct:** *There are tables* loaded down with tasty dishes over there; please help yourself.

- ▶ Abstract nouns (such as “humor” or “condition”) and uncountable nouns (such as “air”) are usually singular.

**Incorrect:** *The state* of the students’ academic and athletic achievements at the schools in the cities within the region **are** improving, but rural districts are lagging.

**Correct:** *The state* of the students’ academic and athletic achievements at the schools in the cities within the region **is** improving, but rural districts are lagging.

## 031 Question Topic

### ▶ VERBS SPLIT FROM SUBJECTS

#### DESCRIPTION

Sometimes writers pack in a great deal of information between the subject of a sentence and the actual verb. In order to evaluate the correct form of the verb, mentally eliminate “extras” and pare the sentence down to the minimum information that still forms a complete thought.

#### Example

The mountain, which thrusts its spiky peaks into the sky like frozen flames, often **1** awe travelers into complete silence.

(A) NO CHANGE

(B) have awed

(C) are awing

(D) awes



#### Explanation:

Eliminating the long phrase beginning with “which,” the adverb “often,” and the prepositional phrase “into complete silence” simplifies the example to “The mountain awes travelers.” Thus, the subject of the sentence is “The mountain,” which takes the present-tense singular third-person verb “awes,” making (D) correct.

- ▶ Plural nouns in the midst of a sentence do not necessarily take a plural verb forms if they are not the subject:

Every afternoon my sister, toting textbooks, snacks, pillows, and ear phones, claims the couch in the living room.

Every afternoon my sister, toting textbooks, snacks, pillows, and ear phones, claims the couch in the living room.

My sister claims the couch.

- ▶ Singular nouns in the midst of a sentence do not necessarily take a plural form of the verb, either:

Understandably, spies, given their job description, training, and knowledge of current technology, know a bit about tracking cell phones.

Understandably, spies, given their job description, training, and knowledge of current technology, know a bit about tracking cell phones.

Spies know a bit about tracking cell phones.

## 032 Question Topic

### GROUPS AND PARTS OF GROUPS

#### DESCRIPTION

Nouns that represent groups are known as “collective nouns.” They are words such as “team,” “staff,” and “load.” Collective-noun subjects take a singular verb. This can be confusing when the collective noun is followed by a prepositional phrase beginning with “of.”

#### Example

The staff of dedicated nurses and doctors **1** are here to serve the public.

- (A) NO CHANGE                      (C) be  
(B) is                                      (D) being



#### Explanation:

The subject of the sentence is “The staff,” a third-person singular noun that corresponds to “is.” The words “nurses and doctors” describe “staff,” but they are not the main subject of the sentence. Thus, choice (B) is correct.

- **Individual parts** of groups, described by phrases such as “a member of,” “one piece of,” “a collection of” are singular nouns.

**Incorrect:** The collection of first-edition books **sit** on the bookshelf.

**Correct:** The collection of first-edition books *sits* on the bookshelf.

- The noun phrase “The number of \_\_\_\_\_” is singular whereas the phrase “a number of \_\_\_\_\_” is plural:

*The number of wolves* in the national park *is* increasing steadily.

*A number of park rangers* *are* investigating the cause of this recent wolf resurgence.

Notice that the subject “the number of wolves” takes a singular verb (“is”), whereas the subject “a number of park rangers” takes a plural verb (“are”).

- Nouns that begin with “each,” “either,” “neither,” or “none” express one part of the pair or group. Thus, they require a singular verb.

**Incorrect:** Each of the musicians **want** to lead the band; **each have** the necessary charisma.

**Correct:** Each of the musicians *wants* to lead the band; *each has* the necessary charisma.

**Incorrect:** Neither the groom nor the bride **envision** a formal wedding reception.

**Correct:** Neither the groom nor the bride *envisions* a formal wedding reception.

## 033 Question Topic

### PARTICIPLES, GERUNDS, AND INFINITIVES

#### DESCRIPTION

Sometimes “action words” do *not* serve as verbs in a sentence. **Participles, gerunds, and infinitives** allow us to talk *about* actions and their effects. Depending on the context in which they are used, participles, gerunds, and infinitives serve as nouns, adjectives, or adverbs. Therefore, they cannot serve as a sentence’s main verb and do not change according to subject-verb agreement.

#### Example

One of my favorite movies, *Ben Hur*, **1** taking place in ancient Rome.

(A) NO CHANGE

(B) takes

(C) take

(D) to take



#### Explanation:

Because a participle, gerund, or infinitive cannot serve as the main action of a sentence, choices (A), (C), and (D) are incorrect. Choice (B) is correct because it contains a present-tense verb that agrees with the singular subject of the sentence, “One of my favorite movies.”

► A **participle** acts as a modifier (an adjective or adverb), so it provides description. Present participles are formed by adding “-ing” to the end of a verb’s base form (i.e., “running,” “jumping,” and “being”). Past participles are often formed by adding “-en” or “-ed” to a verb’s simple past-tense form, which sometimes undergoes a minor spelling change as well (i.e., “forgotten,” “spoken,” and “written”).

- Often, past participles are used to describe a person’s feelings:

Andrew was *bored* by the abstract, black-and-white film.

- Present participles usually describe the person, thing, or circumstance that provoked the feeling:

The abstract, black-and-white film was *boring*.

► A **gerund** acts as a singular noun that describes an activity. Gerunds are formed by adding “-ing” to a verb base form, so distinguishing present participles from gerunds requires using the context of the sentence.

Many people claim that *swimming* provides better exercise than *running* does.

*Hunting* was essential to the survival of early humans.

► An **infinitive verb**, or just an “infinitive,” acts as a noun, adjective, or adverb. Infinitives are formed by adding the word “to” before a verb’s base form. Thus, “to fly,” “to dive,” and “to be” are infinitive verbs.

**Infinitive as a noun:** Diana tries *to walk* for at least an hour every day.

**Infinitive as an adjective:** Andrea is looking for an exciting book *to read*.

**Infinitive as an adverb:** Eric is going to the store *to return* a recent purchase.

# 034 Question Topic

## AUXILIARY VERBS

### DESCRIPTION

Frequently, writers and speakers of English express nuances about time (tense) through auxiliary, or helping, verbs. For example, consider the difference in the statements “I eat” and “I will be eating,” or “You were brave” and “You could have been brave.” Auxiliary verbs include forms of the words *be*, *do*, and *have*, as well as the modal verbs *can*, *could*, *must*, *might*, *would*, *will*, and *shall*.

### Example

Arturo isn't here yet. He **1** had been walking slowly due to his knee injury.

(A) NO CHANGE

(C) is walking

(B) have walked

(D) walk



### Explanation:

Logically, “is walking” explains what the singular subject “Arturo” is doing in the present, which matches the phrase “isn't here yet” in the present tense, so the correct choice is (C).

### Auxiliary Verbs and Tense

- ▶ Although participles can take past or present forms, they cannot be used to determine a sentence's tense. If applicable, use the auxiliary verb instead.

Casey *has* traveled to Burma four times.

*Because “has” is a present-tense form of the verb “have,” the sentence is in the present perfect—a variation of the present tense. The present perfect shows that something happened in the past but has consequences that affect the present. The past participle “traveled” indicates that Casey’s visits to Burma occurred in the past, but it does not determine the tense of the sentence.*

Arturo *was* walking when he *tripped* on a crack in the sidewalk.

*Although the sentence includes the present participle “walking,” the verbs “was” and “tripped” indicate that the sentence takes place in the past.*

### Auxiliary Verbs and Subject-Verb Agreement

- ▶ The auxiliary verbs “be,” “do,” and “have” must agree in number with the subject.

Most **students** *have* finished the test, but **Noah** *has* not finished yet.

While **you** *were* studying yesterday, I *was* too.

**Noah and I** *have* wanted to go skiing for a long time; **he** *has* never been before.



Read the passage and answer the corresponding questions.

## PASSAGE

## Land of Sagas

Iceland is a land of superlatives. The small island sits at the top of the world, undergoes constant volcanic activity, and **1 commands** some of the most breathtaking vistas on Earth. It also happens to have more writers, per capita, than anywhere else on Earth; one in ten Icelanders **2 are published authors**.

Of course, storytelling is not a new phenomenon in Iceland. Since the earliest Viking settlers set foot on the island over 1,000 years ago, Iceland has been a land of stories, or “sagas,” as Icelanders call them. After all, a large repertoire of stories **3 help** communities get through long, harsh winters, such as those in Iceland, and dramatic landscapes are likely to inspire dramatic plots. The island reportedly inspired J.R.R. Tolkien’s setting for the seminal *Lord of the Rings* trilogy. More recently, it has provided the backdrop for filmed fantasy epics such as television’s *Game of Thrones* series.

Undoubtedly, Iceland’s natural beauty and history of storytelling **4 contributes** to the nation’s incredible literary output. However, a more practical factor may drive Iceland’s publishing phenomenon. The Icelandic government, in a bid to support Icelandic culture both through the writing of literature and the translation of literature, **5 provides some funding** for writers. This state support is significant enough to keep some authors on salary. Ultimately, finding inspiration to write about your nation’s natural beauty and rich culture **6 is** wonderful, but being paid by your government to give voice to your inspiration is both wonderful and practical.

1

- (A) NO CHANGE  
(B) command

2

- (A) NO CHANGE  
(B) is a published author

3

- (A) NO CHANGE  
(B) helps

4

- (A) NO CHANGE  
(B) contribute

5

- (A) NO CHANGE  
(B) provide some funding

6

- (A) NO CHANGE  
(B) are



# CHAPTER 2

Mastering the Writing and Language Test

## Section H: Pronouns

Pronouns are tricky parts of speech. A **pronoun** replaces a noun, noun phrase, or another pronoun. Despite this simple description, English speakers commonly make mistakes with pronouns when they speak and write.

- ▶ There are many different types of pronouns; this section focuses primarily on **personal pronouns**, which are used to refer to the first person, second person, and third person.
- ▶ A pronoun's **case** shows how the word functions in a sentence. It can be in the nominative case, the objective case, or the possessive case.
  - A pronoun will be in the **subjective case** when it functions as the **subject** of a sentence.
  - A pronoun will be in the **objective case** when it functions as the **object** of a sentence.
  - A pronoun will be in the **possessive case** when it is being used to show **ownership**.

The table below shows the different cases of personal pronouns.

Person	Subjective Case	Objective Case	Possessive Case
First-Person Singular	I	me	my/mine
First-Person Plural	we	us	our(s)
Second-Person Singular/Plural	you	you	your(s)
Third-Person Singular	he, she, it	him, her, it	his, her(s), its
Third-Person Plural	they	them	their(s)

- ▶ “Uncountable nouns” are nouns that are singular quantities: “energy,” “water,” “money,” etc. It would sound strange to say “We spent all of our monies.” Uncountable nouns take the pronoun “it.”
- ▶ “Countable nouns” are nouns that can appear as two or more: “people,” “bananas,” “dollars,” etc. It would sound strange to say “How many dollar do you have?” They can be referred to using either singular or plural pronouns.
  - Some modifiers and pronouns that express inexact quantities fall into either the “uncountable” or the “countable” categories.

Uncountable Modifiers/ Pronouns (Singular)	Countable Modifiers/ Pronouns (Plural)
(a) little	several
less	(a) few, fewer
much	many
more, most	more, most
some, any	some, any

The coffee is ready; would you like *a little*? Is that too *much*, would you prefer *less*?

The cookies are ready; would you like *a few*? Is that too *many*, would you prefer *fewer*?

# 035 Question Topic

## INDEFINITE PRONOUNS

### DESCRIPTION

**Indefinite pronouns** refer to an unspecified person, place, or thing. The indefinite pronouns in the box are always singular, and pronouns that replace them must be singular as well.

#### Common Indefinite Pronouns

Everyone	Anyone	Someone	No one
Everything	Anything	Something	Nothing
Everybody	Anybody	Somebody	Nobody

### Example

Everybody is entitled to **1** his or her opinion.

- (A) NO CHANGE      (C) one's  
(B) their              (D) whose



#### Explanation:

Because "everybody" is singular, it must be replaced by a singular pronoun. Choice (A) is correct because "his" and "her" are both singular. Although "one's" is singular, the pronoun "one" does not take a specific referent, making (C) incorrect.

- ▶ Since indefinite pronouns do not indicate gender, plural pronouns seem to fit with them naturally, as plural pronouns are gender-neutral in English. However, such a construction is still not acceptable in most published or academic writing, and when answering questions on the Writing and Language Test, you must be ready to correct such mistakes:

**Incorrect:** Someone is knocking at the door; please find out what **they** want.

**Correct:** *Someone* is knocking at the door; please find out what *he* or *she* wants.

**Incorrect:** No one seems to think that the rules apply to **them**.

**Correct:** *No one* seems to think that the rules apply to *him* or *her*.

- ▶ "Each" also indicates that a noun is singular, and must be replaced by a singular pronoun. Another possibility is to change the noun to a plural one.

**Incorrect:** Each child got a permission form, which **they** promptly lost.

**Correct:** *Each child* got a permission form, which *he* or *she* promptly lost.

**Correct:** *All of the children* got permission forms, which *they* promptly lost.

## 036 Question Topic

### PRONOUNS WITH COLLECTIVE NOUN REFERENTS

#### DESCRIPTION

**Collective nouns** describe groups, such as “the Lopez family” or “the volleyball team.” Because collective nouns are often singular nouns that refer to multiple individuals, deciding whether they should correspond with singular or plural pronouns may appear difficult but can easily be mastered.

#### Example

The Federal Bureau of Investigation, better known as the FBI, receives **1** their funding from the U.S. government.

(A) NO CHANGE

(B) its

(C) this

(D) it's



#### Explanation:

The pronoun at the underlined portion refers to the singular subject of the sentence, “The Federal Bureau of Investigation,” so choice (B), the singular personal pronoun “its,” is correct.

- ▶ With simple collective nouns, use common sense when deciding whether a singular or plural pronoun is appropriate. Are the members of the group acting as a single unit, or independently?

**Singular Collective Noun:** *The team* lost *its* first game but won the next three.

**Plural Collective Noun:** *The team* disbanded at the end of the season, returning to *their* respective homes.

- ▶ On the other hand, when you see a phrase that follows the pattern *(noun) of (noun)*—as in “each of the businessmen” or “all of the employees”—remember that the antecedent will always be the **first** word:

*The board* of directors asked for a review of *its* financial records.

*The phrase “of directors” simply describes “The board,” which is the true antecedent of “its.”*

*The herd* of elephants traversed *its* territory.

- ▶ The proper name of a business or organization, even if it is a plural, takes a singular pronoun:

*Plants & Things* is donating one of *its* most beautiful orchids to the school auction.

*Friends of the Symphony* held *its* annual dinner outdoors this year.

## 037 Question Topic

### PRONOUNS AS OBJECTS

#### DESCRIPTION

Objective pronouns include the words “me,” “you,” “him,” “her,” “it,” “us,” and “them.” The object of a sentence or clause receives the action.

#### Example

The project was an extraordinary learning experience for **I** my group and myself.

(A) NO CHANGE

(B) my group and I.

(C) my group and me.

(D) I and my group.



#### Explanation:

Choice (C) is correct because the speaker and the group are objects of the preposition “for,” so the pronoun for the speaker must be “me.” If we were to take out “my group and,” it would be clear that the phrase should be “for me,” not “for I.”

#### Pronouns as Objects of Prepositions

- ▶ When a pronoun is the object of a preposition, make sure that it is in the **objective case**, even if it is separated by another noun. The most common mistake here is using “I” where one should use “me,” or using “we” instead of “us.”

**Incorrect:** She sent a letter *to* my sister and *I*.

**Correct:** She sent a letter *to* my sister and *me*.

**Incorrect:** *For we* beginning surfers, the waves were just right.

**Correct:** *For us* beginning surfers, the waves were just right.

#### Reflexive Pronouns as Objects

- ▶ When the subject of the sentence is also the object, such as in the statement “Mason sat by himself,” a reflexive pronoun is used.

- Reflexive pronouns include *myself*, *yourself*, *herself*, *himself*, *ourselves*, *yourselves*, and *themselves*.

**Incorrect:** I talk to *me*.

**Correct:** I talk to *myself*.

# 038 Question Topic

## → AMBIGUOUS PRONOUNS

### DESCRIPTION

Ambiguous pronoun use occurs when a writer uses a pronoun that can refer to more than one noun.

### Example

Kaitlyn picked up her friend Brooke from class, and they went to **1** her house to load up the skis.

(A) NO CHANGE

(B) the

(C) one's

(D) Brooke's



### Explanation:

The correct choice is (D) because it clarifies whether "her house" is the home of Kaitlyn or of Brooke.

- ▶ When pronouns are ambiguous, writers can revise the sentence by repeating the target noun.

**Ambiguous:** The assignment was to read **the book**, write **an essay** about it, and give **it** to the teacher.

**Revised:** The assignment was to read *the book*, write *an essay* about it, and give *the essay* to the teacher.

- ▶ Sentence revision can also clarify meaning.

**Ambiguous:** He was mixing green **paint** with **glue** when it spilled.

**Revised:** He was mixing green *paint* with *glue* when *the mixture* spilled.

**Ambiguous:** **They** were visiting **friends** when **they** began talking about visiting Machu Picchu.

**Revised:** While *they* were visiting, *their friends* began talking about visiting Machu Picchu.

## 039 Question Topic

### WHO AND WHOM

#### DESCRIPTION

The pronoun “who” and its objective form “whom” can serve many purposes in a sentence, making the mastery of them tricky for many students.

#### Example

The student asked his academic advisor, “To **1** who should I give my letter of recommendation?”

(A) NO CHANGE

(B) whom should I

(C) who is the person that I

(D) whom is the person that I



#### Explanation:

The correct choice is (B); the pronoun at the underlined portion is the object of the preposition “To,” so the pronoun must be in the objective case, making “whom” correct. Choices (C) and (D) are incorrect because they are unnecessarily wordy.

- ▶ “Who” and “whom” can form questions, making them interrogatives.

**Who** loves you? **Whom** do you love?

- ▶ They also introduce **relative clauses**, which give further information about a person or persons.

My friend, **who** always gets As, has been helping me prepare for an upcoming midterm.

- ▶ They are also used to define or identify a person or persons. A common mistake is to use “that” to refer to a person or persons:

**Incorrect:** The head coach is the person **that** is wearing sunglasses.

**Correct:** The head coach is the person **who** is wearing sunglasses.

- ▶ Some experts claim that the pronoun “whom” is disappearing from the English language. In most Published or academic writing, however, the word “whom” is still expected where appropriate. The pronoun “whom” acts as the object of an action or a preposition.

**Incorrect:** **Who** did you call when you won the award?

**Correct:** **Whom** did you call when you won the award?

**Incorrect:** It is not clear yet **who** the director is going to hire.

**Correct:** It is not clear yet **whom** the director is going to hire.



Read the passage and answer the corresponding questions.

## PASSAGE

## Business Management

In the business world, management styles are always changing. However, two of the most enduring management styles are "Management by Objectives" (MBO) and "Total Quality Management" (TQM).

MBO was first popularized by German-American professor and business consultant Peter Drucker. In **1** his 1954 book, *The Practice of Management*, Drucker describes MBO as the process of an organization's employees and managers agreeing on objectives so that **2** it is working toward the same goals. This style is symbolically represented by the now ubiquitous "statement of purpose" often posted on the websites of companies or other entities. A typical employee may experience MBO without realizing it when a manager gives **3** them written objectives and evaluations. Before MBO, these practices were uncommon in employee management.

TQM focuses on improving the quality of products and services through continuous modifications in response to employee and customer feedback. It is unclear to **4** whom the credit for TQM methods should go, but they were first used on a large scale in Japanese industry. The U.S. Navy may have begun to incorporate the methods during the 1960s in its air systems production. TQM first became popular in the manufacturing sector but spread to other areas, including retail sales, hotels, educational institutions, airlines, and even government. Nearly everyone participates in TQM at some point when **5** they answer a "customer feedback survey" or some other response form.

One characteristic that distinguishes TQM from MBO is flexibility: although companies using TQM have goals, **6** they are constantly changing based on feedback from consumers and employees.

1

- (A) NO CHANGE  
(B) their

2

- (A) NO CHANGE  
(B) they are

3

- (A) NO CHANGE  
(B) him or her

4

- (A) NO CHANGE  
(B) who

5

- (A) NO CHANGE  
(B) he or she answers

6

- (A) NO CHANGE  
(B) the goals

## Section I: Commonly Confused Words

In the English language, it is not uncommon for words with very different meanings to sound similar or the same. When speaking, the differences rarely matter. But in writing, using the correct word is crucial for expressing thoughts accurately.

## 040 Question Topic

## → HOMOPHONES

**DESCRIPTION**

Some commonly confused words are **homophones**—words that sound the same but are spelled differently and have different meanings.

**Example**

No matter what **1** your doing, you will do it better if you are in a good mood.

(A) NO CHANGE

(B) yours is

(C) you're

(D) you were

**Explanation:**

The sentence as written confuses the possessive pronoun “your” with “you’re,” the contraction of “you are.” Thus, choice (C) contains the correct contraction.

- An apostrophe can make a big difference. The homophones “its” and “it’s” have completely different meanings.

IT'S	ITS
<p>“It’s” is the contracted, or shortened, form of “it is” and “it has.” In other words, it + is/has = it’s.</p> <p><i>It’s</i> time to transplant the flower.</p> <p><i>It’s</i> been too long since I have gone fishing.</p>	<p>“Its” is a possessive pronoun like “his,” “her,” “ours,” or “their.”</p> <p>The flower is outgrowing <i>its</i> container.</p>



- The homophones “they’re,” “there,” “their” also cause trouble for many students.

THEY'RE	THERE	THEIR
<p>“They’re” is the contracted form of “they are.” In other words, they + are = they’re.</p> <p><i>They’re</i> going to the barbecue at the park.</p>	<p>“There” can be a place, a demonstrative pronoun that answers “where?”</p> <p>The barbecue is over <i>there</i>, next to the swimming pool.</p> <p>OR, “there” can be a strange pronoun that does not actually replace a noun; it is sometimes called an “existential pronoun” because it declares that something exists.</p> <p><i>There</i> is a large crowd gathering.</p>	<p>“Their” is a possessive adjective like “his” or “our.”</p> <p>I believe that they are bringing <i>their</i> swimming suits.</p>

## 041 Question Topic

### PHONETIC SIMILARITY

#### DESCRIPTION

Commonly confused words are not always exact homophones; they may have **phonetic similarity**, meaning they sound similar even though they have different meanings or play different roles in communication.

#### Example

The doctor walked **1** through a snowstorm to get to the hospital and perform the emergency surgery.

- (A) NO CHANGE  
(B) threw

- (C) thru  
(D) though



#### Explanation:

The correct choice is (A); “through” means passing into and out of, as the doctor did by walking into the storm and out of it at the hospital.

- “Affects” is a verb whereas “effect” is a noun.

Rain often *affects* traffic.

The *effect* of rain is usually more traffic jams.

- 
- **“Than”** is used when forming comparisons. **“Then”** is used when forming conditional statements; **“then”** also means “at that time” or “in that case.”

There are more bananas *than* you can imagine in that truck.

If you want a banana, *then* just follow that truck.

*Then* you will have all the bananas that you want.

- Example sentences of other commonly confused words with phonetic similarity include:

**Incorrect:** He likes every vegetable **accept** onions.

**Correct:** He likes every vegetable *except* onions.

**Incorrect:** She didn't expect to **loose** the race.

**Correct:** She didn't expect to *lose* the race.

**Incorrect:** We **past** the school on the way to the park.

**Correct:** We *passed* the school on the way to the park.

# Additional Commonly Confused Words

**NOTE** The following definitions/synonyms only summarize the most common uses for each word.

Commonly Confused Words	Part(s) of Speech	Definition/Synonyms
accept	verb	receive, gain; accept something as true, believe
except	preposition	not including, besides
adverse	adjective	harmful, unlucky, unfavorable
averse	adjective	having a strong feeling of opposition
bare	verb, adjective	(verb) uncover, expose; (adjective) simple, unclothed
bear	verb, noun	(verb) transport, support; tolerate; (noun) a type of large mammal
capital	noun	money; a city or town with political and economic importance
capitol	noun	a building that houses the legislative branch of a government
complement	verb, noun	(verb) improve something by adding a part or component; (noun) an addition that completes something
compliment	verb, noun	(verb) praise someone or something; (noun) an expression of mild praise
lose	verb	have something taken away, misplace
loose	adjective	unsecured, detached
passed	verb (past tense)	leave behind, progress, travel
past	adjective, noun	(adjective) no longer existing; (noun) the time before the present moment, former times
principal	adjective, noun	(adjective) main, primary; (noun) a person of authority, director
principle	noun	a concept that serves as the foundation of a behavior or system
to	preposition	indicating a particular direction, identifying something that is affected
too	adverb	extremely, excessively; additionally, also
two	number	2
whose	determiner/ pronoun	showing that something belongs to or is associated with a person
who's	contraction	a shortened form of "who is"



Read the passage and answer the corresponding questions.

## PASSAGE

## Apocalypse Soon

Doomsday prophecies have become almost commonplace. In the **1** passed two decades alone, Americans have harbored apocalyptic fears based on the new millennium and the Mayan calendar. Religious cult leaders are infamous for heralding the end of civilization, the end of mankind, the end of Earth, the end of the end itself!

Although most modern doomsday prophecies are built on shaky foundations, we must **2** accept that **3** their remains a chance that environmental factors will conspire to spell out the end of life as we know it. Scientists refer **4** too these ecological disasters as extinction events—periods in which a large portion of life on Earth suddenly dies. There have been at least five such events in the past 600 million years, and each one has had a huge **5** affect on Earth's biodiversity.

The most recent extinction event is called the Cretaceous-Paleogene (K-Pg) extinction event, but most people know it as "the one that killed the dinosaurs." The K-Pg extinction event occurred approximately 66 million years ago, when a large meteor collided with present day Central America. The meteor impact triggered ecological catastrophes that killed an estimated 75 percent of all life on Earth. In fact, most if not all extinction events were caused by **6** adverse environmental changes that contributed to or coincided with widespread ecological catastrophes such as volcanic eruptions or runaway greenhouse effects.

Today, human activities such as overhunting and the exploitation of natural resources contribute to the extinction of an estimated 30,000 species per year. Many researchers claim that we are in the midst of another extinction event, one for which the blame falls squarely on humanity's shoulders. As humans continue to look at supernatural prophecies or social paranoia for signs of the apocalypse, the majority of life on Earth must look no further **7** then humanity to see **8** its impending demise.

1

- (A) NO CHANGE  
(B) past

2

- (A) NO CHANGE  
(B) except

3

- (A) NO CHANGE  
(B) they're  
(C) there

4

- (A) NO CHANGE  
(B) to  
(C) two

5

- (A) NO CHANGE  
(B) effect

6

- (A) NO CHANGE  
(B) averse

7

- (A) NO CHANGE  
(B) than

8

- (A) NO CHANGE  
(B) it's

## Section J: Additional Topics

English grammar is filled with tricky little rules that do not make much difference in casual conversation but make a difference in the coherence of written expression. This section illuminates two types of idiomatic word groups that must be memorized.

### 042 Question Topic

#### ► CORRELATIVE CONJUNCTIONS

##### DESCRIPTION

All conjunctions show how ideas are “con-joined,” or how they relate to each other. Correlative conjunctions come in pairs. For example, “neither/nor” is a correlative conjunction: “neither” always pairs with “nor.” The purpose of correlative conjunctions is to connect two equal units of grammar.

##### Example

Many adolescents do not get enough sleep, often due to either social media **1** nor homework.

(A) NO CHANGE

(B) with homework.

(C) or homework.

(D) and homework.



##### Explanation:

The word “either” in the sentence is one part of a correlative conjunction; it must be paired with “or.” Thus, (C) is the correct choice.

- The chart below lists of some of the most frequently used correlative conjunctions, along with examples that demonstrate proper use.

Correlative Conjunction	Example Sentence
either...or	The waiter said, “You may choose <b>either</b> soup <b>or</b> salad.”
neither...nor	Jane was not hungry, so she ordered <b>neither</b> soup <b>nor</b> salad.
both...and	Alex, being very hungry, asked, “Can I have <b>both</b> soup <b>and</b> salad?”
between...and	The waiter responded, “You must choose <b>between</b> soup <b>and</b> salad.”
not only...but also	Alex was <b>not only</b> hungry, <b>but</b> he was <b>also</b> very talkative.
as...as	Alex retorted, “But I want <b>as</b> much food <b>as</b> possible.”
whether...or	Jane said to Alex, “I don’t know <b>whether</b> you are hungry <b>or</b> rude.”

# 043 Question Topic

## PHRASAL VERBS

### DESCRIPTION

A **phrasal verb** consists of either a **verb + preposition** or a **verb + adverb** combination. These phrases have meanings that differ from the meanings of the individual words from which they are formed. For example, the phrasal verb "ran into" does not convey the same meaning as the verb "ran."

### Example

Because he was so tired, Jonas could not **1** focus toward the conversation with his manager.

(A) NO CHANGE

(B) focus on

(C) focus to

(D) focus with



### Explanation:

The preposition that pairs with "focus" is "on." Therefore, (B) is correct.

- ▶ On the Writing and Language Test, you may be asked to pair a preposition with a verb to form an appropriate phrasal verb based on the context of the sentence. Consequently, it is crucial to know the specific prepositions used in phrasal verbs as well as the phrasal verb's meaning.

**Incorrect:** The psychology student was able to **point against** many flaws in Jung's dream theory.

**Correct:** The psychology student was able to **point out** many flaws in Jung's dream theory.

**Incorrect:** The make-up promised to **block against** UVB rays.

**Correct:** The make-up promised to **block out** UVB rays.

- ▶ The chart below lists some frequently used phrasal verbs, along with their meanings and examples that demonstrate proper use.

Phrasal Verb	Meaning	Example Sentence
get by	manage, survive	Although they did not have much money, the young couple managed to <b>get by</b> .
focus on	pay attention to	The professor became angry when he realized his students were not <b>focused on</b> the lecture.
go through	undergo a difficult experience	Since the death of its president, the country has <b>gone through</b> much political turmoil.
	search	Andrew had to <b>go through</b> his entire dresser to find his favorite sweater.
add up	make sense	As the detective interviewed the suspect, he realized that her story did not <b>add up</b> .



Read the passage and answer the corresponding questions.

## PASSAGE

## Sleep Paralysis

Sleep paralysis is a physical and psychological condition that occurs in some individuals during REM sleep. Under normal circumstances, the body is paralyzed during REM sleep to **1 prevent it from** mimicking the actions taken in a dream. However, when sleep paralysis occurs, a person's brain awakens during REM sleep. This leaves a person fully aware of his or her surroundings but unable to move.

Because sleep paralysis renders sufferers helpless and disoriented, it is often a very traumatic experience. Sleep paralysis can render a person **2 both immobile or mute** for up to several minutes at a time. Likewise, it can **3 result from** auditory, tactile, and visual hallucinations that manifest themselves in horrifying ways. Many cultures have unique names for this condition, most of which **4 center on** the disturbing nature of sleep paralysis. For instance, the Japanese call sleep paralysis *kanashibari*, which translates to "bound in metal." Likewise, the Kurdish people call sleep paralysis *mottaka*, which means "suffocating ghost." According to Mexican culture, sleep paralysis is caused by a deceased person's spirit preventing the sleeper's movement, referred to as *se me subio el muerto*, meaning "the dead person is on me."

**5 Whether sleep paralysis is a result of neurological and environmental factors is still up for debate.** Some psychiatrists believe that sleep paralysis is caused by the misfiring of neurons in the pons area of the brain. Other possible causes of sleep paralysis include irregular sleep schedules, increased levels of stress, and the use of artificial sleep aids. Ironically, some drugs used to induce sleep and relaxation are also used to treat sleep paralysis. The benzodiazepine Clonazepam has been used to treat sleep paralysis, as has the antidepressant drug fluoxetine, commonly referred to as Prozac. Ultimately, because **6 neither a definite cause or a reliable cure** has been discovered, sleep paralysis remains as perplexing as it is terrifying.

1

- (A) NO CHANGE  
(B) prevent it to

2

- (A) NO CHANGE  
(B) both immobile and

3

- (A) NO CHANGE  
(B) result in

4

- (A) NO CHANGE  
(B) center toward

5

- (A) NO CHANGE  
(B) Whether sleep paralysis is a result of neurological or

6

- (A) NO CHANGE  
(B) neither a definite cause nor a reliable cure

# Improving Style and Structure

## Section K: Development and Organization

The Writing and Language Test measures not only your knowledge of the technical aspects of writing, but also your ability to comprehend and evaluate content. Many of these questions require you to gain the “big picture,” meaning the logical progression of ideas in the passage. You may be asked whether the writer should add information or delete details. You may be asked to select changes for clarity or coherence. Questions may also require evaluating how information presented in a graph or diagram relates to the passage.

### Faces and Feelings ←

Title provides a general focus point.

Introductory sentence makes initial claim.

Researchers say that a person’s facial expression affects the person’s own mood, and also the moods of others. So if a woman smiles, the muscles in her face affect her brain in such a way that she actually feels happier. If another person sees her smiling face, that person’s brain is also affected and *he* feels happier. Frowns have the opposite effect.

Explanations set up information that follows.

Transition phrase and sentence acknowledge counterpoint and set up the information that follows.

Of course, most people do not walk around either smiling or frowning. Most faces we see have in-between expressions, and we have to interpret the emotions behind them. Studies have found that people can be trained to perceive ambiguous facial expressions more positively.

Logical deduction

New claim sets up the information that follows.

Narrative provides evidence to support claim.

For example, in one study, aggressive, at-risk teenagers were shown 15 photos at a time of the same face in a range of expressions from smiling to frowning. The teens had to determine if the expression was happy or angry. For some of the expressions in the mid-range, if a teen identified the expression as angry, the computer responded with a message that the answer was incorrect; the expression was happy. After a week of training, the teens apparently perceived the people around them differently; they became significantly less aggressive.

Ultimately, it seems that people are strongly affected not only by what they see in other people’s faces, but also by what they *think* they see.

Conclusion connects and reflects upon the passage’s main ideas.



**DESCRIPTION**

Some Writing and Language questions may ask whether information in the passage includes too many details, or conversely, not enough support/explanation. You may also be asked to evaluate an introductory or concluding statement. Make sure that you have a clear idea of the passage's and paragraph's main ideas; the title of the passage is a crucial clue.

**Example****A Popular "Spider"**

Chlorophytum comosum is a grass-like, clumping perennial plant. It sends out wiry, arching stalks with flowers that then develop into plantlets. **1** In its natural setting, its stalks droop until the plantlets reach the soil and send out roots of their own. In homes, however, Chlorophytum comosum is usually displayed as a hanging plant, which allows its slender leaves to swing below the plant. **2** The species is native to southern Africa.

- 1** The writer is considering deleting the underlined portion of the sentence. Should it be kept or deleted?
- (A) Kept, because it provides an important clarification.  
 (B) Kept, because it maintains the stylistic pattern established previously.  
 (C) Deleted, because it provides an unnecessary detail.  
 (D) Deleted, because it undermines the previous sentence.
- 2** Which sentence provides the best conclusion for the passage?
- (A) NO CHANGE  
 (B) Consequently, one of its common names is "Spider plant," referring to the spider-like appearance of the plantlets.  
 (C) The plantlets' resemblance to a spider has earned it the nickname "Spider plant," but I don't call it that because I hate spiders.  
 (D) Many people regard it as one of the easiest houseplants to grow.

**Explanation:**

- ▶ **1** The correct choice is (A); the phrase helps clarify the description of the plant's natural characteristics.
- ▶ **2** The correct choice is (B) because the sentence about the common name is more appropriate to conclude the paragraph. (B) improves the focus because it continues the preceding sentence's topic of houseplants.

## 045 Question Topic

### PASSAGE ORGANIZATION

#### DESCRIPTION

Communicating effectively requires coherence. In other words, facts and ideas should be presented logically and should be appropriately connected and complete.

#### Example

##### Teacher for a Day

[1] Substitute teachers must find the classroom, find the light switch, and find several pages of written instructions from the teacher. [2] They must comprehend the purpose of piles of instructional materials and supplies, and they must log on to an unfamiliar computer to find the attendance site. [3] The slightest problem, such as where the teacher keeps extra pencils, means that the substitute must pause instruction; whereupon students can hardly be expected to refrain from loud conversations. [4] Within short order, they meet and manage large groups of students whom they do not know, follow routines that they do not know, and provide instruction for learning activities that they may never have seen before.

To make the paragraph more logical, sentence [4] should go

- (A) before sentence [1].      (C) before sentence [3].  
(B) before sentence [2].      (D) where it is now.



#### Explanation

The correct choice is (C) because as written, the paragraph discusses problems with instruction before it mentions instruction or even meeting students, which is incoherent.

- ▶ SAT Writing and Language Test passages may include bracketed numbers such as “[1]” before several sentences in a paragraph, or for each paragraph. One of the questions will then ask you to decide whether to move a particular sentence (such as “sentence [1]”) to a different place in the paragraph. Or, you may be asked where to place a new sentence.
- ▶ When answering coherence questions, you must consider the logical flow of facts and ideas. Within paragraphs, you can also confirm your selection by looking for clues in diction, such as pronouns in a sentence that must have particular antecedents. If you are asked to rearrange complete paragraphs, you can re-check the topic sentences of each paragraph.

# 046 Question Topic

## TRANSITIONS

### DESCRIPTION

Whereas conjunctions clarify the relationship between ideas *within a sentence*, transition words clarify the relationship between the ideas presented in *different sentences*. SAT Writing and Language Tests often include questions requiring you to select an appropriate connecting word or phrase. You will have to look carefully at the sentences or clauses to consider how to indicate the progression of thought accurately.

### Example

Peyton and Aveline admitted to leaving out a few ingredients. **1** Nonetheless, their cake was arguably better than their father's.

- (A) NO CHANGE  
(B) In fact,  
(C) Similarly,  
(D) For instance,



### Explanation:

Choice (A) is correct because “nonetheless” accurately reinforces the assertion that the cake was “better than Dad’s” in spite of ingredients being left out.

► Following are some categories of functions for transition words and phrases:

**Add and strengthen:** also, additionally, furthermore, in fact, moreover, what is more

**Describe an effect:** as a result, consequently, hence, therefore, thus

**Describe order:** next, subsequently, thereafter

**Show factors in common:** likewise, similarly

**Contrast:** however, in comparison, in contrast, on the other hand

**Reinforce an assertion:** all the same, even so, nevertheless, nonetheless, notwithstanding (that), still

**Introduce specifics:** for example, for instance, in this case, specifically

**Suggest:** alternatively, if not, instead, otherwise, then again

**Prepare to conclude:** thus, finally, in short, hence, therefore

► Transitions that **contrast** or **introduce specifics** may be placed in commas *after* a subject that you want to emphasize:

His family went to the mountains frequently. Mine, *however*, always went to the beach.

Some bird species are incredibly efficient flyers. The albatross, *for example*, can glide hundreds of miles without once flapping its wings.



Read the passage and answer the corresponding questions.

## PASSAGE

## Swimming Giants

**1** Living in weight-supporting water allows some aquatic animal species to become huge. Even behemoths are able to stay afloat and mobile. The most obvious example is the blue whale, the largest animal on Earth. The blue whale is about as long as three school buses, and usually weighs around 200 tons. It usually ambles along at about 5 miles per hour (mph). However, if it is in a hurry, it can swim much faster, up to 20 mph. The giant Pacific octopus can grow to as long as 20 feet end to end and weigh 50 pounds—big enough to wrap around a small car. Yet it can dart after prey at jet-like speed.

**2** On the other hand, water's buoying properties allow some species to thrive even though they appear quite slow and ungainly.

**3** For example, tree sloths, penguins, and elephants are all expert swimmers. The heaviest bony fish, the Mola mola (or ocean sunfish) can weigh up to 2,200 pounds. **4** The Mola mola can therefore be an awkward giant in an aquarium tank. In the open ocean, however, it is perfectly shaped to glide down to deep, cold waters to eat, and then gracefully swim up to the surface to expose one of its large, flat sides to the sun.

- 1** Which choice most effectively establishes the main topic of the passage?
- (A) NO CHANGE  
(B) Animals that live in water have the advantage of speedy mobility.
- 2** Select the answer that best transitions between the first and second paragraphs.
- (A) NO CHANGE  
(B) As a result,
- 3** The writer is considering deleting the underlined sentence. Should the sentence be kept or deleted?
- (A) Kept, because it supports the topic sentence by listing animals that are ungainly on land.  
(B) Deleted, because it lists land animals, distracting from an emphasis on marine life.
- 4** The writer wants to add a sentence here. Which choice would best support the writer's main point about the Mola mola?
- (A) Its body is tall (10 feet) but narrow, so that it looks like a swimming pancake.  
(B) It periodically swims into kelp beds, where smaller fish clean parasites from its skin.

## Section I: Concision, Style, and Syntax

In writing, “style” refers to the manner in which content is conveyed to fulfill the author’s purpose. Questions involving style can refer to diction, tone, and consistency. In the past, people often preferred elaborate and decorative styles of writing, but today’s texts tend to be more direct. In general, academic writing should be concise, formal, and clear.

### 047 Question Topic

#### IMPROVING CONCISENESS

##### DESCRIPTION

**Concision**, or **conciseness**, means presenting an idea clearly and simply. The correct answers on Writing and Language Test questions will not necessarily be the fanciest-sounding or most elaborate ones. Rather, correct answers often convey information in a straightforward manner and without repetition.

##### Example

The scenes sculpted on the Parthenon in ancient Athens were designed **1** in such a way as to inspire awe.

(A) NO CHANGE

(B) so as

(C) as

(D) DELETE the underlined portion



##### Explanation:

The correct choice is (D) because the underlined portion adds no information to the sentence, making it unnecessary and deletable.

- If you determine that a sentence contains unnecessary words or phrases, the sentence is likely wordy or redundant and can be made more concise.

**Wordy:** Serving as entertainment for audiences both young and old, Greek myths are also recognized for their abilities to reveal facets of Greek cultural values and practices.

*The sentence may sound academic, but it lacks clarity because of unnecessary wordiness.*

**Concise:** Greek mythology is not only entertaining, but it also reveals many details about ancient Greek culture.

## 048 Question Topic

### ELIMINATING REDUNDANCIES

#### DESCRIPTION

When writers repeat themselves, they are being redundant. When you choose an answer, be careful to distinguish between **redundancy and support**. While it is redundant to say “The ancient structure was incredibly old,” saying, “The ancient structure is more than 2,000 years old” is not redundant because the phrase “more than 2,000 years old” adds new information.

#### Example

Offerings left in ancient graves tell us what **I** the community valued and what people believed was worth having.

(A) NO CHANGE

(B) the community valued as

(C) people considered

(D) was



*Explanation:*

*Choice (C) is correct because it maintains the same meaning as the underlined portion without the repetition of ideas.*

- ▶ Redundancies are especially common in descriptions. When you notice a long description, make sure none of the terms that comprise the description repeat or overlap with each other.

**Redundant:** The archaeologist looked for subtle clues that were barely noticeable as he combed through the foundations of the ancient structure, which was incredibly old.

*Which phrases are redundant?*

*subtle = barely noticeable*

*ancient = incredibly old*

*Free of redundancy, the sentence is shorter and simpler:*

**Concise:** The archaeologist looked for subtle clues as he combed through the foundations of the ancient structure.

# 049 Question Topic

## IMPROVING DICTION

### DESCRIPTION

Diction refers to the overall characteristics of the words the writer uses. When evaluating answer choices for Writing and Language questions, take note of how effectively the words serve the author's purpose.

### Example

The soldier's torch cut through the darkness, providing a **1** buffer around which his comrades could rally.

(A) NO CHANGE

(B) sign

(C) beacon

(D) message



### Explanation:

The correct choice is (C). A "beacon" is a source of light that serves as a signal to others, which fits best with the context of the example above. Because a "sign" is usually a written indication or a gesture, (B) does not work as well in the context of the sentence.

- ▶ The most appropriate word choice in each case depends largely on the context. In most cases answer choices that include informal, non-standard diction will *not* be the correct answers.

**Less formal:** The aquarium's simulated flash flood displays **scary** force.

**More formal:** The aquarium's simulated flash flood displays *frightening* force.

- ▶ In most cases, the best answer to a diction question will be the one that is specific and that most precisely conveys the author's meaning.

**Less specific:** Passengers hurriedly **got** their bags from the overhead bins.

**More specific:** Passengers hurriedly *retrieved* their bags from the overhead bins.

**Less specific:** Astronauts at the international space station have an important **job**.

**More specific:** Astronauts at the international space station have an important *mission*.

## 050 Question Topic

### IMPROVING CONSISTENCY

#### DESCRIPTION

Good writing often includes rhythms and patterns. For that reason, the Writing and Language Test may ask you to choose an answer that will **maintain a pattern** already established in the text.

#### Example

It is possible that high heels were invented for a purely practical reason. Ninth-century pottery images show Persian horseback riders wearing high heels, probably to grip the stirrups **1** and so their feet did not slip.

Which choice most closely matches the stylistic pattern established earlier in the sentence?

- (A) which meant that their feet did not slip.                      (C) and keep their feet from slipping.  
(B) whenever their feet started to slip.                              (D) preventing any foot slippage.



#### Explanation:

*In the sentence with the underlined portion, the author speculates that the purpose of the high heels was "to grip the stirrups." Choice (C) is the answer because it follows the same grammatical pattern of an infinitive plus an object: "(to) keep their feet."*

- At the paragraph level, using consistent sentence patterns often makes information easier for readers to absorb. Matching an established pattern requires rereading the previous sentences and noting their structure and tone.

The ancient Egyptian festival of Opet was a multi-day public holiday. The Nile River flooded every summer, covering agricultural fields with nutrients for the soil. Next year's crops would flourish. The flooding was life-giving. It was a symbol of rebirth. It was a sign that the gods were pleased. The floods meant that there was a lot of water for a beautiful floating parade.

*The underlined portion does not match the pattern or tone that precedes it. An improved version is:*

The ancient Egyptian festival of Opet was a multi-day public holiday. The Nile River flooded every summer, covering agricultural fields with nutrients for the soil. Next year's crops would flourish. The flooding was life-giving. It was a symbol of rebirth. It was a sign that the gods were pleased. It even provided the means for beautiful floating processions.





Read the passage and answer the corresponding questions.

## PASSAGE

## "Lost" Watermelon Variety

Farmers in the American South have a long history of growing watermelon, a vine fruit that consists mostly of water.

**1** Nearly every single Southerner of every income level and ethnic background has found watermelon to be refreshing during the region's hot summers. Consequently, watermelon **2** appears frequently in regional dishes.

A recent interest in authentic Southern dishes has led to a return of some "lost" varieties of watermelon. One of these is the Bradford melon. The Bradford was a longtime favorite among Southern cooks. Not only was its interior red and sweet, but its soft rind made delicious pickles. **3** Once commercial farming developed and began using trains and trucks to transport crops to market, however, the Bradford melon was no longer commercially viable. Its rind was simply too soft for stacking.

The Bradford melon's history stems from the American Revolutionary war in the 1770s. The story begins with British forces **4** capturing some American soldiers and placing them on a prisoner-of-war ship bound for the West Indies. At one point, the ship's captain ordered that the prisoners be given some slices of watermelon. One of the imprisoned soldiers **5** loved the fruit so much that he saved every seed from his slice. After the war, that soldier went home to his farm in Georgia, where he planted the seeds. Eventually he developed a successful crop.

Many years later, a farmer named Bradford managed to cross the former soldier's variety with another one, creating the famous Bradford melon. **6** Fortunately, even after it was no longer grown as a commercial crop, members of the Bradford family decided that they liked the Bradford melon so much that they preserved small fields of the melon variety for their own enjoyment. Today, they have revived the crop. They sell the melons to specialty producers of Southern syrups and pickles.

1

- (A) NO CHANGE  
(B) Southerners of every income level and ethnicity have

2

- (A) NO CHANGE  
(B) shows up here and there

3

- (A) NO CHANGE  
(B) With the advent of the modern transportation industry,

4

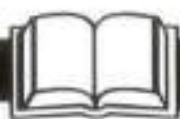
- (A) NO CHANGE  
(B) placing some captive American soldiers

5

- (A) NO CHANGE  
(B) was enchanted; he pocketed the seeds from his slice.

6

- (A) NO CHANGE  
(B) After the tender melon's commercial demise around the beginning of the 20th century, the Bradford family preserved it in their own gardens for generations.



# Answers & Explanations...

## Mastering the Writing and Language Test

### Question Topics 011 - 014: Clauses

1) **⇒** B

The sentence containing the underlined portion consists of a dependent clause ("After...solid") followed by an independent clause ("they...foot"). Generally, when a dependent clause comes before an independent clause, a comma separates the two clauses, making (B) the correct choice.

2) **⇒** A

The sentence containing the underlined portion consists of a dependent clause ("When...half") followed by an independent clause ("they...lifeboats"). Generally, when a dependent clause comes before an independent clause, a comma separates the two clauses, making (A) the correct choice.

3) **⇒** A

The underlined portion includes the prepositional phrase beginning "before they managed." It describes *when* something is happening. Thus, it does not need separating from the rest of the sentence, making choice (A) correct.

4) **⇒** B

The underlined portion is part of a dependent clause. ("After" is a subordinate conjunction, signaling that a dependent clause follows.) Dependent clauses cannot stand alone as sentences; they need to be connected to an independent clause. Thus, as written, the sentence is a fragment. (B) is correct; "They were caught in a hurricane" is an independent clause, so (B) forms a complete sentence.

5) **⇒** B

Choice (A) creates a run-on sentence by connecting two complete sentences with only a conjunction

("and" in this case). Two sentences can be connected using a comma and a conjunction or a semicolon, or separated by a period. Because (B) uses a period to separate the sentences, it is the correct choice.

6) **⇒** B

As written, the underlined section creates confusion because it is not clear that Shackleton had to turn back each of the the three times. The phrase at (B) more clearly connects the ideas by using the transition word "but" and by making the second half a dependent clause.

### Question Topics 015 - 018: Phrases

1) **⇒** A

The phrase "a military general" is an appositive that adds information about Zhou Yu. When an appositive appears anywhere other than at the very beginning or end of a sentence, the appositive must be separated from the rest of the sentence using a pair of commas, em dashes, or parentheses. Because (A) places commas at the beginning and end of the appositive, it is the correct choice.

2) **⇒** B

"To General Zhou Yu's surprise" begins with the preposition "to," so it is a prepositional phrase. When a lengthy prepositional phrase appears at the beginning of a sentence, a comma should always end the phrase. Thus, (B) is the correct answer.

3) **⇒** B

The past participle "appeared" is incorrect here because the action is occurring at the same time as the main verb, "arranges." (B) is correct because "appearing" creates a parallel time frame.

4) **⇒** A

The phrase “the forces of Cao Cao” is an appositive that describes “the enemy.” End-of-sentence appositives must be separated from the rest of a sentence using either a comma, an em dash, or a pair of parentheses. (A) correctly uses an em dash to separate the appositive from the rest of the sentence.

5) **⇒** B

Generally, short prepositional phrases, such as “in the straw,” do not need to be separated from the rest of the sentence with a comma, making (B) the correct choice.

6) **⇒** B

The participial phrase describes a noun that is not included—the phrase is a dangling modifier. As written, the sentence indicates that the arrows sped away, rather than the boats. (B) clarifies the sentence.

#### Question Topics 019 – 020: Verb Tense

1) **⇒** B

Because service animals still help people with disabilities today, the verb “to help” should be in the present tense. Although the saying happened in the past, the usage falls into the category of being a universal truth.

2) **⇒** B

The verb tense in the sentence should be consistent with the verb tense in the surrounding sentences. (B) correctly changes “coax” to the past tense.

3) **⇒** A

When reporting something that someone said in the past, the future tense is expressed using the conditional “would” instead of “will.” Because the sentence containing the underlined portion is reporting something the trainer said, “would” is the appropriate verb to express a future event.

4) **⇒** B

When using the word “will,” conditional statements (statements introduced by “if” or “when”) are generally expressed using the present tense. Thus, the clause “if service-animal organization put more resources...” is a conditional statement, and the verb “put” should be in the present tense.

5) **⇒** A

Although the speaker is mentioning a fact that he or she has read, the sentence is not reported speech. Thus, it makes sense to describe the monkeys’ qualities in the present tense to match the descriptions in the following sentences.

6) **⇒** A

The sentence immediately after the underlined portion says that monkeys “provide good company.” The verb “provide” is in the present tense. Thus, we can safely assume that the underlined portion should be in the present tense, making (A) the correct choice.

#### Question Topics 021 – 022: Mood & Voice

1) **⇒** B

As written, the sentence inappropriately switches from the indicative mood to the imperative mood at the underlined portion. Choice (B) is correct because it changes the sentence into a conditional statement, which is clearer and more consistent.

2) **⇒** A

The underlined portion correctly uses the active voice; the structure conveys the information about a bigger and heavier thing’s capabilities directly and concisely. There is no reason to use the more convoluted passive voice, as in choice (B).

3) **⇒** B

Many subjunctive sentences, including the one containing the underlined portion, describe requirements. When a subjunctive statement contains a third-person singular, present-tense

verb, make sure the verb does not have an “s” at the end, as it would for an indicative sentence. (B) is the correct choice because the verb “contain” must express the subjunctive mood.

4) **⇒** B

Choice (A) is incorrect because it unnecessarily uses the passive voice (“are used”) to express an action that can be stated using the active voice. (A) causes the reader to wonder whether the rotating parts turn the magnet, or whether they only help the magnet turn. (B) is preferable because it uses the active voice to clarify that rotating parts turn a magnet.

5) **⇒** B

Because the sentence containing the underlined portion is expressing a process that occurs in reality, the indicative is more appropriate than the subjunctive, making (B) correct.

6) **⇒** A

The underlined portion correctly uses the passive voice, “is called.” In this case, the reader understands that the subject is “people” or “the public,” “everyone,” etc. (B) would not improve the sentence because although it is in the active voice, it adds an informal “you” as a subject. It also could be understood as an imperative statement, which would not be consistent with the paragraph.

#### Question Topics 023 – 025: Comparing & Listing

1) **⇒** A

The sentence containing the underlined portion compares a moment in the *Firebird Suite* to moments in other songs. The underlined portion is crucial to this comparison because without it, “that moment” would be compared to “any other song,” forming an illogical comparison. Thus, the correct choice is (A).

2) **⇒** B

As written, the sentence at 2 compares music to “people thinking something,” which does not make

sense. Choice (B) corrects the problem, with familiar music being compared to unfamiliar music.

3) **⇒** B

The underlined words are part of a list, and should be consistent grammatically with other parts of the list. In this case, the list consists of past participles: “increased heart rate, dilated pupils...” As a result, (B) is a better match.

4) **⇒** B

The sentence containing the underlined portion is comparing two things: the amount of dopamine released before a “chill-inducing moment” of music and the amount of dopamine released after that same moment. When comparing two things, use the modifier “more”; when comparing more than two things, use the modifier “most.” (B) is correct because this comparison involves only two things, making “more” the appropriate modifier.

5) **⇒** A

The underlined portion is part of a list composed of the simple nouns “expectation” and “pleasure.” Thus, the noun “adaptation” is a good fit, while the gerund “adapting” would be out of place.

6) **⇒** B

When forming the comparative degree, add the “-er” ending to a one-syllable quality and the word “more” before a two-syllable quality. However, adding both the “-er” ending and “more” is redundant, so the underlined portion must be deleted to maintain conciseness.

#### Question Topics 026 – 029: In-Sentence Punctuation

1) **⇒** A

The introductory phrase “Much like the Hawaiian Islands” is lengthy enough to need a comma to separate it from the rest of the sentence. Thus the sentence should not be changed.

2) **⇒** B

Phrases beginning with “that” are rarely preceded by a comma, making (B) the correct choice.

3) **⇒** A

The semi-colon correctly joins two related independent clauses in the same sentence.

4) **⇒** B

The dependent clause “When molten rock was cascading out of the sea to form Jeju Island” comes before a prepositional phrase (“in some areas”) that is part of the independent clause about the lava. Therefore, a comma must follow the dependent clause.

5) **⇒** B

The information “forming insulation” is essential to the sentence; without it, the reader would not know what kept the lava hot. Therefore, it should not be set off from the rest of the sentence with em dashes. (B) appropriately adds a comma to separate the independent clause from the participial phrase “forming insulation that...”

6) **⇒** A

“Subsequently” is a transition word, so it needs a comma to separate it from the rest of the sentence. A colon would imply some elaboration on the word “subsequently,” such as “after that,” which would create a sentence fragment.

7) **⇒** B

A colon is correct in this case because the phrase “a perfectly round...” explains the preceding description of the peak looking like an elevator button. Thus, the colon introduces an elaboration.

### Question Topics 030 - 034: Subject-Verb Agreement

1) **⇒** A

The noun to which the verb “commands” refers is the subject of the sentence, “The small island.”

Because the noun phrase “The small island” is singular, the third-person singular verb “commands” is the appropriate form of the verb, making (A) the correct choice.

2) **⇒** B

The subject of a sentence is never located in a prepositional phrase. Thus, “Icelanders” is NOT the subject of the sentence because it is part of the prepositional phrase “in ten Icelanders.” The subject of the sentence, and the noun to which the verb “is” refers, is “one.” “Is” agrees in number with “one,” as both are singular, so (B) is the correct choice.

3) **⇒** B

The subject in this clause is the collective noun, “a repertoire of stories.” Since there is only one repertoire, the verb must be in the third-person singular, as in “helps.”

4) **⇒** B

The full subject of the sentence, and the noun phrase to which the verb “contribute” refers, is “Iceland’s natural beauty and history.” This noun phrase is plural, as it mentions both “natural beauty” and “history.” Thus, the correct verb form is “contribute” because it corresponds to a plural subject.

5) **⇒** A

The sentence’s essential meaning is that the *Icelandic government provides*. Since “government” is singular, it is correct that the verb “provides” should also be singular in form.

6) **⇒** A

The verb “is” refers to “finding inspiration” (“finding inspiration...is wonderful”). Because all gerunds (words that look like verbs but act like nouns—“finding” in this case) are singular, “is” is the correct form of the verb, and (A) is the correct choice.

Question Topics 035 – 039: Pronouns

1) **⇒** A

The description of Peter Drucker includes both “professor” and “business consultant.” In spite of the two titles, Drucker is singular, so the pronoun “his” is appropriate.

2) **⇒** B

The underlined words occur in a phrase that begins “an organization’s *managers and employees* agreeing...” Since the agreeing is being done by more than one, the pronoun must be plural.

3) **⇒** B

The subject of the sentence is “a typical employee.” Since the subject is singular, a manager can only give a written evaluation to “him” or “her,” not to “them.”

4) **⇒** A

If we turn the indirect question about credit into a hypothetical answer, we would say “The credit for the methods should go to **him** (or “her” or “them”). Remember the rule of thumb that “whom” and “him” sound alike and play a similar role: as the object of a preposition (such as “to”) or of an action.

5) **⇒** B

“Everyone” is an indefinite pronoun. It does not refer to a definite person, but it does refer to an abstract “individual.” Since “everyone” is singular, the pronoun referring to it must be singular as well.

6) **⇒** B

In the sentence as written, it is unclear whether “they” refers to “TQM and MBO,” “companies,” or “goals.” Choice (B) clears up any confusion by restating “the goals.”

Question Topics 040 – 041:  
Commonly Confused Words

1) **⇒** B

The correct choice is (B) because “past” refers to durations of time that have ended, and the underlined portion is referring to the two decades before the present (the past).

2) **⇒** A

“To accept” something is to admit or to agree to take something, and “to except” something is to omit it or leave it out of a list or group. When we plug in these definitions at the underlined portion, it becomes clear that (A) is the correct choice, as it makes sense to say, “we must admit...that environmental factors will conspire...”

3) **⇒** C

The correct choice is the existential pronoun “there,” as the underlined portion emphasizes that “a chance” exists.

4) **⇒** B

The preposition “to” often follows the verb “refer,” making (B) the correct choice.

5) **⇒** B

“Huge” is an adjective that describes the word at the underlined portion. Adjectives generally modify nouns, and “affect” is a verb, so (A) must be incorrect. (B) is correct because “effect” is a noun, so it is logical that “huge” modifies “effect.”

6) **⇒** A

“Averse” means having feelings of dislike or opposition. From this, we can conclude that (B) is incorrect because the underlined portion describes “environmental changes,” and environmental changes cannot have feelings, making (B) illogical in the context of the sentence. “Adverse” means harmful, which makes sense in the sentence, as harmful environmental changes can lead to the extinction of animal species.

7) **⇒** B

Although it may not be immediately evident, the sentence containing the underlined portion includes a comparison, which is evidenced in the use of the comparative word “further” (the comparative form of “far”). Because “than” is used when forming a comparison, (B) is the correct choice.

8) **⇒** A

The underlined portion refers to “life on Earth,” which is showing possession over its “impending demise.” “Its” is the possessive form of “it,” making (A) the correct choice. “It’s” is the contracted form of “it is,” which does not work in the context of the sentence.

Question Topics 042 – 043:  
Additional Topics

1) **⇒** A

The verb “prevent” is often followed by the preposition “from,” making (A) the correct choice. As is evidenced by the underlined portion, a noun or pronoun usually comes between “prevent” and “from.”

2) **⇒** B

When it introduces two alternatives, the adverb “both” always pairs with the conjunction “and,” making (B) the correct choice. “Or” is used in the correlative conjunction “either...or” to indicate that only one of two choices can be selected.

3) **⇒** B

“To result in” is to cause or produce; “to result from” is to be caused by. Based on the context of the sentence, sleep paralysis can cause/produce hallucinations. Thus, (B) is correct choice.

4) **⇒** A

The verb “center” often pairs with the preposition “on,” making (A) the correct choice.

5) **⇒** B

“Whether” is a conjunction that expresses a choice between two options. The conjunction “and” indicates that all of two or more options can be chosen, whereas the conjunction “or” indicates that only one option may be selected. Thus, (B) is correct because both “whether” and “or” suggest that only one of two options can be selected.

6) **⇒** B

The word “neither” always pairs with “nor,” making (B) the correct choice.

Question Topics 044 – 046:  
Development and Organization

1) **⇒** A

The second sentence of the passage says, “Even behemoths are able to stay afloat.” That sentence enhances the idea from (A) that huge species can thrive in water. Furthermore, the rest of the passage discusses huge aquatic animals, including slow ones.

2) **⇒** A

The paragraphs have opposite focuses (fast vs. slow giant aquatic creatures), and the transition “on the other hand” indicates that opposing information will follow. Thus, (A) is the correct choice.

3) **⇒** B

The topic sentence of the passage suggests that aquatic animals are the focus of the passage. Because tree sloths and elephants do not live in water, we can conclude that the underlined sentence distracts from the topic’s focus. Furthermore, penguins do not fit the passage’s focus on “huge” marine animals, specifically blue whales, the giant Pacific octopus, and the Mola mola.



4) **⇒** A

The author focuses on the Mola mola's size, characterizing it as an "awkward giant." Because (A) lists the dimensions of a Mola mola while also describing its "ungainly" shape, it is the correct choice. (B) adds information about the Mola mola that is irrelevant to the main topic of the passage.

Question Topics 047 - 050:  
Concision, Style, & Syntax

6) **⇒** B

As written, the use of the word "fortunately" is jarring in an otherwise neutral passage. Secondly, the sentence at (B) conveys the information more clearly.

1) **⇒** B

Choice (B) is concise. It expresses "income level and ethnic background" as "background," for example, which improves the passage's focus on watermelon itself. Also, (B) corrects unnecessary emphasis: "nearly every single Southerner" becomes simply "Southerners."

2) **⇒** A

The tone of the passage is formal, whereas the tone of the phrase "shows up here and there" is informal. Thus, "appears frequently" is consistent in tone and should remain unchanged.

3) **⇒** B

As written, the phrase is wordy and awkward; it references "commercial farming" without explanation, and its syntax makes it sound as if farming began using trucks, which is muddled. In contrast, (B) is concise and clear.

4) **⇒** B

Choice (B) conveys the same information as (A), but (B) is much more concise.

5) **⇒** B

Both of the choices are grammatically correct, but (B) incorporates more precise and interesting diction.

## Mastering

*The Essay Test*

	<i>Section 1</i>
<b>ESSAY TEST BASICS</b>	122
	<i>Section 2</i>
<b>ESSAY TEST SKILLS</b>	123
	<i>Section 3</i>
<b>APPROACHING THE PASSAGE</b>	124
Practice Activity 1	125
	<i>Section 4</i>
<b>ANNOTATING THE PASSAGE</b>	127
	<i>Section 5</i>
<b>OUTLINING AND WRITING YOUR ESSAY</b>	129
	<i>Section 6</i>
<b>HOW TO PRACTICE</b>	131
Practice Activity 2	132
Practice Activity 3	135
Practice Activity 4	142



## Essay Test Basics

In the Redesigned SAT, the Essay Test is optional. Some colleges and universities do not require SAT Essay scores as part of the application process, but many do. That's why it is a great idea to tackle the Essay Test: it may give you more choices later. The good news is that the Redesigned SAT Essay has a standard prompt which includes very specific directions. Completing the following activities will help you practice, so when you face the Redesigned SAT essay prompt, you will know exactly what to do.



### NOTE

All SAT Essay Tests follow the same procedure: within 50 minutes, you must read a passage and write an analysis of it.

- 1 First, you will be presented with the following instructions:

As you read the passage below, consider how the author uses:

- evidence, such as facts or examples, to support claims.
- reasoning to develop ideas and to connect claims and evidence.
- stylistic or persuasive elements, such as word choice or appeals to emotion, to add power to the ideas expressed.



- 2 After reading the instructions, you will be presented with a 650- to 750-word passage that argues a certain point. As you read the passage, take notes based on the considerations listed above. After the passage, a variation of the following prompt will appear:

Write an essay in which you explain how the author builds an argument to persuade his/her audience about the author's claim. In your essay, analyze how the author uses one or more of the features listed above (or features of your own choice) to strengthen the logic and persuasiveness of his/her argument. Be sure that your analysis focuses on the most relevant features of the passage. Your essay should not explain whether you agree with the author's claims, but rather explain how the author builds an argument to persuade his/her audience.

# Essay Test Skills

The SAT Essay Test is scored based on the following criteria: **Reading**, **Analysis**, and **Writing**.



You are evaluated on your understanding of the passage, on the basis of:

- ▶ including accurate descriptions of overarching and central ideas, major details, and the relationships between ideas and details.
- ▶ accurately using quotes and/or paraphrases.



You are scored based on how well you explain the author's use of reasoning and stylistic elements in a passage. You can demonstrate analytical abilities by:

- ▶ showing that you understand what you are being asked to do by writing an analysis.
- ▶ commenting on several elements that the author uses to build the argument.
- ▶ supporting your points with references to the text.
- ▶ quoting and referencing the most relevant portions of the passage.



You are scored based on how clearly and concisely you present an analysis. You can demonstrate your writing abilities by:

- ▶ making and supporting a central claim regarding the passage.
- ▶ using varied sentence structures and a diverse vocabulary.
- ▶ connecting ideas in such a way that all information is relevant to the prompt.
- ▶ writing a well-organized essay that shows a logical progression.
- ▶ demonstrating proper grammar and use of punctuation.



## NOTE

Essays are scored by two graders, each of whom assigns a score of 1 to 4 points (1 being the lowest) to each of the categories listed above. Thus, each category receives a score of 2 to 8 points.

## Approaching the Passage

Use the standard directions below for guidance when taking notes:

As you read the passage below, consider how the author uses:

- evidence, such as facts or examples, to support claims.
- reasoning to develop ideas and to connect claims and evidence.
- stylistic or persuasive elements, such as word choice or appeals to emotion, to add power to the ideas expressed.



Your primary goal when reading the passage is to **comprehend the issue** that the author is discussing and the author's position on it.

You must also notice how the author builds his or her argument (evidence), how the author explains his or her views (reasoning), and how the author addresses readers' senses and emotions (style). You may have to read the passage more than once to absorb these elements. As you read and review the passage, quickly take notes regarding the author's main strategies.

### Making an Argument: Author Strategies

#### 1. SUPPORTING EVIDENCE:

- *Citation of facts or statistics*
- *Citation of a source of authority*
- *Examples*

#### 2. REASONING AND LOGIC:

- *What the writer thinks, based on the evidence (arguments, claims, connections, and conclusions)*
- *Demonstrations by contrast, analogy, metaphor, and comparison*

#### 3. STYLISTIC OR PERSUASIVE STRATEGIES:

- *Word choices that appeal to emotions*
- *Sentence or paragraph structures used for a particular effect (juxtaposition, repetition, short sentences, and questions)*
- *Descriptive wording, comparisons, and imagery*
- *Reminiscences, warnings, calls to action, reassurances, irony, and humor*



## Practice Activity 1: Recognizing Rhetorical Devices

Each of the following short texts employs at least one rhetorical device.

In the spaces that follow each short text, identify one or more functions it serves. Write:

“E” for supportive Evidence

AND/OR

“R” for Reasoning and logic

AND/OR

“S” for Stylistic or persuasive strategies

- 
1. People generally tend to comply with expectations and follow rules; therefore, the authors of this study hypothesized that most grocery shoppers would change their shopping patterns if they had partitioned shopping carts.

**Function of text:** \_\_\_\_\_

2. Scarlet macaws—those raucous and bustling rulers of the rainforest’s upper canopy—are facing extinction as their habitat shrinks.

**Function of text:** \_\_\_\_\_

3. The company’s data revealed that its employees produced 10 percent more work during the workday if they joined large groups to eat lunch.

**Function of text:** \_\_\_\_\_

4. Consider that Ludwig van Beethoven composed his most sublime and innovative music after he became deaf. It is nothing short of stunning that he was able to use a kind of “inner ear” to express visceral emotions with music.

**Function of text:** \_\_\_\_\_

5. A study led by geneticists at Oxford University used DNA sequences from living people to confirm historical accounts of events that led to the genetic mixing of populations, such as conquests and trade routes.

**Function of text:** \_\_\_\_\_

6. When typical DNA sequences of two populations match, it can be assumed that they have shared ancestry. It also makes sense that the longer the matching sequence is, the more recently the populations intermingled, because the matching is less diluted.

**Function of text:** \_\_\_\_\_

7. Roman coins found at the archaeological site indicate that the ancient village was part of a far-reaching network of trade routes.

**Function of text:** \_\_\_\_\_

8. The Mexican region of Oaxaca (pronounced “wa-ha-ka”) has a reputation for quality folk art based on the hand-loomed wool rugs that have been produced in Oaxacan villages since the Zapotec empire (500 BCE to 900 CE).

**Function of text:** \_\_\_\_\_

9. Critics of mixed-gender schools say that rather than helping students overcome shyness, the schools make students feel painfully self-conscious.

**Function of text:** \_\_\_\_\_

10. If you had a thermos of hot chocolate and you tried to drink it through a straw in the thermos’s cap, the straw would concentrate the liquid’s heat and would probably burn your tongue and the roof of your mouth. Similarly, geothermal energy is captured by drilling narrow vents deep into the ground to reach water heated by the Earth’s inner core of magma. The water is drawn up as steam, which can power turbines.

**Function of text:** \_\_\_\_\_

*\* You can find sample answers with explanations at the end of this chapter.*

# Annotating the Passage

Below you will find a short text accompanied by sample notes. The student went back after writing the notes and underlined the most relevant points. Next, the writer can use the notes to outline an analytical essay.

The following passage is adapted from Peter Janiszewski, Ph.D., "30% of people with a 'healthy' BMI are actually obese," 2015 Obesity Panacea (PLoS BLOGS)

## Passage

Although I've discussed this issue a number of times over the years, every now and then a new study comes out that provides further evidence of the limitations of **body mass index (BMI)** as a measure of health, or even adiposity (level of fat in the body).

Recall that BMI is the most common metric used to assess body weight status, and to identify the presence of overweight and obese individuals. While it is great when used in epidemiological studies across thousands of people, it's a pretty lousy measure on an individual basis. So why does it keep being used? It is relatively easy and inexpensive to measure height and weight – hence, the measure persists in clinical practice.

In this cross-sectional study the authors assessed the BMI, body fat percentage, and cardiometabolic risk factors of 6,123 (924 lean, 1,637 overweight and 3,562 obese, classified according to BMI) Caucasian subjects (69% females) between the ages of 18 and 80 years.

### What did they find?

First, 29% of subjects classified as normal weight and 80% of individuals classified as overweight according to BMI had a body fat percentage within the obese range. Thus, on an individual basis BMI tends to consistently underestimate a person's adiposity. This data implies that there are many individuals who don't weigh that much on an absolute scale, but a large proportion of their weight is composed of fat tissue. These are people who may look thin, but tend to be soft, with little muscle tone. In a clinical setting, these folks may easily be overlooked by their physician due to their "normal weight."

## Sample Notes

➤ Topic is new study: BMI limited as measure of health

➤ BMI based on height, weight; easy/inexpensive way to identify overweight/obesity (counterpoint)  
 Author: BMI is "lousy" measure for individual health (stylistic; word choice)

➤ New study uses body fat % and cardiometabolic risk factors;  
 Author begins to support his case with factual evidence

➤ Study findings: some BMI normal weight and most overweight have body fat % in "obese" range  
 ▶ Data support argument that BMI "lousy" measure for individuals  
 ▶ Supporting example: someone who looks thin but has little muscle



Conversely, approximately 5% of individuals classified as overweight and 0.2% of those classified as obese by BMI actually had low levels of fat mass. These individuals would be the bodybuilders of the bunch – high absolute body weight that is composed mostly of muscle mass. This is often the line of argument used to illustrate how ineffective BMI is at measuring adiposity. And yet, as I’ve criticized before, the misclassification in this direction appears to occur only rarely. This simply suggests there are simply few body builders around. More importantly, any physician should be able to conclude that the patient in front of them with a BMI of  $31 \text{ kg/m}^2$  is not actually obese when their biceps are bigger than their waist.

Finally, when compared to individuals who were actually lean (both on BMI and body fat), those with a high levels of adiposity, regardless of their BMI (normal weight, overweight or obese BMI) had poorer cardiometabolic profiles, including elevated blood pressure, blood glucose and lipid levels, as well as markers of systemic inflammation.

So how can a physician determine whether a patient with a normal or overweight BMI is actually obese? Measuring waist circumference certainly seems to help. This one measure can help distinguish those with a low versus high adiposity despite similar BMIs.

Even better, physicians could start paying less attention to weight or adiposity altogether, and evaluate more relevant markers of a patient’s health, including metabolic factors, psychological status, mobility, etc.

Study data show converse also true, BMI mistaking muscle mass for obesity.

Author; dismisses supportive data because cases occur so rarely  
Reasoning: not likely doctors will misclassify muscular individuals

Evidence: Subjects with high levels of body fat also had high blood pressure, etc.  
Implication: doctors may be missing signs (supports “lousy individual care” argument)

Alternative simple measure proposed: measure waist

Reasoning: if weight and body fat not meaningful, doctors should focus on “more relevant markers” of health

# Outlining and Writing Your Essay

Outlining your essay allows you to organize and connect information mentioned in your notes before you start writing. Without an outline, an essay may become disorganized, wordy, and redundant. By the end of your outlining process, you should know how you will respond to each aspect of the prompt.

## ► Prompt ◀

Write an essay in which you explain how Peter Janiszewski builds an argument to persuade his audience that BMI is not an accurate measurement of an individual's health. Your essay should not explain whether you agree with Janiszewski's claims, but rather explain how Janiszewski builds an argument to persuade his audience.

► WE CAN BREAK THIS LARGE PROMPT INTO THREE CENTRAL QUESTIONS:



## THREE CENTRAL QUESTIONS

### 1 What is the author's attitude toward using BMI to measure an individual's health?

**Confirm** that you understand the central argument made by the author and jot it down. Be very careful to identify this argument correctly, as the author may use counterexamples to prove his points which, if misread, would lead you to think that the author is saying the opposite of what he is saying.

### 2 What evidence and stylistic techniques does the author use to support his attitude?

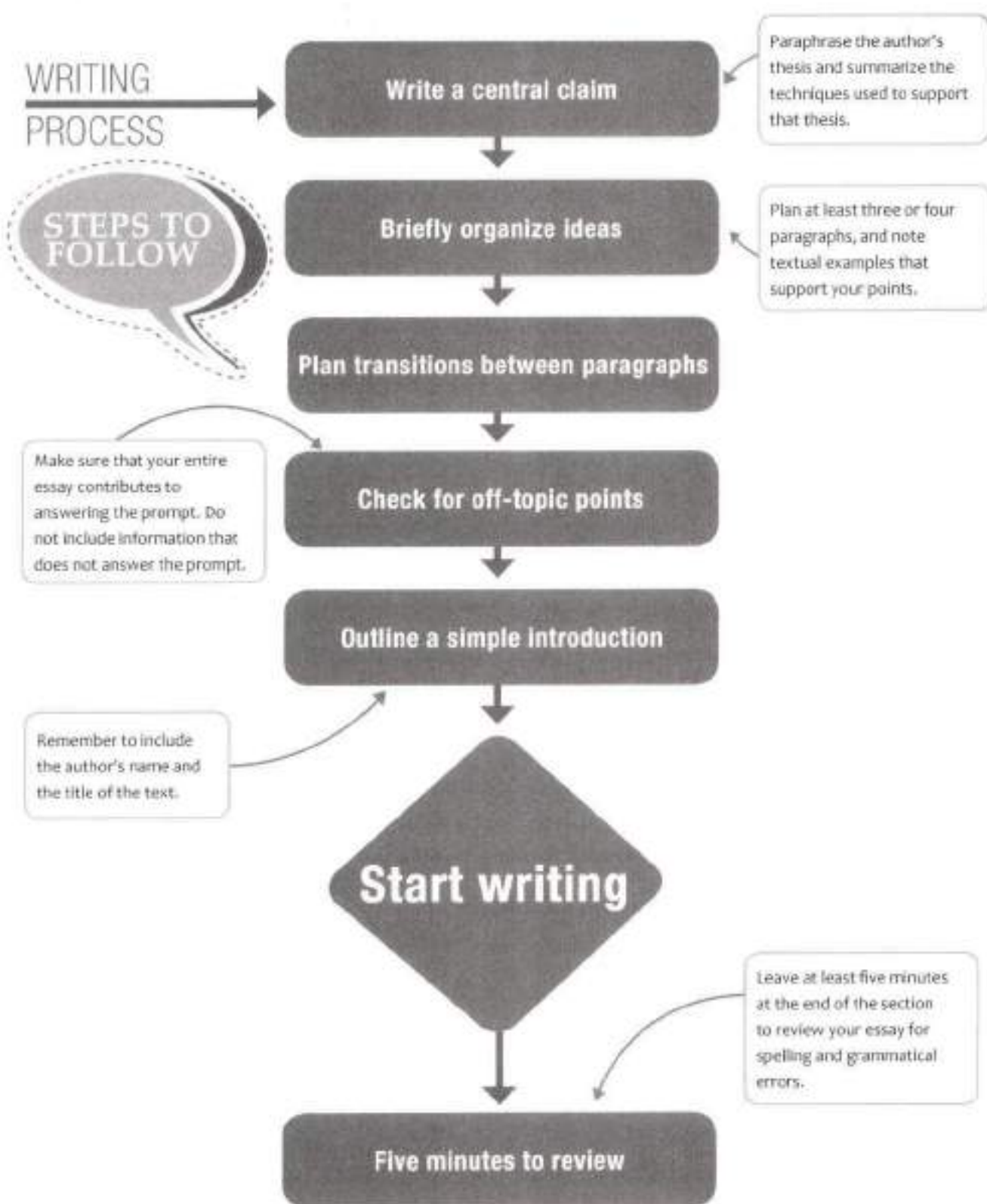
Look at your notes and **identify** the broader techniques used by the author. Begin to plan the structure of your essay based on these broader points.

### 3 How does this evidence support his attitude?

Always **relate** the evidence or stylistic element to the specific point being made. Explain why the strategy in question helps (or does not help) the author build a persuasive argument. For example, you may discuss why particular imagery used by the author is useful, how descriptive diction helps the author prove his or her point, or how the author's use of data persuades the reader.

By answering each of the above questions in an essay, you will have identified the passage's **main topic, evidence, reasoning, and stylistic elements**. In other words, you will know what you want to say in your essay.

Once you know what you will say in your essay, quickly determine how you will say it:



## How to Practice



The Essay Section will always be based on a source text and accompanied by the standard prompt. As a result, practicing is very easy:

Source materials are abundant. You can find persuasive texts in columns and editorials in newspapers, magazines, and media websites. You are virtually surrounded by people who are trying to persuade you of something. All persuaders use **reasoning, evidence, and stylistic elements** to make an argument.



Once you have a source article, **practice** notating it.



**Practice** writing essays. Start without a time limit, and then try timing yourself for 50 minutes.



In the weeks leading up to the test, you should aim to write two practice essays a week. The more you practice, the better your essays will be. And the more awareness you have of current issues, the easier it will be for you to quickly grasp the issue presented.

## Practice Activity 2

## Precise Claims

## NOTES

An essay's introduction provides the framework for everything that follows. It sets the tone of an essay while providing the reader with crucial background information. Possibly because so much is expected of introductions, many students find writing them difficult. On the SAT Essay Test, however, composing a thorough introduction is as simple as making a precise claim about the passage you are analyzing. If possible, include the author's name, the passage's title, any relevant context (such as the year published), the author's overall argument, and the author's primary strategies.

## TO START YOUR ESSAY WITH CLEAR, PRECISE IDEAS:

- ▶ include the title of the article and the name of the author, if available.
- ▶ make a claim about the author's primary strategies.
- ▶ state the author's overall argument.

## DIRECTIONS

The authors and titles excerpted below are imaginary, purely for practicing. Complete the claims about the excerpts with your own ideas. The first one is done for you.

EXCERPT  
1

From "The Irony of Bronze," by Hilda Door.

The year is 300 BCE; stormy seas toss a small ship crossing the Mediterranean Sea. After a valiant struggle, the ship's crew—along with its heavy cargo—is sunk. The families of the crew members wait and wait for them to come home, and finally mourn their loved ones.

Some 2,300 years later, however, an exquisite bronze statue carried by the ship is found in the mud. The statue is dug up; mud is cleaned from its face and hair; it is displayed in the world's finest museums, where children can look into its eyes and connect with people of an ancient era. The irony is that sinking into the sea saved the statue from destruction; most other bronze statues of the period were later melted down to make tools or weapons.



**Claim:** *In her article "The Irony of Bronze," Hilda Door uses imagery to emphasize a painful fact: sometimes human tragedy preserves ancient art.*

EXCERPT  
2

From "Weighing Group Projects," by Tyler Chun.

Daniel and Grace have opposite viewpoints. Daniel loves group project assignments because he is very social. He likes breaking down the project so that each person can choose what to do, and he does not mind hounding his peers if he thinks that they are slacking. But Grace hates group projects because she gets bored and frustrated by how long it takes to coordinate jobs.



**Claim:** In his article "Weighing Group Projects," Tyler Chun uses reasoning to \_\_\_\_\_

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EXCERPT  
3

From "Underwater Photographer," by Steven Sealberg.

Most people think that professional underwater photographers are lucky to get to swim about, shooting scenes of breathtaking marine life. But their art is also a business. Meeting deadlines can require a great deal of knowledge and creativity, mainly because underwater visibility is unpredictable. Rough seas cause reduced visibility for several reasons. One is that the rough surface reflects more sunlight, so that less light penetrates underwater. Another is that wave surges can stir up the silt and sand on the sea bottom, so that the water becomes murky.



**Claim:** In his article "Underwater Photographer," Steven \_\_\_\_\_

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I've heard it said that libraries are on their way out. Some claim that the Internet renders libraries obsolete; after all, why spend time sifting through shelf after dusty shelf when virtually any text is just a Google search or Wikipedia article away? I myself have fallen victim to the convenience of online research—my writing consistently references more hyperlinks than it does brick-and-mortar publishers.

Yet convenience does not necessarily lend itself to learning. Online research is simple, and it puts the learner in a passive position: type a few words, click "Search," and all your questions are answered. But learning is neither simple nor passive. Learning should be challenging, riddled with false starts and dead ends. Learning should be active and tactile. Too often, I've turned to the Internet for research and found exactly what I was looking for after a few minutes of searching. The process is quick and easy. However, that which comes easy is rarely that which stays with us.

More vivid than any memory of online research are my memories of conducting research in my alma mater's labyrinthine library. Memories of diving into the stacks intent on finding one book but ending up with five. Memories of thumbing through entire books looking for just two or three excerpts to strengthen my argument. Memories of frustration when those two or three excerpts didn't exist, and of triumph when I would find four instead of three.

Learning is a journey, not a destination. Online research allows us to teleport from destination to destination, forgoing the memories that come from the journeys. Libraries allow us to walk to our destinations; sure, it takes longer, but it makes the trip memorable.



**Claim:** \_\_\_\_\_

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\_\_\_\_\_

\_\_\_\_\_

*\* You can find sample answers with explanations at the end of this chapter.*

## NOTES

SAT Essay Test responses must focus on the “art and craft of writing.” You must demonstrate that you can identify and analyze the methods an author uses to persuade readers. In other words, once you have determined what an author says, you must explain how he or she says it. One way to analyze an author’s work is to discuss what makes their writing unique. Do they ask questions? Do they use humor to prove their point? The more thorough your analysis, the higher your score will be. Ultimately, SAT Essay Test evaluators are looking for insightful student responses. “Insight” means “seeing into,” implying a deep and profound understanding.

## TO DEMONSTRATE INSIGHTFUL ANALYSIS IN YOUR ESSAY RESPONSE:

- ▶ Name a strategy the author uses.
- ▶ Explain what point the strategy is supporting.
- ▶ Elaborate on how and why it works (or does not work).

It may help to remember the analytical task in this format:

*The strategy of (x) supports the author’s idea that (y) because...*

One way to elaborate on your point is to consider how persuasive the passage would be if the author did not use the strategy:

*If the author did not use the strategy of (x), then....*





## DIRECTIONS

Read the brief excerpts and fill in the blanks below with analytical ideas of your own. The first one is done for you.

EXCERPT

1

From *Not That It Matters*, by A.A. Milne, originally published in 1920.

Golf is so popular simply because it is the best game in the world at which to be bad... At golf it is the bad player who gets the most strokes. However good his opponent, the bad player has the right to play out each hole to the end; he will get more than his share of the game. He need have no fears that his new driver will not be employed. He will have as many swings with it as the scratch man; more, if he misses the ball altogether upon one or two tees. If he buys a new niblick [a golf club] he is certain to get fun out of it on the very first day.

1. **Persuasive strategy:** *Reasoning.*



2. **Idea that it supports:** *Golf is more fun if you are bad at it.*



3. **How and why it is supportive:**

*The author's logical process gives readers a new way to look at golf, and an alternative way of thinking about what makes a sport fun. He points out that in golf, "however good the opponent, the bad player has the right to play out each hole to the end." Rather than being embarrassed by his poor skills, Milne chooses to point out that even as a beginner with new golf clubs, he can have fun "on the very first day."*

*Milne's reasoning reminds readers of typical childhood goals in any game—to get to one's own turn. Milne reasons that "our turn" is long in golf when we are less proficient. It is a humorous point, because it is unexpected and reminds us that golf is just a game. More importantly, he models un-self-conscious enjoyment.*

*If Milne did not use reasoning, and just stated that golf is popular because it is fun even for beginners or bad players, readers would not be persuaded; it would seem a strange idea.*

Do you know Marvis Bay? ...It isn't what you'd call a fiercely exciting spot, but it has its good points. You spend the day there bathing and sitting on the sands, and in the evening you stroll out on the shore with the gnats. At nine o'clock you rub ointment on the wounds and go to bed.

1. **Persuasive strategy:** *Sarcastic humor.*



2. **Idea that it supports:** *Marvis Bay is boring.*



3. **How and why it is supportive:**

Wodehouse says that Marvis Bay "has its good points," but the "good points" sound uncomfortable (gnat bites) and boring ("sitting on the sands," and going to bed at 9 p.m.) The sarcastic humor persuades the reader because \_\_\_\_\_

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If the author did not use sarcastic humor, and just said "Marvis Bay is boring," \_\_\_\_\_

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From *Jean François Millet* by Estelle M. Hurl, originally published in 1900. The following is a collection of comments on Jean François Millet's drawing "Woman Feeding Hens."

Once more let us recall [John] Ruskin's teaching in regard to enclosed spaces. The artist is unhappy if shut in by impenetrable barriers. There must always be, [he] says, some way of escape, it matters not by how narrow a path, so that the imagination may have its liberty.

This is the principle which our painter has applied in his picture ["Woman Feeding Hens"]. [He] wisely gives us a glimpse of the sky above, and shows us the shady vista of the garden walk leading to the great world beyond.

**1. Persuasive strategy:** Referring to an expert authority, "Ruskin."



**2. Idea that it supports:** Artists such as Jean François Millet add openings and pathways to invite imagination about the larger setting.



**3. How and why it is supportive:**

The author's strategy of referring to "Ruskin," who is clearly considered an expert authority on art, \_\_\_\_\_

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If the author did not refer to an expert, the reader might think \_\_\_\_\_

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[Women are said to be single-minded.] But that which is ordinarily a fault may, on occasion of extraordinary stress, become the most transcendent and the most admirable of virtues. I think of this last war [World War I] and of the share our women and the women of other lands have played in it. No one caviled nor complained at the one-ideanness of womankind while the world was in a welter of woe and slaughter. Of all that they had, worth having, our women gave and gave and gave and gave. They gave their sons and their brothers, their husbands and their fathers, to their country; they gave of their time and of their energies and of their talent; they gave of their wonderful mercy and their wonderful patience, and their yet more wonderful courage; they gave of the work of their hands and the salt of their souls and the very blood of their hearts.

1. **Persuasive strategy:** *Repetition.*



2. **Idea that it supports:** *Women's single-mindedness can be* \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



3. **How and why it is supportive:**

*The author's repetition of the word "gave"* \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

*If the author did not use repetition,* \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Many mammals, including cats, dogs, and bears, have claws that are strong and long, useful for climbing, digging, and catching prey. But the most important use for claws in many cases is to assist animals with simply walking and running. The principle is the same as that for treads on the soles of athletic shoes: traction. When a cheetah can dig its claws into the ground, it can push off with more power and thus, more speed. When a polar bear has to walk across slippery ice, the traction from its claws can prevent slipping.

1. Persuasive strategy: *Providing examples.*



2. Idea that it supports: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



3. How and why it is supportive: \_\_\_\_\_  
\_\_\_\_\_  
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\_\_\_\_\_

Many people are familiar with the University of Arizona (UA), located in Tucson, Arizona, partly due to its high-ranking athletic teams, the Wildcats.

But in terms of enrollment, UA is dwarfed by two universities located in Phoenix, Arizona. One of these, Arizona State University (ASU), is the largest public (government-supported) university in the nation, with more than 83,000 students spread over its six campuses and online. The University of Phoenix, a private for-profit institution, has 112 campuses worldwide, and many online programs. It has the largest enrollment of any university in the United States, with about 227,000 students in 2015.

1. Persuasive strategy: \_\_\_\_\_



2. Idea that it supports: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



3. How and why it is supportive: \_\_\_\_\_  
\_\_\_\_\_  
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\_\_\_\_\_

\* You can find sample answers with explanations at the end of this chapter.

## NOTES

Your primary task on the SAT Essay Test is to analyze an author's work. Quoting an author allows you to show the reader exactly what part of the text you intend to analyze while simultaneously demonstrating your own understanding of the text. Moreover, referring to the text frequently helps your response stay focused. When summarizing information from a passage, paraphrasing (using your own words) is often preferable to direct quotations, yet quoting is often effective when you want to highlight a unique stylistic element used by the author.

## 1. TO USE QUOTATIONS SKILLFULLY:

To complete the writing task, you must be able to:

- ▶ Choose parts of the text that have the most to do with your point.
- ▶ Integrate them smoothly into sentences of your own.

## 2. WRITERS INTEGRATE QUOTATIONS IN MANY WAYS, BUT HERE ARE THREE BASIC METHODS:

- ▶ following a complete thought and a colon
- ▶ following a comma
- ▶ following "says that" or its equivalent

Three basic methods	Example
1) (Complete thought): →	<i>In "The Star-Spangled Banner," Francis Scott Keys begins with a rhetorical question: "Oh, say can you see, by the dawn's early light...?"</i>
2) The author says, →	<i>The flag's stars and stripes, Keys says, "were so gallantly streaming."</i>
3) The author says that →	<i>Keys says that "the rockets' red glare, the bombs bursting in air" provided light to see the flag.</i>

**DIRECTION**

Read the brief excerpt and fill in the blanks below with quotations. The first one is partially done for you.

**EXCERPT**  
**1**

From "The Star-Spangled Banner," by Francis Scott Keys, 1814.

Oh, say can you see by the dawn's early light,  
 What so proudly we hail'd at the twilight's last gleaming,  
 Whose broad stripes and bright stars through the perilous fight,  
 O'er the ramparts we watch'd, were so gallantly streaming?  
 And the rocket's red glare, the bombs bursting in air,  
 Gave proof through the night that our flag was still there,  
 Oh, say does that star-spangled banner yet wave  
 O'er the land of the free and the home of the brave?

**Three basic methods****Example**

1) (Complete thought):



*Keys finishes the verse with a second question:*  
 "Oh, say does that star-spangled banner yet wave...?"

*The light from explosions, Keys says, "Gave \_\_\_\_\_"*

\_\_\_\_\_

\_\_\_\_\_

2) The author says,



*Keys says that the United States of America is*  
 "the land \_\_\_\_\_"

\_\_\_\_\_

\_\_\_\_\_

3) The author says that



\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



From "Take Me Out to the Ballgame," lyrics by Jack Norworth, 1908.

Take me out to the ball game,  
Take me out with the crowd.  
Buy me some peanuts and cracker jack,  
I don't care if I never get back,  
Let me root, root, root for the home team,  
If they don't win it's a shame.  
For it's one, two, three strikes, you're out,  
At the old ball game.

**Three basic methods****Example**

1) **(Complete thought):**



*The speaker in the song seems to want to be swept up in something big and exciting: "Take \_\_\_\_\_*

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_."

2) **The author says,**



*The speaker cheerfully imitates an umpire and says, "For \_\_\_\_\_*

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_."

3) **The author says that**



*Showing lighthearted competitive spirit, the speaker says that "If \_\_\_\_\_*

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_."

Should old acquaintance be forgot,  
and never brought to mind?  
Should old acquaintance be forgot,  
and auld lang syne [times gone by]?  
CHORUS:  
For auld lang syne, my dear,  
for auld lang syne,  
we'll take a cup of kindness yet,  
for auld lang syne.  
And surely you'll buy your pint cup!  
and surely I'll buy mine!  
And we'll take a cup o' kindness yet,  
for auld lang syne.

**Three basic methods****Example**1) **(Complete thought):***In Robert Burns' "Auld Lang Syne," the speaker*


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2) **The author says,***The speaker in the song*


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3) **The author says that**


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\* You can find sample answers with explanations at the end of this chapter.





MODEL  
**ANSWERS**  
PRACTICE ACTIVITIES  
1-4



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*In every case, answers will vary. Model answers are merely examples of possible answers.*

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# Model Answers...

## Mastering the Essay Test

### Practice Activity 1

- 1. ➡ R**  
The author describes a prediction about typical human behavior based upon a generalization. The author thus describes a reasoning process: if *x* is true, then *y* must be true.
- 2. ➡ S, E**  
In the middle of a factual statement about scarlet macaws facing extinction, the author interjects an emotionally appealing description of the birds. The stylistic strategy serves to heighten readers' concern about the birds by highlighting their lively and humorous qualities.
- 3. ➡ E**  
The sentence summarizes research data, which can serve as evidence in a text.
- 4. ➡ S**  
Choosing words such as "sublime," "stunning," and "visceral" adds a stylistic layer to an otherwise purely factual sentence. The author's purpose is to persuade the reader to share his or her attitude toward Beethoven's compositions.
- 5. ➡ E, R**  
The text introduces a research study and its general results. Thus, the text provides an introductory sentence that alludes to evidence in the form of facts (DNA findings). It also makes use of reasoning when it indicates the types of claims that will be based on the facts (connections to events in history).
- 6. ➡ R**  
The text primarily describes a reasoning process: in cases where populations' DNA sequences match, it is reasonable to assume that populations have shared ancestry. The more they match, it is reasonable to conclude that they have mingled more recently.
- 7. ➡ E, R**  
The text describes solid evidence in the form of ancient Roman coins found at the site of an archaeological dig. It also contains reasoning and interpretation: the coins must mean that there was a trade network that reached from the site to ancient Rome.
- 8. ➡ E**  
The author packs the sentence full of evidence in the form of facts, including the region, how to pronounce the name of the region, the reputation of the region, the product that provides its renown, and its ancient history.
- 9. ➡ S, R**  
Claims are by definition forms of reasoning, based on some type of deduction or interpretation. The sentence functions as reasoning in that it describes a claim made by "critics of mixed-gender schools." The sentence also includes stylistic devices. Phrases such as "overcome shyness" and "painfully self-conscious" serve to provoke readers' interest and empathy.
- 10. ➡ R, E**  
The text includes many facts about heat, straws, and geothermal energy. It uses reasoning in the form of analogy to explain the facts: if you have experienced *x*, or can imagine experiencing *x*, you can understand *y*, because it has similarities.

## Practice Activity 2

**EXCERPT 2 Sample Answer**

**Claim:** In the article “Weighing Group Projects,” Tyler Chun uses reasoning to explain the pros and cons of group projects.

**EXCERPT 3 Sample Answer**

**Claim:** In his article “Underwater Photographer,” Steven Sealberg uses an explanatory style to spell out the challenges of professional underwater photography.

**EXCERPT 4 Sample Answer**

**Claim:** In “Public Libraries,” Magnolia Wordsmith makes use of rhetorical questions, personal anecdotes, and metaphor to strengthen her argument that libraries still serve an important function despite the growing popularity of online research.

## Practice Activity 3

**EXCERPT 2 Sample Answer**

3. It is a compliment to the reader; it makes the reader feel that the author trusts him or her to “get” the joke. It places the reader with the author, sharing a viewpoint. If the author did not use sarcastic humor, and just said “Marvis Bay is boring,” the reader might feel alienated, because it would sound like a complaint. The author would seem to be negative and overly critical. Instead, readers probably find themselves laughing with the author and assuming that he is correct about the bay.

**EXCERPT 3 Sample Answer**

3. helps the reader feel that the perspective is trustworthy. If the author did not refer to an expert, the idea might seem to be just something that the author herself thinks.

**EXCERPT 4 Sample Answer**

2. a virtue during times of chaos and crisis.  
3. emphasizes the massive outpouring of support by women during the war. If the author did not repeat the word over and over, the reader would not have the same emotional response. The repetition makes the author sound very serious as he attempts to overturn a conventional view of women during his era. The repetition seems like the beating of a fist on a table, which shows strong feeling and is very persuasive.

**EXCERPT 5 Sample Answer**

2. Animal claws help with simply walking and running by providing traction.  
3. The examples help the reader visualize the effect of the animals’ claws. Without the examples of the cheetah and the polar bear, the reader might not pay as much attention to the author’s claim, and might not really agree that claws are necessary for providing traction. Once the reader can visualize the examples, the reader is much more likely to remember and accept the notion.

**EXCERPT 6 Sample Answer**

1. Use of data as evidence  
2. In the U.S., ASU and University of Phoenix are the largest institutions of their categories.  
3. The author’s use of enrollment figures and number of campuses for each institution is persuasive because the numbers are huge. The numbers surprise the reader, who might have trouble imagining so many students in one university. If the author had not included the data as evidence, the reader might think that ASU and the University of Phoenix were only slightly larger than other campuses, and would not have been convinced. The numbers, however, are inarguable evidence.

#### Practice Activity 4

##### EXCERPT 1 Sample Answer

2. proof through the night that our flag was still there.
3. of the free and the home of the brave.

##### EXCERPT 2 Sample Answer

1. me out to the ballgame, take me out with the crowd.”
2. “For it’s one, two, three strikes you’re out.”
3. they don’t win it’s a shame.”

##### EXCERPT 3 Sample Answer

1. asks a rhetorical question: “Should old acquaintance be forgot?”
2. apparently does not want to forget old times, and says, “We’ll take a cup of kindness yet.”
3. The speaker indicates trust when he says that “surely you’ll buy your pint cup.”

# MASTERING SAT MATHEMATICS

	<i>Chapter 4</i>
MASTERING SAT ALGEBRA	155
	<i>Chapter 5</i>
MASTERING ADVANCED TOPICS IN MATH	181
	<i>Chapter 6</i>
MASTERING SAT GEOMETRY	205
	<i>Chapter 7</i>
MASTERING SAT DATA ANALYSIS	235





# Math Test Basics

## A. Breaking Down the Math Test

The Math portion of the SAT consists of two tests:

- **One No-Calculator Math Test, 25 minutes**  
20 questions total: 15 multiple-choice questions, 5 student-produced response questions.
- **One Calculator Math Test, 55 minutes**  
38 questions total: 30 multiple-choice questions, 8 student-produced response questions including a pair of related questions (numbers 37 and 38) that are worth two points each.

Each correctly answered question is worth one point, with the exception of the pair at the end of the Calculator Test, which are worth two points per correctly answered question. Unanswered and incorrectly answered questions are worth zero points.

### Note

There is no scoring penalty for wrong answers—this means you should always guess even if you are unsure of the answer to a question.

## B. Introducing the Questions You Will See

The questions on the Math Tests can be classified according to four categories that correspond to the chapters of this book:

- **Mastering SAT Algebra:**  
Modeling and solving single equations and systems of equations; linear functions and their graphs
- **Mastering Advanced Topics in Math:**  
Polynomials and their graphs; factoring
- **Mastering SAT Geometry:**  
Geometry and trigonometry; complex numbers
- **Mastering SAT Data Analysis:**  
Graph and table analysis; probability and statistics

# KEY SKILLS

## FLUENCY

### ARITHMETIC

Fluency with arithmetic operations (addition, subtraction, multiplication, and division) is tested explicitly in the No-Calculator Test, but it is also essential in mastering the Calculator Test, as excessive use of your calculator will slow you down and can lead to errors.

### ALGEBRAIC

Fluency with algebraic operations means identifying structures in algebraic expressions and using these structures to manipulate, factor, and solve expressions.

## TRENDS AND RELATIONSHIPS

### UNDERSTAND

The Math Test expects you to predict how manipulating one variable will affect related variables. The test evaluates your understanding of statistical measures (e.g. mean and median) by asking you how changes in data affect these measures. These questions can be conceptual, or they may ask you to calculate actual values.

### DEMONSTRATE

You are expected to demonstrate an understanding of trends and relationships by identifying and describing graphical representations such as scatterplots and two-way tables.

## GRAPHS

### TYPES

Graphs are important across all four categories. The types of graphs you will encounter range from simple linear functions to polynomials with multiple roots to geometric figures in the coordinate plane.

### ANALYSIS

You are expected to create, sketch, and transform graphs from their functions, as well as determine equations from graphs.



## Mastering

## SAT Algebra



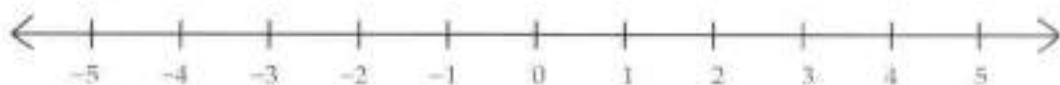
	<i>Section 1</i>
NUMBER PROPERTIES	156
	<i>Section 2</i>
ALGEBRAIC EXPRESSIONS	157
	<i>Section 3</i>
INEQUALITIES	158
	<i>Section 4</i>
SYSTEMS OF EQUATIONS	160
	<i>Section 5</i>
THE SLOPE OF A STRAIGHT LINE	163
	<i>Section 6</i>
LINEAR FUNCTIONS	164
	<i>Section 7</i>
ABSOLUTE VALUE	165
	<i>Section 8</i>
QUADRANTS ON THE COORDINATE PLANE	166
	<i>Section 9</i>
WORD PROBLEMS	168



# Fundamental Concepts and Techniques

## NUMBER PROPERTIES

**Real number**: any number that can be located on a number line, including positive numbers, negative numbers, fractions, decimals, and square roots.



**Integer**: a whole number, including positive whole numbers, negative whole numbers, and zero.

Negative: -4, -9, -12...

Zero: 0

Positive: 1, 2, 3, 4, ...

**Consecutive integers**: whole numbers that follow each other in numerical order. Thus, the sequence 1, 2, 3, 4 consists of four consecutive positive integers, and the sequence 2, 4, 6, 8 consists of four consecutive even integers.

## 051 Question Topic

### NUMERICAL CALCULATIONS

- ▶ Questions that require purely numerical calculations, including questions that involve plugging in numerical values for variables, can be easily and accurately solved by adhering to the order of operations (see Teacher's Tip).

#### Example

What is the value of  $7 - 5 + \frac{6(4-2)^2}{2}$ ?



**Solution**:

First, calculate anything inside parentheses:  $(4 - 2) = 2$

Second, calculate any value that has an exponent:  $(2)^2 = 4$

Multiply:  $6(4) = 24$

Divide:  $\frac{24}{2} = 12$

Add and subtract:  $7 - 5 + 12 = 14$

The correct answer is 14.



#### TEACHER'S TIP

Solve equations and inequalities in the following way:

1. Calculate values contained in parentheses, ( ).
2. Calculate values involving exponents.
3. Calculate values being multiplied or divided.
4. Calculate values being added or subtracted.



## ALGEBRAIC EXPRESSIONS

- **Equation** : a mathematical statement in which two expressions are equal to one another and set on either side of an equal sign:

$$\underbrace{10 + 5 = 7 + 8}_{\text{(equation)}}$$

(expression)      (expression)

- **Variable** : a symbol (often a lower-case or upper-case letter) that represents one or more numbers. For instance, in the equation  $a + b = c + 5$ ,  $a$ ,  $b$ , and  $c$  are variables.

When an equation includes a variable, the numerical value of that variable which makes the equation true (makes the two sides equal to each other) is called the **solution** to the equation. An equation may have more than one solution, or it may have no solutions.

- **Properties of Equality** :

- **Addition Property of Equality**: For all real numbers  $a$ ,  $b$ , and  $c$ , if  $a = b$ , then  $a + c = b + c$ .
- **Subtraction Property of Equality**: For all real numbers  $a$ ,  $b$ , and  $c$ , if  $a = b$ , then  $a - c = b - c$ .
- **Multiplication Property of Equality**: For all real numbers  $a$ ,  $b$ , and  $c$ , if  $a = b$ , then  $a \cdot c = b \cdot c$ .
- **Division Property of Equality**: For all real numbers  $a$ ,  $b$ , and  $c$ , if  $a = b$ , then  $\frac{a}{c} = \frac{b}{c}$ .
- **Distribution Property of Equality**: For all real numbers  $a$ ,  $b$ , and  $c$ ,  $a(b + c) = ab + bc$ .

## 052 Question Topic

### ALGEBRA PROBLEMS IN ONE VARIABLE

- Always begin by examining the question for structures and expressions that consist of more than just a single variable or number that will help manipulate the equations. Most questions will contain such a structure, and difficult questions may require you to recognize a question's structure to answer the question at all.
- Use the properties of equality to isolate the variable on one side of the equation.
- Confirm the solution by plugging the value back into the original equation.

#### Example

If  $4x + 5 = 8$ , then  $8x + 9$  equals

- (A) 8                                      (C) 12  
(B) 10                                     (D) 15



**Solution** :

Recognize that  $8x$  has twice the value of  $4x$ . Multiply the first equation by 2:

$$2 \cdot [4x + 5] = [8] \cdot 2 \rightarrow 8x + 10 = 16$$

Subtract 1 from both sides of the equation:

$$8x + 10 - 1 = 16 - 1 \rightarrow 8x + 9 = 15.$$

The correct choice is (D).



#### TEACHER'S TIP

Always assess an equation's structure before attempting to solve it.

## INEQUALITIES

An **inequality** shows that two mathematical expressions are NOT equal to one another. Inequalities are used to show that one quantity is greater than ( $>$ ), less than ( $<$ ), greater than or equal to ( $\geq$ ), less than or equal to ( $\leq$ ), or not equal ( $\neq$ ) to another quantity. Below are simple inequality statements with their meanings:

- ▶  $10 > 8$  means "ten is greater than eight."
- ▶  $15 < 20$  means "fifteen is less than twenty."
- ▶  $10 + x \geq 9$  means "any quantity that is ten greater than  $x$  is greater than or equal to nine."
- ▶  $6 - y \leq 4$  means "any quantity that is  $y$  less than six is less than or equal to four."
- ▶  $0 \neq 1$  means "zero is not equal to one."

### Properties of Inequality

- ▶ Transitive Property of Order: For all real numbers  $a$ ,  $b$ , and  $c$ , if  $a < b$  and  $b < c$ , then  $a < c$ .
- ▶ Addition Property of Order: For all real numbers  $a$ ,  $b$ , and  $c$ , if  $a < b$ , then  $a + c < b + c$ .
- ▶ Multiplication Property of Order: For all real numbers  $a$ ,  $b$ , and  $c$ :
  - (A) If  $a < b$  and  $c > 0$ , then  $ac < bc$ .
  - (B) If  $a < b$  and  $c < 0$ , then  $ac > bc$ .

## 053 Question Topic

### SOLVING INEQUALITIES

- ▶ Solving inequalities is much like solving equations, with one very important exception: *when solving inequalities, reverse the direction of the inequality sign whenever you multiply or divide the inequality by a negative number.*
- ▶ Use the properties of inequality to isolate the variable on one side of the inequality.

#### Example

If  $3p - 9 < 6$  and  $2q + 2 < -6$ , and if  $p$  and  $q$  are integers, then the largest value of  $p + q$  is

- (A) -2
- (B) -1
- (C) 0
- (D) 1



**Solution:**

To find a possible sum for  $p$  and  $q$ , first solve the inequalities above for  $p$  and  $q$  respectively.

Solving for $p$ :	Solving for $q$ :
$3p - 9 < 6$	$2q + 2 < -6$
$3p < 15$	$2q < -8$
$p < 5$	$q < -4$

Now add the largest values for  $p$  and  $q$ . Since  $p < 5$ , the largest whole-number value for  $p$  is 4, and since  $q < -4$ , the largest whole-number value for  $q$  is -5:

$$4 + (-5) = -1$$

The correct choice is (B).



#### TEACHER'S TIP

When solving inequalities, reverse the direction of the inequality sign whenever you multiply or divide the inequality by a negative number.

## 054 Question Topic

### → ALGEBRAIC WORD PROBLEMS

When you encounter an algebraic word problem, convert the sentences into algebraic expressions by converting words that indicate relations and operations into symbols. Examples include:

- ▶ "is" means "="
- ▶ "more than," "the sum of," and "increased by" mean "+"
- ▶ "less than" and "the difference" mean "-"
- ▶ "the product of" means "x"

#### Example

If  $19 + x$  is 6 more than 11, what is the value of  $3x$ ?

- (A) -6                                  (C) 5  
(B) -3                                  (D) 10



**Solution:**

First convert the problem into a mathematical equation. The word "is" means "is equal to," and "more than" means "plus." The problem becomes the equation:  
 $19 + x = 6 + 11$

Before we find the value of  $3x$ , we must solve the equation for  $x$ :  
 $19 + x = 6 + 11$   
 $x = 17 - 19$   
 $x = -2$

If  $x = -2$ , then  $3x = 3 \cdot -2 = -6$ .

The correct choice is (A).



#### TEACHER'S TIP

Convert a word problem into a mathematical equation before attempting to solve it.



## SYSTEMS OF EQUATIONS

A system of equations is a set of two or more equations with the same variables. There are two methods for solving systems of equations, which are outlined in the Question Topics below.

As with single variable equations, whenever you see a question involving a system of equations, begin by looking for structures that will help you solve the question. Recognizing these structures will always save you time, and occasionally will be necessary to complete the question.

### Systems With No Solutions or Infinite Solutions

Some systems will have either no solutions or infinite solutions. Before trying to solve a system of equations, examine it to see if either of the following cases is applicable:

- ▶ A system of equations has no solution when two equations contradict each other. For example, the system of equations that consists of the equations  $x + y = 1$  and  $x + y = 2$  has no solution.
- ▶ A system of equations consisting of two equations has infinite solutions if it can be demonstrated that the two equations are equivalent to each other. For example, the system of equations that consists of  $2x = 8y$  and  $4x = 16y$  has an infinite number of solutions.

## 055 Question Topic

### THE ADDITION-OR-SUBTRACTION METHOD

The Addition-or-Subtraction Method is generally preferred when solving SAT Math questions with systems of equations because it requires you to recognize relationships of structure between equations. Apply the following steps when using the Addition-or-Subtraction Method:

1. Determine whether one equation can be transformed through division or multiplication so that either or both coefficients of the variable(s) matches the coefficient(s) in the other equation.
2. Multiply or divide one equation so that it matches the other equation as described above.
3. Add or subtract one equation from the other to eliminate one variable.
4. Solve the resulting equation for a single variable.
5. If necessary, substitute the value of the variable into one of the original equations to find the value of the other variable.

#### Example

If  $2x = y + 7$  and  $5x = 2y + 15$ , what is the value of  $x$ ?



**Solution:**

To find the value of  $x$ , we must eliminate  $y$ . Multiply the first equation by 2, and then subtract this equation from the second equation to get the answer:

$$\begin{array}{r} 5x = 2y + 15 \quad \rightarrow \quad 5x - 2y = 15 \\ 2(2x) = 2(y + 7) \rightarrow \quad -4x - 2y = 14 \\ \hline x = 1 \end{array}$$



#### TEACHER'S TIP

For systems of equations, always begin by looking for structures that will help solve the question.

# 056 Question Topic

## THE SUBSTITUTION METHOD

The Substitution Method can be used for most systems of equations, but doing so often takes longer than the Addition-or-Subtraction Method. However, the Substitution Method is very useful when there is no easily discernible relationship between two equations, or when you are presented with equations that only have one variable in common. Apply the following steps when using the Substitution Method:

1. Solve one equation for one of the variables.
2. Substitute the solution from step 1 into the other equation and solve for the other variable.
3. Substitute this value in the equation used in step 1 and solve.

### Example

If  $\frac{x}{y} = \frac{7}{3}$  and  $\frac{y}{z} = \frac{4}{5}$ , then  $\frac{x}{z} = ?$

(A)  $\frac{12}{35}$

(C)  $\frac{12}{7}$

(B)  $\frac{5}{7}$

(D)  $\frac{28}{15}$



**Solution:**

Since both equations have the  $y$  variable, solve both equations for  $y$ :

$$y = \frac{3}{7}x, \text{ and } y = \frac{4}{5}z$$

According to the Substitution Method:

$$\frac{3}{7}x = \frac{4}{5}z$$

Convert the equation above into the form  $\frac{x}{z}$ :

$$x = \frac{28}{15}z \rightarrow \frac{x}{z} = \frac{28}{15}$$

The correct choice is (D).



### TEACHER'S TIP

Use ratios to solve for unknowns.

## 057 Question Topic

### TRANSFORMING EQUATIONS WITH MORE THAN ONE VARIABLE

When working with an equation or inequality with more than one variable, it will often be necessary to solve for one variable. Certain questions will ask you to do only this. To solve for a given variable, transform the equation or inequality so that the variable is isolated on one side of the equation. This variable is then said to be expressed in terms of the other variable(s).

#### Example

If  $6y(3 - 4x) = z$  and  $x = -\frac{3}{2}$ , what is  $y$  in terms of  $z$ ?

(A)  $\frac{z}{18}$

(C)  $16z$

(B)  $\frac{z}{12}$

(D)  $\frac{z}{54}$



**Solution:**

Our goal is to isolate  $y$  on one side of the equation. First plug in the value for  $x$ , then simplify the equation:

$$6y\left[3 - 4\left(-\frac{3}{2}\right)\right] = z$$

$$6y\left(3 + \frac{12}{2}\right) = z$$

$$6y(3 + 6) = z$$

$$6y(9) = z$$

$$54y = z$$

$$y = \frac{z}{54}$$

The correct choice is (D).



#### TEACHER'S TIP

Always check that minus signs are distributed correctly.

## THE SLOPE AND MIDPOINT OF A STRAIGHT LINE

- ▶ The slope of a non-vertical line that contains point A  $(x_1, y_1)$  and B  $(x_2, y_2)$  is given by the formula:

$$\text{Slope } (m) = \frac{\text{Rise}}{\text{Run}} = \frac{\text{Change in } y}{\text{Change in } x} = \frac{y_2 - y_1}{x_2 - x_1}$$

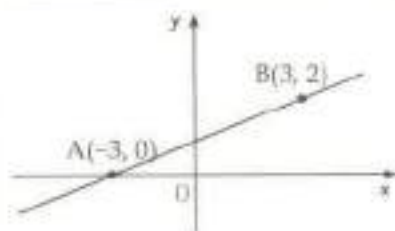
- ▶ Horizontal lines have a slope of zero.
- ▶ Vertical lines have an undefined slope.
- ▶ Word problems will often describe slope as "rate of change," or they ask how quickly or slowly a quantity changes given two data points. In these cases, use the slope formula above to get the answer.
- ▶ The midpoint between two points  $(x_1, y_1)$  and  $(x_2, y_2)$  is the point  $\left[ \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right]$

### 058 Question Topic

#### PARALLEL AND PERPENDICULAR LINES

- ▶ If the line  $l_1$  has slope  $m_1$  and line  $l_2$  has slope  $m_2$ , then  $l_1$  is parallel to  $l_2$  only if  $m_1 = m_2$
- ▶ If the line  $l_1$  has slope  $m_1$  and line  $l_2$  has slope  $m_2$ , then  $l_1$  is perpendicular to  $l_2$  only if  $m_1 \cdot m_2 = -1$ .

#### Example



If the point C (not shown), with coordinates  $(a, 41)$ , lies on the line AB in the figure above, what is the value of  $a$ ?



Solution:

$$\text{Slope } AB = \frac{2 - 0}{3 - (-3)} = \frac{2}{6} = \frac{1}{3}$$

$$\text{Slope } BC = \frac{41 - 2}{a - 3} = \frac{1}{3}$$

$$\frac{39}{a - 3} = \frac{1}{3}$$

$$a - 3 = 117$$

$$a = 120$$

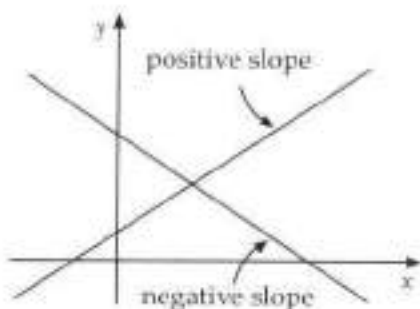


#### TEACHER'S TIP

The phrase "rate of change" means "slope."

## LINEAR FUNCTIONS

- ▶ The graph of a linear function is always a straight line.
- ▶ When lines intersect, the point of intersection is the common solution to the equations of the two lines.
- ▶ A line that rises as it moves from left to right has a positive slope. A line that falls as it moves from left to right has a negative slope.



### 059 Question Topic

#### THE EQUATION OF A LINE

- ▶ There are several ways to write the equation of a linear function. Each form highlights certain features of the graph:
  - **Point-Slope Form:**  $y - y_1 = m(x - x_1)$ , or  $\frac{y - y_1}{x - x_1} = m$ . A line in this form has slope  $m$  and includes the point  $(x_1, y_1)$ .
  - **Slope-Intercept Form:**  $y = mx + b$ . A line in this form has slope  $m$  and  $y$ -intercept  $b$  (which is the point  $(0, b)$ ).
  - **Standard Form:**  $Ax + By = C$
  - **Intercept Form:**  $\frac{x}{a} + \frac{y}{b} = 1$ . A line in this form has  $x$ -intercept  $a$  and  $y$ -intercept  $b$ .

#### Example

What is the equation of a line with  $y$ -intercept  $-3$  that is parallel to the line with equation  $2x + 5y = 8$ ?



**Solution:**

Rewrite the equation  $2x + 5y = 8$  in slope-intercept form to determine slope:

$$y = -\frac{2}{5}x + \frac{8}{5}$$

The slope of both lines is  $-\frac{2}{5}$ .

The slope-intercept form of the line is  $y = mx + b \rightarrow y = -\frac{2}{5}x - 3$ .

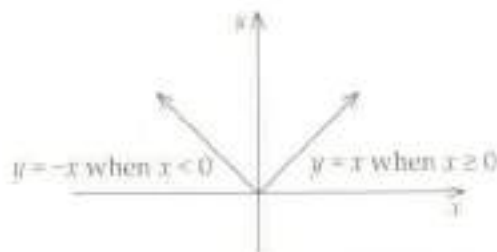


#### TEACHER'S TIP

Each form of the equation of a line highlights certain features of the graph.

## ABSOLUTE VALUE

- ▶ In any pair of nonzero opposites, such as  $-8$  and  $8$ , one number is negative and the other is positive. The positive number of any pair of nonzero opposites is called the absolute value of each number in the pair. An absolute value is indicated by straight vertical brackets. For example,  $|-8| = 8$ , and  $|8| = 8$ .
- ▶ The absolute value of a number,  $x$ , can also be defined as the distance between zero and  $x$  on the number line, which always produces a positive value.
- ▶ The graph of the function  $y = |x|$  consists of two parts:
  - For  $x < 0$ , the graph of  $f(x) = |x|$  is the line  $y = -x$ .
  - For  $x \geq 0$ , the graph of  $f(x) = |x|$  is the line  $y = x$ .



### 060 Question Topic

#### ABSOLUTE VALUE PROBLEMS

- ▶ The absolute value of zero is zero:  $|0| = 0$ .
- ▶ If  $|x| = a$ , then  $x = a$  or  $x = -a$ .
- ▶ If  $|x| < a$ , then  $-a < x < a$ .
- ▶ If  $|x| > a$ , then  $x > a$  or  $x < -a$ .

#### Example

If  $x$  and  $y$  are consecutive negative odd integers whose sum is  $-120$ , and  $x > y$ , what is the value of  $|y - x|$ ?



**Solution:**

Since  $x$  and  $y$  are consecutive negative odd integers with a sum of  $-120$  and  $x > y$ , we can write the following equations:

$$x = y + 2$$

$$x + y = -120$$

Using substitution, we can write:

$$(y + 2) + y = -120 \rightarrow 2y + 2 = -120$$

Subtracting 2 from both sides gives us  $2y = -122$ .

Divide both sides by 2 to get  $y = -61$ .

Therefore,  $x = -59$ .

The value of  $|y - x|$  is  $|-61 - (-59)| = |-2| = 2$ .



#### TEACHER'S TIP

When solving absolute value problems, start by removing the absolute value sign and solving for the nonzero opposites of the value separately.

## QUADRANTS ON THE COORDINATE PLANE

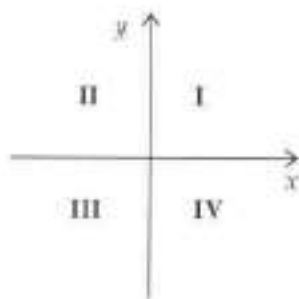
Questions on the SAT Math Test may test your understanding of the four quadrants of a coordinate plane. These quadrants may also be referenced in any question that includes the coordinate plane, including certain questions in trigonometry:

**Quadrant I:**  $x$  and  $y$  are positive

**Quadrant II:**  $x$  is negative,  $y$  is positive.

**Quadrant III:**  $x$  and  $y$  are negative.

**Quadrant IV:**  $x$  is positive,  $y$  is negative.



### 061 Question Topic

#### GRAPHING INEQUALITIES

- ▶ Inequalities are graphed as regions. First, graph the inequality as if it were an equation. This line separates the points on the plane that satisfy the inequality from those that do not.
- ▶ If the inequality is  $>$  or  $<$ , then the points on the boundary line itself do not satisfy the inequality and the line is drawn as broken. If the inequality is  $\geq$  or  $\leq$ , the points on the line are included in the region and the boundary is represented as a solid line.
- ▶ The boundary line divides the plane into two regions. When a linear inequality is expressed in slope-intercept form, and the inequality is  $<$  or  $\leq$ , then the region is below the line. If the inequality is  $>$  or  $\geq$ , the region is above the line.

#### Example

$$2y + x < 1$$

$$y + 3x \geq 5$$

If the system of inequalities above is graphed on a coordinate plane, the solution to the system will fall into which of the following sets of quadrants?

(A) I, II, and IV

(B) III and IV

(C) III only

(D) IV only



**Solution:**

Change the first inequality to slope-intercept form:

$$2y + x < 1$$

$$2y < -x + 1$$

$$y < -\frac{x}{2} + \frac{1}{2}$$

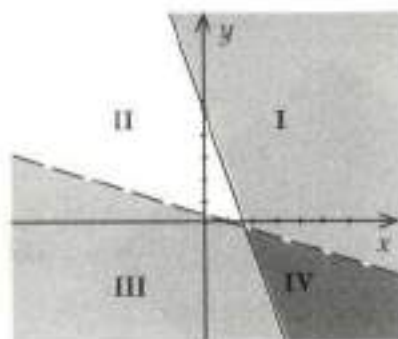
The boundary of the region represented by this inequality is the line  $y = -\frac{x}{2} + \frac{1}{2}$ . As the inequality is "less than," the line is broken and the region is below the line.

Now graph the second inequality:

$$y + 3x \geq 5$$

$$y \geq -3x + 5$$

The boundary of the region represented by the second inequality is the line  $y = -3x + 5$ . As the inequality is "greater than or equal to," the line is solid and the region is above the line.



All of the points that satisfy the system are in Quadrant IV. The correct choice is (D).



### TEACHER'S TIP



When a linear inequality is expressed in slope-intercept form, and the inequality is  $<$  or  $\leq$ , then the region is below the line. If the inequality is  $>$  or  $\geq$ , the region is above the line.





# Word Problems

WORD  
PROBLEM



1. Read the problem carefully, and determine what values you are trying to find.

2. Assign variables to unknown values. If appropriate, make a sketch.

3. Write an equation or equations that represent the relationships among values.

4. Solve the equation or equations.

5. Check solutions in the context of the problem.

If you see any of these phrases in a word problem, you will have to use an inequality to solve it.

**Common phrases that indicate an inequality**

What is maximum/minimum value of \_\_\_\_\_?

What is the highest/lowest possible value for \_\_\_\_\_?

What is the most/least value \_\_\_\_\_?

What is the most/least expensive \_\_\_\_\_?

## 062 Question Topic

### WORD PROBLEMS IN GEOMETRY

#### Example

The length of a rectangular field is 10 meters greater than three times its width. A roll of fencing that is 180 meters long and 1 meter high will enclose the field with no fencing left over. What are the dimensions, in feet, of the field?



Solution:

1. As you read the problem, determine what you are trying to find. In this problem we are looking for the dimensions (the length and width) of the field.

2. Refer to the length of the field as  $l$  and the width of the field as  $w$ . Sketch the figure described in the problem:



3. Create equations from the information in the word problem. Using the sentence, "The length of a rectangular field is 10 meters greater than three times its width," we can create the equation:

$$l = 10 + 3w$$

Additionally, the problem tells us, "A roll of fencing that is 180 meters long... will enclose the field with no fencing left over." Thus, the 180-foot roll of fencing will encircle the *perimeter* ( $P$ ) of the field. The general equation for calculating perimeter is

$$P = 2l + 2w$$

4. Before solving, we need to reduce the number of variables in our equation for perimeter. This can be accomplished through substitution: Since  $P = 180$  and  $l = 10 + 3w$ , we can rewrite the equation for the perimeter of the field as  $180 = 2(10 + 3w) + 2w$  and solve for  $w$ :

$$180 = 2(10 + 3w) + 2w$$

$$180 = 20 + 6w + 2w$$

$$160 = 8w$$

$$20 = w$$

Knowing the width allows us to find the length. Since  $l = 10 + 3w$  and  $w = 20$ ,  $l = 10 + 3(20)$ , so  $l = 70$ . Thus, the dimensions of the field in feet are  $w = 20$  and  $l = 70$ .

5. Plugging the solutions into one of the original equations allows us to check our answer.

$$180 = 2(70) + 2(20)$$

# 063 Question Topic

## WORD PROBLEMS IN STATISTICS

### Example

The average grade,  $x$ , of a class of 30 students was below the passing grade 70. If 10 of the students had raised their test scores by 15 points each, the average for the class would have been passing or above. Which of the following describes all possible values of  $x$ ?

(A)  $67 \leq x < 70$

(B)  $67 < x < 70$

(C)  $65 \leq x < 70$

(D)  $65 < x < 70$



**Solution:**

1. After reading the problem, determine what you are trying to find. The problem asks for the range of average test scores in the class.
2. The problem tells us that the average test score in the class is represented by the variable  $x$ . Instead of sketching a diagram, we must determine what formulas the question is asking us to use. Here, we must be able to calculate average (arithmetic mean), which uses the formula:

$$\text{Arithmetic mean} = \frac{\text{sum of all values (test scores)}}{\text{total number of values (test scores)}}$$

3. Now we must create the equations and/or inequalities that will allow us to find the value(s) of  $x$ . The sentence, "The average grade,  $x$ , of a class of 30 students was below the passing grade 70" can be summarized by the inequality  $x < 70$ . The sentence, "If 10 of the students had raised their test scores by 15 points each, the average for the class would have been passing or above" can be expressed using the equation:

$$x + 5 = \frac{30x + (15 \times 10)}{30}$$

The expression  $x + 5$  represents the average score after 10 students raised their scores by 15 points each. Ten students each scoring 15 points above their original scores results in an increase in the sum of all scores of 150 points; distributed equally to all students, this results in an average score increase of 5 points.  $30x$  represents the number of students (30) times the original average test score. The expression  $15 \times 10$  represents the 10 students who raised their scores by 15 points each.

4. Now we can solve the problem. We know that the average test score would be equal to or above 70 if 10 students had scored 15 points higher. Therefore,  $x + 5 \geq 70$ .  
By solving for  $x$ , we determine that  $x \geq 65$ . Since we know that the original average was less than 70, we combine the two inequalities to get the correct answer:  $65 \leq x < 70$ .
5. Plugging in any possible value of  $x$  into the equation created in step 3 confirms this solution.

## 064 Question Topic

### WORD PROBLEMS WITH INEQUALITIES

#### Example

David can spend no more than \$160 on pants and shirts for school. He buys 4 pairs of pants at \$24 each. If  $k$  represents the dollar amount he can spend on shirts, which of the following inequalities could be used to determine the possible values for  $k$ ?

- (A)  $(4) 24 - k \leq 160$                       (C)  $(4) 24 + k \leq 160$   
(B)  $(4) 24 - k \geq 160$                       (D)  $(4) 24 + k \geq 160$



Solution:

1. After reading the problem, determine what you are trying to find. The problem asks for an inequality that expresses amount of money David can spend on shirts after he buys 4 pairs of pants at \$24 each.
2. The problem tells us that the dollar amount David can spend on shirts is represented by  $k$ . Before creating an inequality, sketch the information provided in the word problem:

$$( \text{Pants} \times 4 ) + \text{Shirts} \leq 160$$

(k)

- 3/4. Because the answer to this question does not require us to solve an equation or inequality, the "solution step" can be combined with the "creating an equation/inequality step."  
Convert the information presented in the problem into an inequality. Start with the sentence, "David can spend no more than \$160 on pants and shirts for school." The phrase, "no more than \$160" means that his total spending on pants and shirts must be "less than or equal to \$160." Then incorporate the information in the sentence, "He buys 4 pairs of pants at \$24 each." This sentence tells us that he spent  $4 \times 24$  dollars on pants. The final sentence gives us the rest of the information we need to create an inequality: "If  $k$  represents the dollar amount he can spend on shirts, which of the following inequalities could be used to determine the possible values for  $k$ ?" If  $k$  is the amount of money he can spend on shirts and he has already spent  $4 \times 24$  dollars on pants, we can state:

$$4 \times 24 + k \leq 160$$

Thus, the correct choice is (C).

5. For this problem, checking an answer simply means ensuring that all relevant information in the problem is accounted for in the inequality above.

# 065 Question Topic

## WORD PROBLEMS WITH MULTIPLE VARIABLES

### Example

There are eight fewer students on the Debate Club than on the Math Team, and there are only half as many students on the Ecology Force as on the Debate Club. How many students are on the Debate Club if there is a total of 68 students, and if each student can only participate in one activity?

- (A) 12  
(B) 24  
(C) 32  
(D) 36



Solution:

1. After reading the problem, determine what you are trying to find. The problem asks for the number of students on the Debate Club.
2. Assign variables to the different clubs:  $d$  = Debate Club,  $m$  = Math Team,  $e$  = Ecology Force.
3. Using the information in the sentence, "There are eight fewer students in the Debate Club than on the Math Team, and there are only half as many students on the Ecology Force as on the Debate Club," we can create the equations:

$$\begin{aligned}d &= m - 8 \\ e &= \left(\frac{1}{2}d\right)\end{aligned}$$

As there are a total of 68 students, we can write:

$$68 = d + m + e$$

Next, we must reduce the number of variables we have to deal with. The question wants us to find the number of students in the Debate Club, so substitute  $d$  for  $m$  and  $e$ . Doing so gives us the equation:

$$68 = d + (d + 8) + \left(\frac{1}{2}d\right)$$

4. Now solve for  $d$ :  
$$68 = 2\frac{1}{2}d + 8$$
$$60 = 2\frac{1}{2}d$$
$$d = 24$$

Thus, the correct choice is (B).

5. Check your solution by using the number of students on the Debate Team to find the number of students in the other clubs; ensure that the total number of students in all clubs equals 68.

## Example

Peter owes his friend  $p$  dollars. Last month he paid  $\frac{1}{4}$  of the amount owed. This month he paid his friend  $\frac{1}{5}$  of the remaining amount plus \$15.00. In terms of  $p$ , how much money does he still owe?

(A)  $\frac{p-15}{20}$

(C)  $\frac{4p-15}{5}$

(B)  $\frac{3}{4}p-15$

(D)  $\frac{3}{5}p-15$



Solution:

- After reading the problem, determine what you are trying to find. The problem asks for the amount of money Peter owes his friend.
- The problem tells us that the variable  $p$  is the total amount owed.
- Before we determine how much Peter still owes, we must calculate how much he has already repaid. Last month he paid  $\frac{1}{4}p$ , so the remaining amount owed is

$$p - \frac{1}{4}p = \frac{3}{4}p$$

This month, he paid one fifth of this amount, which is  $\left(\frac{1}{5}\right)\left(\frac{3}{4}\right)p$ , plus an additional fifteen dollars. Thus, the amount paid this month is

$$\left(\frac{1}{5}\right)\left(\frac{3}{4}\right)p + 15 = \frac{3}{20}p + 15$$

- The amount he owes is


$$\frac{3}{4}p - \left(\frac{3}{20}p + 15\right) = \frac{15}{20}p - \frac{3}{20}p - 15 = \frac{3}{5}p - 15$$

Therefore, the correct choice is (D).


- Once you have found the solution, double check your work by quickly reviewing each step to ensure that no steps were skipped and that there are no calculation errors.

# Quick Practice

1. If  $x + 3 = 12$ , what is the value of  $(x + 7)^2$ ?

 (A) 144  
(B) 169  
(C) 196  
(D) 256

2. If the function  $\nabla$  is defined as  $x \nabla y = x^2 + y^2 + xy$  for all integers  $x$  and  $y$ , what is the value of  $-3 \nabla -5$ ?

 (A) 29  
(B) 38  
(C) 49  
(D) 54


3. If  $y = 2x - 3$  and  $23y - 15y = 30$ , what is the value of  $x$ ?

(A)  $\frac{3}{2}$   
(B) 2  
(C)  $\frac{5}{2}$   
(D)  $\frac{27}{8}$

4. If  $6(p + q) + 5 = 29$ , what is the value of  $p + q$ ?

(A) 3  
(B) 4  
(C) 5  
(D) 6

5. A sequence begins with the number  $a_0$  and subsequent numbers are determined by taking the previous number, tripling it, and adding six to the product. What is the smallest starting number  $a_0$  in a sequence whose fifth term is greater than 10,000?

 (A) 120  
(B) 121  
(C) 362  
(D) 368

6. Dorothy receives a paycheck every two weeks for \$750. Every month, she must pay \$800 in rent and \$450 in bills. She has also committed to putting 15% of her monthly income into a savings account. What is the most she can allocate to other expenses each month?

(A) \$0  
(B) \$25  
(C) \$100  
(D) \$250

7. If  $p$ ,  $q$ , and  $r$  are positive integers, and  $pq = 25$  and  $qr = 24$ , which of the following must be true?

(A)  $p > r > q$   
(B)  $q > r > p$   
(C)  $q > p > r$   
(D)  $r > p > q$

8. If  $p$  is  $\frac{3}{4}$  of  $q$  and  $q$  is  $\frac{4}{7}$  of  $r$ , what is the value of  $\frac{p}{r}$ ?

(A)  $\frac{3}{5}$   
(B)  $\frac{3}{7}$   
(C)  $\frac{4}{7}$   
(D)  $\frac{8}{9}$

9. If  $x = y^2$  for any positive integer  $y$ , and  $z = x^3 + x^2$ , what is  $z$  in terms of  $y$ ?

(A)  $y^3 + y^2$   
(B)  $y^7$   
(C)  $y^2 + y$   
(D)  $y^6 + y^4$

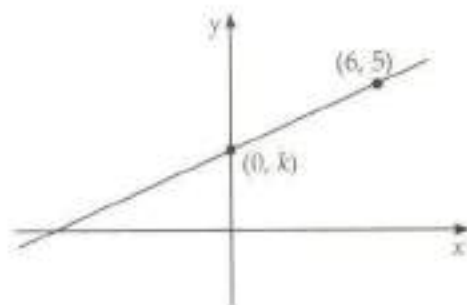
10. If  $y = 3x + 2$  and  $x > 5$ , which of the following represents all possible values of  $y$ ?

- (A)  $y < 15$   
 (B)  $y > 15$   
 (C)  $y < 17$   
 (D)  $y > 17$

11. At a bottling company, machine A fills a bottle with spring water and machine B accepts the bottle only if the number of fluid ounces is between  $7\frac{9}{10}$  and  $8\frac{1}{10}$ . If machine B accepts a bottle containing  $x$  fluid ounces, which of the following describes all possible values of  $x$ ?

- (A)  $|x - 8| = \frac{1}{10}$   
 (B)  $|x + 8| = \frac{1}{10}$   
 (C)  $|x - 8| < \frac{1}{10}$   
 (D)  $|x + 8| < \frac{1}{10}$

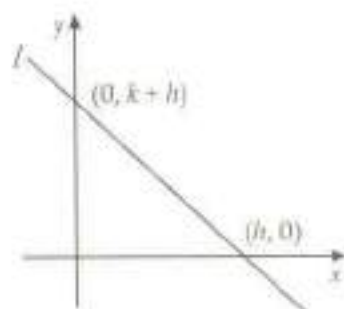
12.



In the figure above, the slope of the line is  $\frac{1}{2}$ . What is the value of  $k$ ?

- (A)  $\frac{1}{2}$   
 (B)  $\frac{3}{2}$   
 (C) 2  
 (D) 3

13.



In the figure above, if the slope of line  $l$  is  $k$ , what is  $h$  in terms of  $k$ ?

- (A)  $\frac{k}{1+k}$   
 (B)  $\frac{-k}{1+k}$   
 (C)  $\frac{k}{1-k}$   
 (D)  $1+k$

14. What is the  $y$ -intercept of the line that passes through the points  $(4, -2)$  and  $(1, 3)$ ?

- (A) -4  
 (B) 1  
 (C)  $\frac{14}{3}$   
 (D) 8

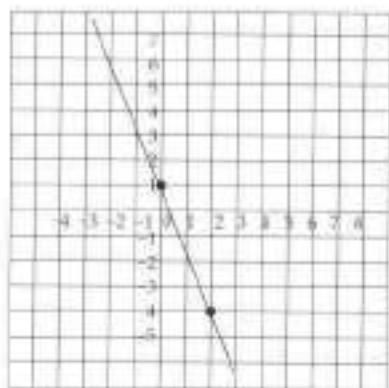
15. On the coordinate plane, the line  $\overline{AB}$  passes through the origin. If  $\overline{AB} \perp \overline{CD}$  and they intersect at  $(10, 6)$ , where does  $\overline{CD}$  cross the  $x$ -axis?

- (A)  $(0, 12)$   
 (B)  $(0, 22\frac{2}{3})$   
 (C)  $(13\frac{3}{5}, 0)$   
 (D)  $(20, 0)$



# Quick Practice

16.



Which of the following equations is graphed in the figure above?

- (A)  $y = -\frac{5}{2}x + 1$
- (B)  $y = \frac{5}{2}x + 1$
- (C)  $y = -\frac{5}{2}x - 1$
- (D)  $y = \frac{5}{2}x - 1$

17. At a computer store, Peter bought USB drives at eight dollars each and David bought USB drives at thirteen dollars each. If they bought a combined eight USB drives and spent \$89 between them, how many USBs did David buy?

- (A) Two
- (B) Three
- (C) Four
- (D) Five

18. A politician proposes a flat-rate tax scheme that would use the same rate for every taxpayer regardless of income. He presents this scheme in the form of an equation,  $T = 200 + 0.25x$ , where  $T$  is the total taxes collected and  $x$  is a taxpayer's annual income. What is the significance of the value 200 in this equation?

- (A) The taxes assigned to a person who has an income of zero
- (B) The number of taxable days in the year
- (C) The administrative costs of processing a single payer's taxes
- (D) The amount of tax collected per \$1,000 of income

19. If  $12f + 5g = 15$  and  $8f + 15g = 17$ , what is the value of  $f + g$ ?

- (A)  $\frac{2}{3}$
- (B)  $\frac{3}{2}$
- (C)  $\frac{5}{2}$
- (D)  $\frac{8}{3}$

20. James has  $x + 23$  apples, Scott has  $x + 25$  apples, and John has  $x + 12$  apples. All of their apples are put into three empty boxes with exactly  $y$  apples in each box. What is the value of  $y$  in terms of  $x$ ?

- (A)  $x + 20$
- (B)  $3x + 20$
- (C)  $3x + 60$
- (D)  $3x + 10$



**ANSWERS  
&  
EXPLANATIONS**

1-20



# Answers & Explanations...

## Mastering SAT Algebra



1.	(D)	6.	(B)	11.	(C)	16.	(A)
2.	(C)	7.	(A)	12.	(C)	17.	(D)
3.	(D)	8.	(B)	13.	(B)	18.	(A)
4.	(B)	9.	(D)	14.	(C)	19.	(D)
5.	(B)	10.	(D)	15.	(C)	20.	(A)

1) **⇒** D

$$x + 3 = 12$$

$$x + 3 + 4 = 12 + 4$$

$$x + 7 = 16$$

$$(x + 7)^2 = 256$$

2) **⇒** C

$$x \nabla y = x^2 + y^2 + xy$$

$$-3 \nabla -5 = (-3)^2 + (-5)^2 + (-3)(-5)$$

$$-9 + 25 + 15 = 49$$

3) **⇒** D

$$23y - 15y = 30 \rightarrow 8y = 30 \rightarrow y = \frac{15}{4}$$

Substitute this result into the first equation:

$$y = 2x - 3$$

$$\frac{15}{4} = 2x - 3 \rightarrow 2x = \frac{27}{4} \rightarrow x = \frac{27}{8}$$

4) **⇒** B

$$6(p + q) + 5 = 29$$

$$6(p + q) = 24$$

$$p + q = 4$$

5) **⇒** B

The sequence begins with the number  $a_0$ , so the fifth term of the sequence is  $a_4$ :

$$a_1 = 3a_0 + 6$$

$$a_2 = 3(3a_0 + 6) + 6 = 9a_0 + 24$$

$$a_3 = 3(9a_0 + 24) + 6 = 27a_0 + 78$$

$$a_4 = 3(27a_0 + 78) + 6 = 81a_0 + 240$$

The fifth term must be greater than 10,000:

$$81a_0 + 240 > 10,000$$

$$81a_0 > 9,760$$

$$a_0 > 120.5$$

As  $a_0$  is an integer, the smallest starting value is 121.

6) **⇒** B

$$\text{Monthly income} = \frac{\$750}{2 \text{ weeks}} \times \frac{4 \text{ weeks}}{1 \text{ month}} = \$1,500$$

$$\text{Expenses} = \text{Rent} + \text{Bills} = \$800 + \$450 = \$1,250$$

$$\text{Savings} = (0.15)(1500) = \$225$$

$$\text{Remaining income} = 1500 - (800 + 450 + 225) = \$25$$

7) **⇒** A

$$q = \frac{25}{p} = \frac{24}{r}$$

As the numbers 24 and 25 have no factors in common, and all three numbers are integers, we can infer that  $p = 25$ ,  $r = 24$ , and  $q = 1$ . Therefore,  $p > r > q$  must be true.

8) **⇒** B

$$p = \frac{3}{4}q \rightarrow q = \frac{4p}{3}$$

$$\text{Also, } q = \frac{4r}{7}$$

$$\text{We can write: } \frac{4p}{3} = \frac{4r}{7} \rightarrow \frac{p}{r} = \frac{3}{7}$$

9) **⇒** D

$$x = y^2$$

$$z = x^3 + x^2$$

Substitute  $y$  for  $x$  in the second equation:

$$z = (y^2)^3 + (y^2)^2$$

$$z = y^6 + y^4$$

10) **⇒** D

$$y > 3x + 2$$

$$x > 5$$

Therefore,

$$y > 3(5) + 2 \rightarrow y > 17$$

11) **⇒** C

$$7.9 < x < 8.1$$

Subtract 8 from the inequality:

$$-0.1 < x - 8 < 0.1$$

This implies that:  $x - 8 > -0.1$  for  $x < 8$  and  $x - 8 < 0.1$  for  $x > 8$ .

These two inequalities can be combined into an expression using an absolute value:

$$|x - 8| < 0.1$$

12) **⇒** C

The value of  $k$  is the  $y$ -intercept, which is

equivalent to the value of  $b$  in the slope intercept form of a line. The slope,  $m$ , is given in the question as  $\frac{1}{2}$ . Using the point specified on the graph:

$$y = mx + b \rightarrow 5 = \frac{1}{2}(6) + b \rightarrow b = 2$$

13) **⇒** B

The slope of  $l$  is  $k$ , and the  $y$ -intercept of  $l$  is  $k + h$ . The equation of the line is:

$$y = kx + (k + h)$$

Plug in the point  $(h, 0)$ :

$$0 = kh + k + h$$

$$kh + h = -k$$

$$h(k + 1) = -k$$

$$k = \frac{-k}{1 + k}$$

14) **⇒** C

Determine the slope of the line:

$$m = \frac{3 - (-2)}{1 - 4} = \frac{5}{-3}$$

Solve for  $b$ :

$$y = -\frac{5}{3}x + b$$

$$3 = -\frac{5}{3}(1) + b$$

$$b = \frac{14}{3}$$

15) **⇒** C

Only choices (C) and (D) are points on the  $x$ -axis.  $\overline{AB}$  passes through the points  $(0, 0)$  and  $(10, 6)$ . The slope of  $\overline{AB}$  is:

$$m_w = \frac{6}{10} = \frac{3}{5}$$

The slope of  $\overline{CD}$  is the negative reciprocal of the

slope of  $\overline{AB}$ :

$$m_{CD} = -\frac{5}{3}$$

Since we know  $\overline{CD}$  passes through (10, 6), we can determine the equation for the line and then its  $x$ -intercept:

$$6 = -\frac{5}{3}(10) + b \rightarrow b = \frac{68}{3}$$

$$y = -\frac{5}{3}x + \frac{68}{3}$$

As we are looking for the  $x$ -intercept, we substitute zero for  $y$ :

$$0 = -\frac{5}{3}x + \frac{68}{3}$$

$$5x = 68$$

$$x = 13\frac{3}{5}$$

16) **⇒** A

The line passes through the point (0, 1) so the  $y$ -intercept is 1. Eliminate (C) and (D). From the graph, we see that the slope of the line is negative. We can eliminate (B). The correct choice is (A).

17) **⇒** D

$x$  = number of \$8 USBs

$y$  = number of \$13 USBs

$$x + y = 8$$

$$8x + 13y = 89$$

Solve for  $y$ :

$$8(8 - y) + 13y = 89$$

$$64 - 8y + 13y = 89$$

$$5y = 25$$

$$y = 5$$

18) **⇒** A

The variable  $x$  represents a taxpayer's annual income. When  $x = 0$ ,  $T = 200$ . Choices (B) and (C) are incorrect because there is no mention of administrative costs or taxable days in the question.

Choice (D) is incorrect because the equation gives the amount of taxes collected in terms of a taxpayer's total income, not per \$1,000 of income.

19) **⇒** D

$$12f + 5g = 15$$

$$8f + 15g = 17$$

Multiply the first equation by a factor of 3:

$$36f + 15g = 45$$

Subtract the second equation in the system from the equation above to give:

$$28f = 28 \rightarrow f = 1$$

Solve for  $g$ :

$$12(1) + 5g = 15 \rightarrow 5g = 3 \rightarrow g = \frac{3}{5}$$

$$\text{Finally, } f + g = \frac{8}{5}$$

20) **⇒** A

$$\begin{aligned} \text{Total number of apples} &= (x + 23) + (x + 25) + (x + 12) \\ &= 3x + 60 \end{aligned}$$

The number of apples in each box,  $y$ , is:

$$y = \frac{3x + 60}{3} = x + 20$$

## Mastering

*Advanced Topics In Math*

**POLYNOMIALS** *Section 1*  
182

**RADICALS** *Section 2*  
187

**EXPONENTS** *Section 3*  
190

**THE GRAPH OF A QUADRATIC FUNCTION** *Section 4*  
193

**WORKING WITH ZEROES** *Section 5*  
194



# Fundamental Concepts and Techniques

## POLYNOMIALS

You will encounter the following terms on the SAT:

- ▶ **Monomial:** a polynomial with one term; for example,  $5x$  or  $6b^2$
- ▶ **Binomial:** a polynomial with two terms; for example,  $3x + 2y$  or  $2x^2 + y^2$
- ▶ **Trinomial:** a polynomial with three terms; for example,  $2x + 3y + 5z$  or  $x^2y + 3y + z^2$
- ▶ **Polynomial:** a monomial or any combination of two or more monomials. Each of the three terms above, and any combination that can be formed from them, are referred to as polynomials.

### 067 Question Topic

#### ADDITION AND SUBTRACTION OF POLYNOMIALS

Terms must consist of the same variables raised to the same powers in order to add or subtract them. For example:  $ax^n + bx^n + cx^n + dx^n = (a + c)x^n + (b + d)x^n$

#### Example

Simplify the expression  $(9n^2 + 5n) + (n^2 - 6n + 12)$ .



#### TEACHER'S TIP

Polynomial operations, like numerical calculations, are subject to the order of operations.



**Solution:**

The expression can be rearranged to:

$$(9n^2 + n^2) + [5n + (-6n)] + 12$$

$$10n^2 - n + 12$$

### 068 Question Topic

#### MULTIPLICATION OF POLYNOMIALS

- ▶ When multiplying terms of the same variable, add the exponents.
- ▶ When raising a term to a power, multiply exponents.
- ▶ When multiplying a polynomial by a polynomial, multiply each term in one polynomial by each term in the other, and add similar terms.

#### Example

Simplify the expression  $(y + 2)(y^3 - 5y^2 + 2)$ .



**Solution :**

$$\begin{aligned}
& (y+2)(y^3-5y^2+2) \\
&= y(y^3-5y^2+2) + 2(y^3-5y^2+2) \\
&= y^4-5y^3+2y+2y^3-10y^2+4 \\
&= y^4-5y^3+2y^3-10y^2+2y+4 \\
&= y^4-3y^3-10y^2+2y+4
\end{aligned}$$



**TEACHER'S TIP**



Keep careful track of minus signs.



## 069 Question Topic

### DIVISION OF POLYNOMIALS

- ▶ When dividing monomials, subtract exponents.
- ▶ When dividing a polynomial by a monomial, distribute the monomial across the terms of the polynomial.

#### Example

What is the quotient of  $\frac{6p^3-3p^2-4p+15}{6p}$ ?



**TEACHER'S TIP**



In subtraction of polynomials, subtract coefficients. In division of polynomials, subtract exponents.



**Solution :**

$$\frac{6p^3-3p^2-4p+15}{6p} = \frac{6p^3}{6p} - \frac{3p^2}{6p} - \frac{4p}{6p} + \frac{15}{6p} = p^2 - \frac{1}{2}p - \frac{2}{3} + \frac{5}{2p}$$

## 070 Question Topic

### LONG DIVISION OF POLYNOMIALS

When dividing a polynomial by a polynomial:

- ▶ Set up the division, adding zero coefficients so that every power is included.

$$\frac{\text{DIVIDEND}}{\text{DIVISOR}} = \text{QUOTIENT} \quad \begin{array}{r} \text{QUOTIENT} \\ \text{DIVISOR} \overline{) \text{DIVIDEND}} \end{array}$$

- ▶ The quotient is the expression that is multiplied by the divisor to give the next term of the dividend.
- ▶ The product of the quotient and the divisor is **subtracted** from the next two terms of the dividend.
- ▶ Remember that your remainder is a quotient of the divisor.

#### Example

If the expression  $\frac{x^2+8x+10}{x+2}$  is rewritten in the equivalent form  $A - \frac{B}{x+2}$ , and  $B$  is an integer, what is the value of  $B$ ?





**Solution:**

First set up the operation:

$$x+2 \overline{)x^3 + 0x^2 + 8x + 10}$$

Note the zero coefficient that has been added to the term  $x^2$  so that all powers of  $x$  are included. Next, determine the first term of the quotient:

$$\begin{array}{r} x^2 \\ x+2 \overline{)x^3 + 0x^2 + 8x + 10} \\ \underline{x^3 + 2x^2} \phantom{+ 8x + 10} \\ -2x^2 \phantom{+ 8x + 10} \end{array}$$

Complete the operation:

$$\begin{array}{r} x^2 - 2x + 12 \\ x+2 \overline{)x^3 + 0x^2 + 8x + 10} \\ \underline{x^3 + 2x^2} \phantom{+ 8x + 10} \\ -2x^2 + 8x \phantom{+ 10} \\ \underline{-2x^2 - 4x} \phantom{+ 10} \\ 12x + 10 \\ \underline{12x + 24} \\ -14 \end{array}$$

The quotient is  $x^2 - 2x + 12 - \frac{14}{x+2}$ . If this is written in the form  $A - \frac{B}{x+2}$ ,  $B = 14$ .



**TEACHER'S TIP**

Add zero coefficients if necessary so that every power is included.

## 071 Question Topic

### → FACTORING POLYNOMIALS

When factoring a polynomial, always look first for a Greatest Common Factor (GCF). The GCF is the variable with the highest power that is common to all terms in a polynomial. If there is a GCF, factor it first. For example, the GCF of the polynomial  $x^4 + x^3 - x^2$  is  $x^2$ . The factored form is  $x^2(x^2 + x - 1)$ .

**Example**

Factor the polynomial  $6x^4 - 15x^3 + 3x^2$ .



**Solution:**

Identify the Greatest Common Factor.

The GCF is  $3x^2$ . The factored form is:

$$6x^4 - 15x^3 + 3x^2 = 3x^2(2x^2 - 5x + 1)$$



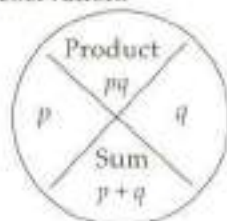
**TEACHER'S TIP**

When factoring a polynomial, always look for a GCF first.

## 072 Question Topic

### → FACTORING QUADRATICS 1

- ▶ A quadratic trinomial of the form  $ax^2 + bx + c$  for which  $a = 1$  can be factored in the following way: If  $x^2 + bx + c = x^2 + (p + q)x + pq$ , where  $b = p + q$  and  $c = pq$ , then the factored form is  $(x + p)(x + q)$ .
- ▶ Try using the schema below (or some similar diagram) to factor quadratics. Begin by writing the product  $pq$  (coefficient  $c$ ) in the top segment and the sum  $p + q$  (coefficient  $b$ ) in the bottom segment. Then determine the values of  $p$  and  $q$  by observation:



#### Example

Factor the quadratic trinomial  $x^2 - 5x + 6$ .



**Solution:**

$$x^2 - 5x + 6 = x^2 + [(-2) + (-3)]x + (-2)(-3)$$

The factored form is  $(x - 2)(x - 3)$ .



#### TEACHER'S TIP

Using the diagram above for the example would give:



## 073 Question Topic

### → FACTORING QUADRATICS 2

- A quadratic trinomial of the form  $ax^2 + bx + c$  for which  $a \neq 1$  can be factored in the following way: If  $ax^2 + bx + c = pqx^2 + (ps + qr)x + rs$ , where  $a = pq$ ,  $b = ps + qr$ , and  $c = rs$ , then the factored form is  $(px + r)(qx + s)$ .

#### Example

Factor the quadratic trinomial  $5x^2 + x - 4$ .



**Solution:**

$$5x^2 + x - 4 = (5)(1)x^2 + [(5)(1) + (1)(-4)]x + (-4)(1)$$

The factored form is  $(5x - 4)(x + 1)$ .



#### TEACHER'S TIP

Quadratics can be solved by factoring or using the quadratic equation:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

# 074 Question Topic

## SPECIAL PRODUCTS

- ▶ A polynomial of the form  $a^2 - b^2$  is called a *difference of squares* and can be factored as:  
 $a^2 - b^2 = (a - b)(a + b)$ .
- ▶ The square of a binomial can be expanded as follows:
  - Binomial sum squared:  $(a + b)^2 = a^2 + 2ab + b^2$
  - Binomial difference squared:  $(a - b)^2 = a^2 - 2ab + b^2$
- ▶ The cube of a binomial can be expanded as follows:
  - Binomial sum cubed:  $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$
  - Binomial difference cubed:  $(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$

### Example

If  $(p + q)^2 = 82$  and  $pq = 12$ , what is the value of  $p^2 + q^2$ ?

- (A) 8                      (C) 43  
(B) 36                     (D) 58



**Solution:**

Use the expansion of a binomial squared to expand the first equation:

$$(p + q)^2 = p^2 + 2pq + q^2 = 82$$

We can then substitute  $pq = 12$  into the equation above and solve:

$$p^2 + q^2 + 2(12) = 82$$

$$p^2 + q^2 = 82 - 24 = 58$$

The correct choice is (D).



### TEACHER'S TIP

The difference of squares is the most important special product to remember.

## RADICALS

- ▶ A number,  $b$ , is called the square root of a positive real number,  $a$ , if the equation  $b^2 = a$  is true. It follows that the equation  $b = \pm\sqrt{a}$  is also true.
- ▶ The symbol  $\sqrt{\quad}$  is called a radical and, as above, is used to indicate a square root. A number or expression under a radical is referred to as a radicand.
- ▶ For any real number  $a$ ,  $\sqrt{a^2} = |a|$ .
- ▶ A square root is also denoted by an exponent of value  $\frac{1}{2}$ , that is,  $a^{\frac{1}{2}} = \sqrt{a}$ .
  - Product Property of Square Roots: For any numbers  $a$  and  $b$ , where  $a \geq 0$  and  $b \geq 0$ ,  $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$ .
  - Quotient Property of Square Roots: For any numbers  $a$  and  $b$ , where  $a \geq 0$  and  $b \geq 0$ ,  $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$ .

### 075 Question Topic

#### EQUATIONS WITH RADICALS

- ▶ When you encounter an equation that contains a variable as a radicand, begin by rewriting the equation so that the radical containing the variable is isolated on one side of the equation.
- ▶ Next, square both sides of the equation to remove the radical.
- ▶ The resultant equation is not necessarily equivalent to the original equation. All solutions must be checked against the original equation to ensure that they are not extraneous. In general terms, an extraneous solution is a solution that works with a transformed or simplified equation but that does not work with the original equation. In the case of radicals, an extraneous solution will sometimes be a solution that results in a negative radicand, or otherwise not satisfy the equation.

#### Example

Solve  $\sqrt{5x-4} - x = -2$ .



**Solution:**

$$\begin{aligned}\sqrt{5x-4} - x = -2 &\rightarrow \sqrt{5x-4} = x-2 \rightarrow (\sqrt{5x-4})^2 = (x-2)^2 \\ 5x-4 = x^2 - 4x + 4 &\rightarrow 0 = x^2 - 9x + 8 \rightarrow 0 = (x-8)(x-1)\end{aligned}$$

Therefore,  $x = 1$  and  $x = 8$ .

Next, we must test for extraneous solutions. First, check the solution  $x = 8$  by plugging into the original equation:

$$\sqrt{5(8)-4} - 8 = -2 \rightarrow \sqrt{36} - 8 = -2 \rightarrow 6 - 8 = -2$$

Yes,  $x = 8$  is a solution to the equation.

Next, we test the second solution,  $x = 1$ :

$$\sqrt{5(1)-4} - 1 = -2 \rightarrow \sqrt{1} - 1 = -2 \rightarrow 1 - 1 \neq -2$$

No,  $x = 1$  is not a solution to the equation. It is an extraneous solution.



#### TEACHER'S TIP

All solutions must be checked against the original equation to ensure that they are not extraneous.

# 076 Question Topic

## SIMPLIFYING RATIONAL EXPRESSIONS

- ▶ A rational expression, or algebraic function, is a quotient of two polynomials. The following are examples of rational expressions:  $\frac{2x+1}{x^2}$ ,  $\frac{2x^2+3x-5}{x^2+4}$ ,  $\frac{ab^2}{a^2+a}$
- ▶ You cannot divide by zero. Solutions that make the denominator equal to zero are examples of extraneous solutions.

### Example

Simplify  $\frac{2x^2+x-3}{2-x-x^2}$ .



*Solution:*

$$\frac{2x^2+x-3}{2-x-x^2} \rightarrow \frac{2x^2+x-3}{-x^2-x+2} \rightarrow \frac{2x^2+x-3}{-(x^2+x-2)} \rightarrow \frac{(x-1)(2x+3)}{-(x-1)(x+2)} \rightarrow \frac{2x+3}{x+2}$$

The final form  $-\frac{2x+3}{x+2}$ , is the original expression in simplified

form. We must, however, check all rational expressions for extraneous solutions. According to the original equation, the variable  $x$  cannot take the values 1 and -2 because these values make the denominator of the equation equal to zero. We write

the final form as:  $-\frac{2x+3}{x+2}$ , for  $x \neq 1, -2$ .



### TEACHER'S TIP

Variables in denominator are extraneous solutions: You cannot divide by zero.

# 077 Question Topic

## CONJUGATES AND RATIONALIZING THE DENOMINATOR

- ▶ If we have a fraction with a radical in the denominator, we are required to manipulate the expression so that the radical in the denominator is removed. This is called simplifying the expression or rationalizing the denominator.
- ▶ If the denominator is a monomial, multiply the entire expression by the radical in the denominator over itself.
- ▶ If the denominator is a binomial, use the conjugate of the denominator over itself to rationalize the denominator. Conjugates are defined as follows: if  $b$  and  $d$  are both nonnegative, then the binomials  $a\sqrt{b} + c\sqrt{d}$  and  $a\sqrt{b} - c\sqrt{d}$  are called conjugates of one another. If,  $a$ ,  $b$ ,  $c$  and  $d$  are integers, the product of conjugates follows the difference of squares and their product will be an integer.

### Example

Simplify the expression  $\frac{3}{5-2\sqrt{7}}$ .



Solution :

$$\begin{aligned}\frac{3}{5-2\sqrt{7}} &= \frac{3}{(5-2\sqrt{7})} \times \frac{(5+2\sqrt{7})}{(5+2\sqrt{7})} = \frac{3(5+2\sqrt{7})}{(5)^2 - (2\sqrt{7})^2} \\ &= \frac{15+6\sqrt{7}}{25-28} \\ &= \frac{15+6\sqrt{7}}{-3} \\ &= -5-2\sqrt{7}\end{aligned}$$



### TEACHER'S TIP

The binomials  $a\sqrt{b} + c\sqrt{d}$  and  $a\sqrt{b} - c\sqrt{d}$  are called conjugates of one another. Their product is a difference of squares.

## EXPONENTS

- ▶ **Fractional Exponents:** Fractional exponents are equivalent to roots. A fractional exponent of  $\frac{1}{2}$  is equivalent to a square root; a fractional exponent of  $\frac{1}{3}$  is equivalent to a cube root; and so on. In mathematical notation, we can write,  $x^{\frac{1}{2}} = \sqrt{x}$ , and  $x^{\frac{1}{3}} = \sqrt[3]{x}$ .
- ▶ **Negative Exponents:** Negative exponents are equivalent to the reciprocal of the base (the variable or number raised to some power) raised to the absolute value of the exponent. For example,  $x^{-2} = \frac{1}{x^2}$ .
- ▶ **Zero Exponents:** Any base raised to the power zero equals 1. That is,  $x^0 = 1$ .
- ▶ **Exponential Equations:** An exponential equation is an equation that contains a term with a variable in the exponent. For example,  $a^x = b$  is an exponential equation, where  $a$  and  $b$  are any two real numbers.

### 078 Question Topic

#### OPERATIONS WITH EXPONENTS

The operations of exponents are summarized below. Assume all bases and denominators are nonzero.

- |   |   |
|---|---|
| $(a^m) \cdot (a^n) = a^{m+n} \rightarrow (2^3) \cdot (2^4) = 2^7 = 128$   | $\frac{a^m}{a^n} = a^{m-n} \rightarrow \frac{3^6}{3^3} = 3^3 = 27$  |
| $(a^m)^n = a^{m \cdot n} \rightarrow (6^2)^3 = 6^6$   | $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n} \rightarrow \left(\frac{2}{x}\right)^3 = \frac{2^3}{x^3} = \frac{8}{x^3}$ |
| $\left(\frac{a}{b}\right)^{-n} = \frac{a^{-n}}{b^{-n}} = \frac{b^n}{a^n} \rightarrow \left(\frac{2}{x}\right)^{-2} = \frac{2^{-2}}{x^{-2}} = \frac{x^2}{2^2} = \frac{x^2}{8}$ | $\left(\frac{a}{b}\right)^0 = \frac{a^0}{b^0} = 1 \rightarrow \frac{x^0}{2^0} = 1$                                      |
| $(ab)^n = a^n \cdot b^n \rightarrow (2x)^3 = 2^3 \cdot x^3 = 8x^3$  | $a^{\frac{m}{n}} = \sqrt[n]{a^m} \rightarrow (2x)^{\frac{3}{2}} = \sqrt{(2x)^3}$  |

#### Example

Simplify the expression  $\left(\frac{2p^2q^{-1}}{3r^{-4}s}\right)^{-2}$



**Solution:**

$$\left(\frac{2p^2q^{-1}}{3r^{-4}s}\right)^{-2} = \frac{(2p^2q^{-1})^{-2}}{(3r^{-4}s)^{-2}} = \frac{2^{-2}p^{-4}q^2}{3^{-2}r^4s^{-2}} = \frac{\frac{1}{4} \cdot \frac{1}{p^4} \cdot q^2}{\frac{1}{9} \cdot r^4 \cdot \frac{1}{s^2}} = \frac{9q^2s^2}{4p^4r^4}$$



#### TEACHER'S TIP

Fractional exponents are equivalent to roots. Negative exponents indicate the reciprocal.

**Definitions**

- ▶ A **function** is a set of ordered pairs with a consistent relation between the two values of each pair.
- ▶ The set of all first coordinates of the ordered pairs is called the **domain** of the function.
- ▶ The set of all the second coordinates is called the **range** of the function.

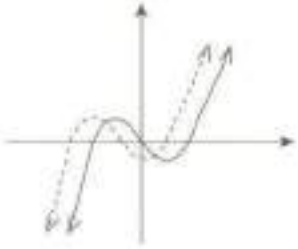
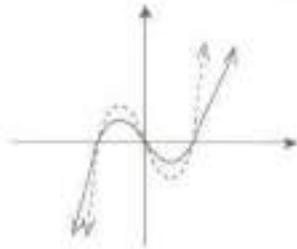
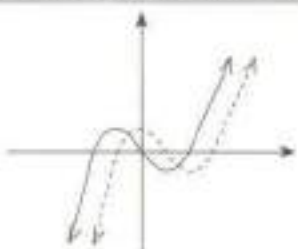
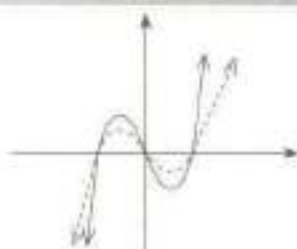
**Area and Circumference**

- ▶ The equation  $y = f(x)$  represents the graph of a function.
- ▶ The domain of  $y = f(x)$  is the set of *x-coordinates* on the graph of the function.
- ▶ The range of  $y = f(x)$  is the set of *y-coordinates* on the graph of the function.
- ▶ The zeros of  $y = f(x)$  are equivalent to the *x-intercepts* of the graph.

## 079 Question Topic

### TRANSFORMATIONS

A **transformation** of a function is the conversion of a function to another function by the introduction of a constant. This results in a change in the graph of the function via certain shifts we refer to as translations. The most common transformations and translations are summarized below:

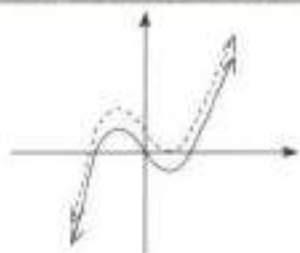
When the function $f(x)$ is changed to:	The graph is changed:	When the function $f(x)$ is changed to:	The graph is changed:
$y = f(x + a), a > 0$		$y = c(f(x)), c > 1$	
The graph shifts to the left $a$ units. Minimum and maximum values stay the same. Zeros are changed.		The graph is stretched vertically. Minimum and maximum values are changed. Zeros stay the same.	
$y = f(x - a), a > 0$		$y = c(f(x)), 0 < c < 1$	
The graph shifts to the right $a$ units. Minimum and maximum values stay the same. Zeros are changed.		The graph is shrunk vertically. Minimum and maximum values are changed. Zeros stay the same.	



When the function  $f(x)$  is changed to:

The graph is changed:

$$y = f(x) + a, a > 0$$

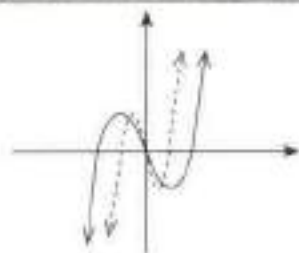


The graph shifts upwards  $a$  units. Minimum values, maximum values, and zeros are changed.

When the function  $f(x)$  is changed to:

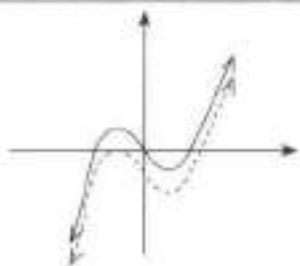
The graph is changed:

$$y = c[f(x)], c > 1$$



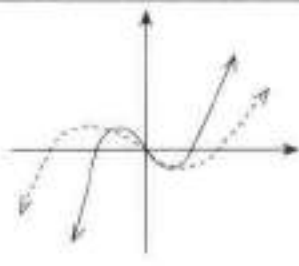
The graph is shrunk horizontally. Minimum and maximum values are the same. Zeros are changed.

$$y = f(x) - a, a > 0$$



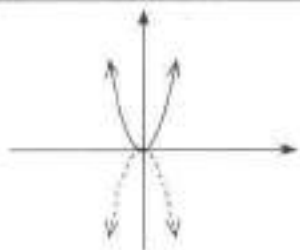
The graph shifts downward  $a$  units. Minimum values, maximum values, and zeros are changed.

$$y = c[f(x)], 0 < c < 1$$



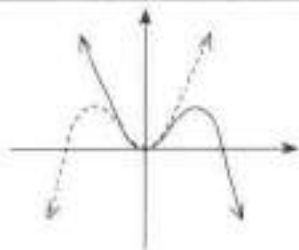
The graph is stretched horizontally. Minimum and maximum values are the same. Zeros are changed.

$$y = -f(x)$$



The graph is reflected across the  $x$ -axis.

$$y = f(-x)$$



The graph is reflected across the  $y$ -axis.

### Example

The graph of function  $f(x)$  is translated 3 units to the left, 4 units upwards, and stretched vertically by a factor of 2, to produce a new function. If  $f(x) = x^2 - 12x + 9$ , what is the new function?



**Solution:**

Approach this question by considering the translation step-by-step:

- Translation 3 units to the left produces the new function  $f'$ :

$$\begin{aligned} f'(x) &= f(x+3) = (x+3)^2 - 12(x+3) + 9 \\ &= x^2 + 6x + 9 - 12x - 36 + 9 = x^2 - 6x - 18 \end{aligned}$$

- Translation 4 units upwards produces the new function  $f''$ :

$$f''(x) = f'(x) + 4 = x^2 - 6x - 18 + 4 = x^2 - 6x - 14$$

- A vertical stretch by factor of two produces the function  $f'''$ :

$$\begin{aligned} f'''(x) &= 2f''(x) = 2(x^2 - 6x - 14) \\ f'''(x) &= 2x^2 - 12x - 28 \end{aligned}$$

The new function is  $f'''(x) = 2x^2 - 12x - 28$ .



### TEACHER'S TIP

Approach translation questions step-by-step.

## THE GRAPH OF A QUADRATIC FUNCTION

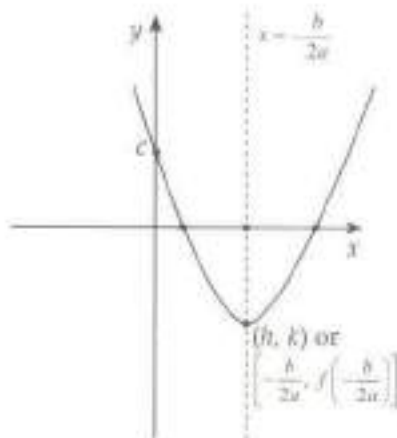
The graph of a quadratic function is a parabola. The characteristics of this graph can be determined from either the standard form or the vertex form of the equation:

► For the standard form,  $y = ax^2 + bx + c$

- The vertex is  $\left[-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right]$
- The axis of symmetry is  $x = -\frac{b}{2a}$
- The  $y$ -intercept is  $(0, c)$
- The  $x$ -intercepts are  $\left(\frac{-b - \sqrt{b^2 - 4ac}}{2a}, 0\right)$  and  $\left(\frac{-b + \sqrt{b^2 - 4ac}}{2a}, 0\right)$

► For the vertex form,  $y = a(x - h)^2 + k$ :

- The vertex is  $(h, k)$



## 080 Question Topic

### TRANSFORMATIONS ON QUADRATIC FUNCTIONS

- If the quadratic  $y = x^2$  is transformed to  $y = (x + h)^2$ , the parabola is translated to the left  $h$  units. If the same quadratic is transformed to  $y = (x - h)^2$ , the parabola is translated to the right  $h$  units.
- If the quadratic  $y = x^2$  is transformed to  $y = x^2 + k$ , the parabola is translated vertically  $k$  units.
- If the quadratic  $y = x^2$  is transformed to  $y = ax^2$ , the parabola is scaled vertically by a factor of  $a$  units.
- If a quadratic is written in the vertex form  $y = a(x - h)^2 + k$ , the vertex of the parabola is the point  $(h, k)$ .

#### Example

The path of a basketball can be modeled by the equation

$y = -4x^2 + 16x + 6$ , where  $x$  represents time and  $y$  represents the height of the basketball. Which of the following is the maximum height reached by the ball?

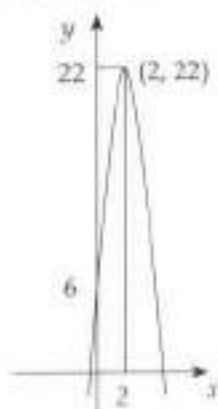
- (A) 18                      (C) 22  
(B) 20                      (D) 24



**Solution:**

First, change the standard form of the quadratic to the vertex form by completing the square:

$$\begin{aligned}y &= -4x^2 + 16x + 6 \\ &= -4(x^2 - 4x) + 6 \\ &= -4(x^2 - 4x + 4 - 4) + 6 \\ &= -4(x - 2)^2 + 16 + 6 \\ &= -4(x - 2)^2 + 22\end{aligned}$$



From the vertex form, we can determine that the vertex of the parabola is (2, 22). When  $a < 0$  for a quadratic equation written in the form  $a(x - h)^2 + k$ , the graph of the parabola opens downward. Since  $a = -4$ , the parabola is inverted, as we would expect since the function models the path of a ball in the air. The maximum height of the basketball is 22 meters. The correct choice is (C).



**TEACHER'S TIP**



The vertex form is best for translations of quadratic functions.



## WORKING WITH ZEROES

- ▶ A zero for a polynomial, also called a solution to that polynomial, is a value such that when it is plugged into the polynomial, the value of the polynomial is zero.
- ▶ Zeros are related to factors of polynomials as follows: if  $a$  is a zero of a polynomial, then  $(x - a)$  is a factor of the polynomial.
- ▶ Zeros represent the values at which the graph of the polynomial crosses the  $x$ -axis; that is, the zeros are the  $x$ -values at which  $y = 0$ .

# 081 Question Topic

## WORD PROBLEMS WITH QUADRATICS

When working on a word problem involving a quadratic, follow these steps:

1. Read the question carefully.
2. Determine what the question is asking you to find, and note information that is given. If possible, make a sketch.
3. Assign a variable and write an equation that represents the relationships between the numbers that are given in the question.
4. Solve the equation.
5. Check solutions in the context of the problem.

### Example

A landscaper designed a rectangular grass plot with a length three meters less than four times its width. If the plot has an area of 175 square meters, what is the width of the plot?



Solution:



If  $x$  is the width of the plot, then the length of the plot is  $4x - 3$ . Since the area is 175 square meters, we can write the relationships as:

$$x(4x - 3) = 175$$

$$\text{Expand the parentheses: } 4x^2 - 3x - 175 = 0$$

$$\text{Use the quadratic formula: } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(4)(-175)}}{2(4)} = \frac{3 \pm \sqrt{9 + 2800}}{8}$$

$$= \frac{3 + \sqrt{2809}}{8} = \frac{3 + 53}{8}$$

$$x = \frac{56}{8} = 7 \text{ and } x = \frac{50}{8} = -6.25$$

Check solutions in the context of the problem. Since the width of a field cannot be a negative value, the solution  $x = -6.25$  is not relevant. The width of the field is 7 meters.



### TEACHER'S TIP

Zeros represent the values at which the graph of the polynomial crosses the  $x$ -axis because they are  $x$ -values for which  $y = 0$ .

# Quick Practice

1. If  $y = x^2 + x$  for any positive integer  $x$ , and if  $z = y^2 + y$ , what is  $z$  in terms of  $x$ ?
- (A)  $x^4 + x^2 + x$   
(B)  $x^4 + x^3 + x^2 + x$   
(C)  $x^4 + x$   
(D)  $x^4 + 2x^3 + 2x^2 + x$
2. The side of one square is three centimeters longer than the side of a second square, and the area of the second square is 51 square centimeters less than the area of the first square. What is the length of the second square?
- (A) 3 centimeters  
(B) 5 centimeters  
(C) 6 centimeters  
(D) 7 centimeters
3. Which of the following is equivalent to the expression  $\frac{x^2 - 16}{x^3 + x^2 - 20x}$ ?
- (A)  $\frac{4}{x + 5}$   
(B)  $\frac{x + 4}{4}$   
(C)  $\frac{x + 4}{x + 5}$   
(D)  $\frac{x + 4}{x^2 + 5x}$
4. Which of the following is equivalent to the expression  $x^2 - zx + xy - zy$ ?
- (A)  $(x - y)(x + z)$   
(B)  $(x - z)(x + y)$   
(C)  $x(x + z - y) - zy$   
(D)  $x^2 + x(z - y) - zy$
5. Which of the following is a simplified form of  $\frac{5x + 10}{15(x + 2)}$ ?
- (A)  $\frac{x}{(x + 2)^2}$   
(B)  $\frac{3}{x + 2}$   
(C)  $\frac{1}{3(x + 2)}$   
(D)  $\frac{x + 10}{3(x + 2)^2}$
6. If  $ax^2 - bx = ay^2 + by$ , what is the value of  $\frac{a}{b}$ ?
- (A)  $\frac{1}{x - y}$   
(B)  $\frac{1}{x + y}$   
(C)  $\frac{x - y}{x + y}$   
(D)  $\frac{x + y}{x - y}$
7. If  $\frac{a^2 - 4}{(a - 2)^2} = b$  and  $a \neq 2$ , what is the value of  $a$  in terms of  $b$ ?
- (A)  $\frac{2 + b}{2 - b}$   
(B)  $\frac{4}{b - 1}$   
(C)  $\frac{b + 2}{b - 2}$   
(D)  $\frac{2b + 2}{b - 1}$

8. If  $\frac{x^2 + A + 1}{x + y} = x - y + \frac{1}{x + y}$ , what is  $A$  in terms of  $x$  and  $y$ ?

(A)  $xy$   
 (B)  $-y^2$   
 (C)  $x^2$   
 (D)  $y^2$

9. If  $\sqrt{\frac{9^{x+3}}{27^x}} = 81$ , what is the value of  $x$ ?



(A)  $-2$   
 (B)  $-1$   
 (C)  $0$   
 (D)  $1$

10. Which of the following is equivalent to the expression  $y^{\frac{1}{2}}(y^{\frac{1}{2}} + y^{-\frac{1}{2}})$ ?

(A)  $y + 1$   
 (B)  $y$   
 (C)  $1$   
 (D)  $0$

11. An urban planner is calculating the cost of building maintenance in a proposed housing structure. The cost of maintenance can be approximated by dividing the number of residents by the number of units, and multiplying that number by \$44. The following function is used to determine the cost of maintenance:

$$C = \frac{(475)(44)(1.12)^x}{(200)}$$

Where  $C$  is the cost of maintenance and  $x$  is the number of years from the present (year 0). What is the significance of the value 475 in the function?

- (A) The number of units in the building  
 (B) The number of residents currently in the building  
 (C) The number of resident in the building after year one  
 (D) The cost of maintenance per resident

12. A chemist has 80 pints of 20 percent salt solution. How many pounds of pure salt must be added to produce a solution that is 30 percent salt?



(A) 4.6  
 (B) 8  
 (C) 11.4  
 (D) 16

13. Which of the following is equivalent to the expression  $\frac{6 + 2\sqrt{2}}{\sqrt{2} - \sqrt{3}}$ ?

(A)  $-4 - 6\sqrt{2} - 6\sqrt{3} - 2\sqrt{6}$   
 (B)  $4 + 6\sqrt{2} + 6\sqrt{3} + 2\sqrt{6}$   
 (C)  $-4 + 6\sqrt{2} - 6\sqrt{3} + 2\sqrt{6}$   
 (D)  $4 - 6\sqrt{2} + 6\sqrt{3} - 2\sqrt{6}$

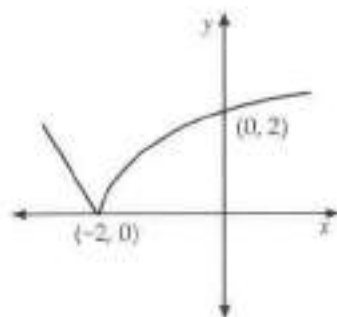
# Quick Practice

14. Which of the following is true of the equation

$$x+1 = \sqrt{x+1}?$$

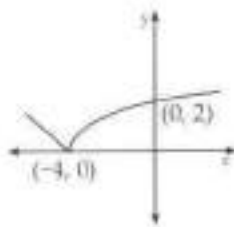
- (A) It has no roots.
- (B) It has only one root.
- (C) The roots are zero and  $-1$ .
- (D) The roots are zero and  $2$ .

15.

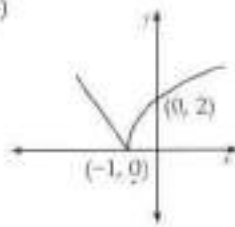


The figure above is the graph of function  $f$ . Which of the following could be the graph of  $y = f(2x)$ ?

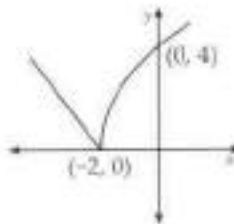
(A)



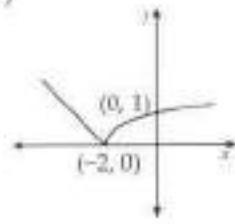
(B)



(C)



(D)

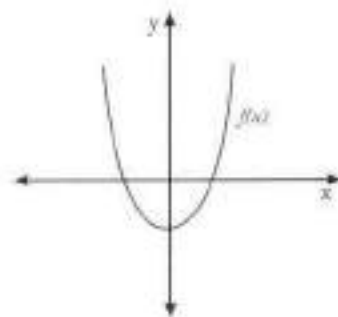


16. A certain function  $g$  has the property that  $g(x+y) = g(x) + g(y)$  for all values of  $x$  and  $y$ . Which of the following statements must be true when  $p = q$ ?

- I.  $g(p+q) = 2g(p)$
- II.  $g(p+q) = [g(p)]^2$
- III.  $g(q) + g(q) = g(2p)$

- (A) None.
- (B) I only.
- (C) I and III only.
- (D) II and III only.

17.



The figure above is the graph of the function  $f(x) = px^2 - 2$ , where  $p$  is a constant. If  $g(x) = \frac{p}{2}x^2 - 2$ , which of the following describes the graph of  $g(x)$  in the relation to the graph of  $f(x)$ ?

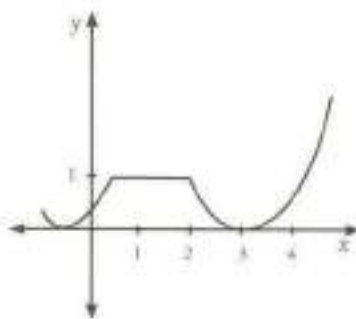
- (A) It will be narrower and opens upward.
- (B) It will be wider and opens downward.
- (C) It will be wider and opens upward.
- (D) It will be narrower and opens downward.

18. The functions  $f$ ,  $g$ , and  $h$  are defined as

$f(x) = -2x^2$ ,  $g(x) = 4x$ , and  $h(x) = f(x) - g(x)$ . For  $x > 5$ , which of the following describes the value of  $h$  as  $x$  increases in value?

- (A)  $h$  increases only.  
 (B)  $h$  decreases only.  
 (C)  $h$  stays the same.  
 (D)  $h$  decreases then increases.

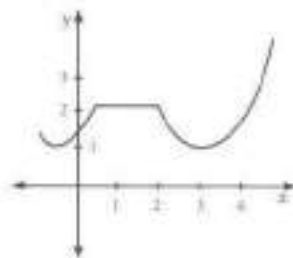
19.



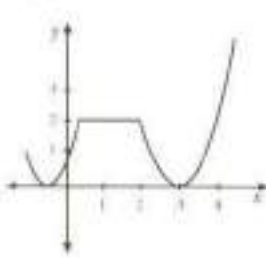
The figure above is the graph of  $y = f(x)$ . Which of the following could be the graph of

$$y = \frac{1}{2}f(x)?$$

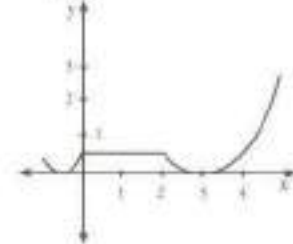
(A)



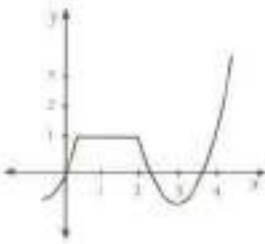
(B)



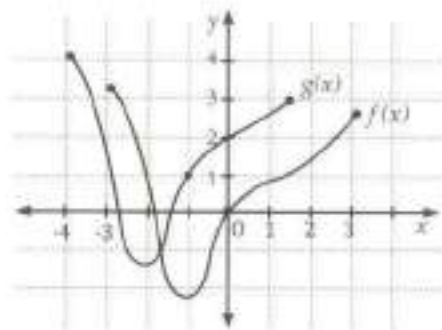
(C)



(D)



20.



The graphs of functions  $f$  and  $g$  in the interval  $-4 \leq x \leq 3$  are shown above. Which of the following is the function  $g$  in terms of  $f$ ?

- (A)  $g(x) = f(x+1)$   
 (B)  $g(x) = f(x) + 1$   
 (C)  $g(x) = f(x+1) + 1$   
 (D)  $g(x) = f(x-1)$







# ANSWERS

&

# EXPLANATIONS

1-20



# Answers & Explanations...

## Mastering Advanced Topics



1. (D)	6. (A)	11. (B)	16. (C)
2. (D)	7. (D)	12. (B)	17. (C)
3. (D)	8. (B)	13. (A)	18. (B)
4. (B)	9. (A)	14. (B)	19. (C)
5. (C)	10. (A)	15. (B)	20. (C)

1)  $\Rightarrow$  D  
 $y = x^2 + x$   
 $z = y^2 + y$

Substitute the first equation into the second:

$$\begin{aligned} z &= (x^2 + x)^2 + (x^2 + x) \\ &= (x^4 + 2x^3 + x^2) + (x^2 + x) \\ &= x^4 + 2x^3 + 2x^2 + x \end{aligned}$$

2)  $\Rightarrow$  D  
 Let  $x$  be the length of the second square. We can write the following equation relating the areas of the two squares, and solve for  $x$ :

$$\begin{aligned} (x+3)^2 - x^2 &= 51 \\ (x^2 + 6x + 9) - x^2 &= 51 \\ 6x + 9 &= 51 \\ 6x &= 42 \\ x &= 7 \end{aligned}$$

3)  $\Rightarrow$  D

$$\begin{aligned} \frac{x^2 - 16}{x^2 + x^2 - 20x} &= \frac{(x-4)(x+4)}{x(x^2 + x - 20)} = \frac{(x-4)(x+4)}{x(x-4)(x+5)} \\ &= \frac{(x+4)}{x(x+5)} = \frac{x+4}{x^2 + 5x} \end{aligned}$$

4)  $\Rightarrow$  B  
 Choice (B) can be written as:  
 $(x-z)(x+y) = x^2 + xy - zx - zy$

5)  $\Rightarrow$  C

$$\frac{5x+10}{15(x+2)^2} = \frac{5(x+2)}{15(x+2)^2} = \frac{1}{3(x+2)}$$

6)  $\Rightarrow$  A

$$\begin{aligned} ax^2 - bx &= ay^2 + by \\ ax^2 - ay^2 &= by + bx \\ a(x^2 - y^2) &= b(x+y) \\ \frac{a}{b} &= \frac{x+y}{(x^2 - y^2)} = \frac{x+y}{(x-y)(x+y)} = \frac{1}{x-y} \end{aligned}$$

7)  $\Rightarrow$  D

$$\begin{aligned} \frac{a^2 - 4}{(a-2)^2} = b &\rightarrow \frac{(a-2)(a+2)}{(a-2)^2} = b \rightarrow \frac{(a+2)}{(a-2)} = b \\ a+2 &= b(a-2) \\ a+2 &= ba - 2b \\ a - ba &= -2b - 2 \\ a(1-b) &= -2b - 2 \\ a &= \frac{2b+2}{b-1} \end{aligned}$$

8)  $\Rightarrow$  B

$$\frac{x^2 + A + 1}{x + y} = x - y + \frac{1}{x + y}$$

$$\frac{x^2 + A + 1 - 1}{x + y} = x - y$$

$$x^2 + A = (x + y)(x - y)$$

$$x^2 + A = (x^2 - y^2)$$

$$A = -y^2$$

9)  $\Rightarrow$  A

$$\sqrt{\frac{9^{x+3}}{27^x}} = 81 \rightarrow \sqrt{\frac{(3^2)^{x+3}}{(3^3)^x}} = 3^4 \rightarrow \frac{3^{x+3}}{3^{\frac{3x}{2}}} = 3^4$$

$$3^{(x+3) - \frac{3x}{2}} = 3^4$$

$$x + 3 - \frac{3x}{2} = 4 \rightarrow \frac{2x}{2} - \frac{3x}{2} = 4 - 3$$

$$-\frac{x}{2} = 1$$

$$x = -2$$

10)  $\Rightarrow$  A

$$y^{\frac{1}{2}} \left( y^{\frac{1}{2}} + y^{-\frac{1}{2}} \right) = y^{\frac{1}{2} + \frac{1}{2}} + y^{\frac{1}{2} - \frac{1}{2}} = y^1 + y^0 = y + 1$$

11)  $\Rightarrow$  B

The denominator of the function is the number of units (200). The numerator must include the number of residents. As  $x$  represents the number of years after year 0, 1.12 must be the growth rate and 475 the number of residents in year 0.

12)  $\Rightarrow$  B

The amount of salt in the solution is:

$$(0.2)(80) = 16 \text{ lb}$$

To increase the concentration of salt to 30%, add  $x$  lb. of salt:

$$0.3 = \frac{16 + x}{80}$$

$$(0.3)(80) = 16 + x$$

$$24 = 16 + x$$

$$x = 8$$

13.  $\Rightarrow$  A

$$\frac{6 + 2\sqrt{2}}{\sqrt{2} - \sqrt{3}} = \left( \frac{6 + 2\sqrt{2}}{\sqrt{2} - \sqrt{3}} \right) \left( \frac{\sqrt{2} + \sqrt{3}}{\sqrt{2} + \sqrt{3}} \right)$$

$$= \frac{(6 + 2\sqrt{2})(\sqrt{2} + \sqrt{3})}{2 - 3}$$

$$= \frac{6\sqrt{2} + 6\sqrt{3} + 2(2) + 2\sqrt{6}}{-1}$$

$$= -4 - 6\sqrt{2} - 6\sqrt{3} - 2\sqrt{6}$$

14.  $\Rightarrow$  B

$$x + 1 = \sqrt{x + 1}$$

$$\frac{x + 1}{\sqrt{x + 1}} = \frac{\sqrt{x + 1}}{\sqrt{x + 1}} \rightarrow \frac{(\sqrt{x + 1})^2}{\sqrt{x + 1}} = \frac{\sqrt{x + 1}}{\sqrt{x + 1}}$$

$$\sqrt{x + 1} = 1$$

$$(\sqrt{x + 1})^2 = 1^2$$

$$x + 1 = 1$$

$$x = 0$$

There is only one solution.

15) **⇒** B

When  $x = 0$ ,  $x - 2x = 0$  and  $f(x) = f(2x)$ . We can infer that the  $y$ -intercept of  $f(x)$  is the same as the  $y$ -intercept of  $f(2x)$  and is the point  $(0, 2)$ ; on this basis we can eliminate (C) and (D). From the graph, we can also see that  $f(-2) = 0$ . Therefore, the value  $y = f(2x) = 0$  when  $x = -1$ , and (B) is correct.

16) **⇒** C

Begin by evaluating Roman numeral I. When  $p = q$ , it is also true that  $g(p) = g(q)$ . If we substitute  $p$  for  $x$  and  $q$  for  $y$  in the form of the function given in the question,  $g(x + y) = g(x) + g(y)$ , we get the function  $g(p + q) = g(p) + g(q)$ . Since  $g(p) = g(q)$ , we can substitute  $g(p)$  for  $g(q)$ , which means that  $g(p + q) = g(p) + g(p) = 2g(p)$ . Roman numeral I must be true. We can eliminate choices (A) and (D) because they do not include Roman numeral I. To choose between (B) and (C), we need only to evaluate Roman numeral III. Because  $p = q$ , it is also true that  $2p = 2q$  and  $g(2p) = g(2q)$ . Also,  $g(2q) = g(q + q) = g(q) + g(q)$  according to the property of the function. Therefore,  $g(q) + g(q) = g(2p)$ , and III is true. The correct choice is (C).

17) **⇒** C

From the graph, we know that  $p > 0$  because the parabola opens upwards. The value of  $\frac{p}{2}$  will also be positive and the graph of  $g(x)$  will open upwards. Also,  $p > \frac{p}{2}$  for  $p > 0$ , so for all values of  $x$  except  $x = 0$ ,  $f(x) > g(x)$ . This implies that the graph of  $g(x)$  will be wider (or flatter) than the graph of  $f(x)$ .

18) **⇒** B

$$h(x) = f(x) - g(x)$$

$$h(x) = -2x^2 - 4x$$

$$h(x) = -2x(x + 2)$$

The function  $h$  is the product of two expressions,  $-2x$  and  $x + 2$ . Consider them separately. For  $x > 5$ ,  $-2x$  is negative in value and decreases as  $x$  increases. Over the same range,  $x + 2$  is positive in value and increases as  $x$  increases. Their *product* must decrease in value as  $x$  increases.

19) **⇒** C

The graph of  $y = \frac{1}{2}f(x)$  will have values of  $y$  that are one-half those of  $y = f(x)$  for all values of  $x$ .

From the graph of  $y = f(x)$ , we see that when  $0.5 < x < 2$ ,  $f(x) = 1$ . This means that for the graph of  $y = \frac{1}{2}f(x)$ , the value of  $y$  when  $0.5 < x < 2$  is  $\frac{1}{2}(1) = \frac{1}{2}$ . This corresponds to choice (C).

20) **⇒** C

The graph of  $g(x)$  is the graph of  $f(x)$  translated vertically 1 unit and horizontally 1 unit to the left. This is transforms the function in the following ways:

$$\text{Vertical translation: } g(x) = f(x) + 1$$

$$\text{Horizontal translation: } g(x) = f(x + 1) + 1$$

## Mastering

## SAT Geometry



	<i>Section 1</i>
VOLUME	206
	<i>Section 2</i>
TRIANGLES	208
	<i>Section 3</i>
CIRCLES	215
	<i>Section 4</i>
ARCS, SECTORS, AND RADIAN MEASURE	217
	<i>Section 5</i>
CIRCLE THEOREMS	218
	<i>Section 6</i>
TRIGONOMETRY	220
	<i>Section 7</i>
COMPLEX NUMBERS	223



# Fundamental Concepts and Techniques

## 082 Question Topic

### VOLUME OF SOLIDS

#### Prisms and Cylinders

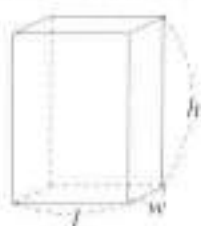
- ▶ A prism is a type of general cylinder. Both prisms and cylinders are named for the shape of their bases. For example, a cylinder with a circle as the base is called a circular cylinder, and a prism with a hexagon as the base is called an hexagonal prism.

Formula for a Cylinder



$$\text{Volume} = \pi r^2 h$$

Formula for a Prism



$$\text{Volume} = lwh$$

#### Pyramids and Cones

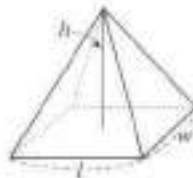
- ▶ A cone is a solid in which lines that begin on the perimeter of the base meet at a single point called the vertex.
- ▶ A pyramid is a cone that has a polygon as its base. Both cones and pyramids are named by the shape of their base (a triangular pyramid, a circular cone, etc.).

Formula for a Cone



$$\text{Volume} = \frac{1}{3} \pi r^2 h$$

Formula for a Pyramid



$$\text{Volume} = \frac{1}{3} lwh$$

#### Spheres

- ▶ A sphere is a surface that represents the set of all points a fixed distance from a single point. The fixed distance is the radius,  $r$ , and the point is the center of the circle.
- ▶ A hemisphere is one-half of a sphere.

Formula for a Sphere



$$\text{Volume} = \left(\frac{4}{3}\right) \pi r^3$$

Formula for a Hemisphere



$$\text{Volume} = \left(\frac{2}{3}\right) \pi r^3$$

**Example**

A cylinder is attached to a cone as shown and the entire object has a height of 1 meter. If the radius of both the cylinder and the cone is 10 centimeters, and the volume of the entire solid is  $8000\pi$  cubic centimeters, what is the height of the cylinder?

(A) 30 centimeters

(C) 70 centimeters

(B) 50 centimeters

(D) 100 centimeters

**Solution:**

Let  $x$  be the height of the cylinder in centimeters, and  $y$  be the height of the cone affixed to the cylinder in centimeters. The total volume of the solid is the sum of the volumes of the cylinder and the cone:

$$V = \pi r^2 x + \frac{1}{3} \pi r^2 y$$

This expression can be rearranged to:  $x + \frac{1}{3}y = \frac{V}{\pi r^2}$

The combined height of the solid is 1 meter, or 100 centimeters. As we are calculating in centimeters, we can write the following equation:

$$x + y = 100 \rightarrow y = 100 - x$$

Substitute for  $y$  in the equation for total volume, and solve for  $x$ :

$$x + \frac{1}{3}(100 - x) = \frac{V}{\pi r^2} \rightarrow x = \frac{3}{2} \left( \frac{V}{\pi r^2} - \frac{100}{3} \right) \rightarrow x = \frac{3}{2} \left( \frac{8000\pi}{\pi(10)^2} - \frac{100}{3} \right) \rightarrow x = \frac{3}{2} \left( 80 - \frac{100}{3} \right)$$

$$\rightarrow x = \frac{240}{2} - \frac{300}{6} = 120 - 50 = 70$$

The height of the cylinder is 70 centimeters. The correct choice is (C).

## 083 Question Topic

### VOLUME AND AREA

#### Relationships Between Two Solids

- ▶ If the ratio of sides or heights between two similar solids is  $a : b$ , then the ratio of their surface areas is  $a^2 : b^2$  and the ratio of their volumes is  $a^3 : b^3$ . If we assign the solids a scale factor  $k$  such that the ratio  $a : b = k$ , then the ratio of their surface areas is equal to  $k^2$  and the ratio of their volumes is equal to  $k^3$ .

#### Transforming a Single Solid

- ▶ If a solid is re-scaled in three dimensions, then the volume of the rescaled solid will be the products of the scale factors. For example, if a rectangular prism has its length, width, and height doubled, the final volume will be eight times ( $2 \times 2 \times 2$ ) the volume of the original solid.



## Example

If a sphere has a surface area of  $3x \text{ cm}^2$ , and another sphere has a surface area of  $x \text{ cm}^2$ , what is the ratio of the volume of the first sphere to the volume of the second sphere?

(A)  $\frac{1}{3}$

(C) 3

(B)  $\sqrt{3}$

(D)  $3\sqrt{3}$



**Solution:**

The two objects referred to in the question are both spheres, so their shapes are similar. Because their shapes are similar, we can calculate a scale factor from their areas: if the ratio of surface areas between solids is  $a^2 : b^2$ , the scale factor  $k$  is equivalent to  $a : b$ , and the ratio of their volumes is  $k^3$ :

$$\frac{a^2}{b^2} = \frac{3x}{x} \rightarrow k = \frac{a}{b} = \sqrt{\frac{3x}{x}} = \sqrt{3} \rightarrow k^3 = 3\sqrt{3}$$

The correct choice is (D).



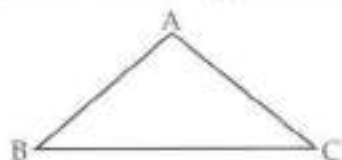
## TEACHER'S TIP

For two similar objects with scale factor  $k$ , the ratio of their areas is  $k^2$ , and the ratio of their volumes is  $k^3$ .

## TRIANGLES

## Naming and Definitions

- ▶ A triangle is typically named using three upper-case letters, each of which is used to label one of the triangle's three vertices.
- ▶ Sometimes, angles will be named with a single letter, such as  $\angle A$ , and other times they will be named using the three letters that represent the sides that form the angle (such as  $\angle BAC$ ).
- ▶ There are two ways of naming the sides of a triangle. The first way is to use the letters that represent the bounds of the line, such as  $\overline{AB}$ . The second way is to use a single letter that corresponds to the angle that faces the side. The side is typically named using a lower case letter in italics (such as the letter  $a$ ).
- ▶ An *obtuse triangle* is a triangle in which one angle is an obtuse angle. An obtuse angle is an angle that is greater than ninety degrees. An obtuse triangle must have one obtuse angle and two acute angles.

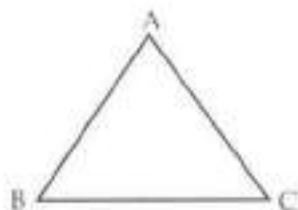


$\angle A > 90^\circ$

$\angle B < 90^\circ$

$\angle C < 90^\circ$

- ▶ An *acute triangle* is a triangle in which all angles are acute angles. An acute angle is an angle that is less than ninety degrees.



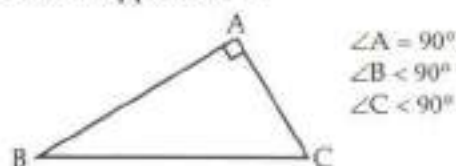
$\angle A < 90^\circ$

$\angle B < 90^\circ$

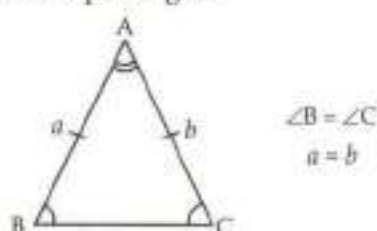
$\angle C < 90^\circ$

- ▶ A *right triangle* is a triangle which contains a 90 degree angle. The sides of right angles are named according to their positions with respect to the right angle (as with the hypotenuse) or according to which of the other angles is being discussed (as with adjacent and opposite sides):

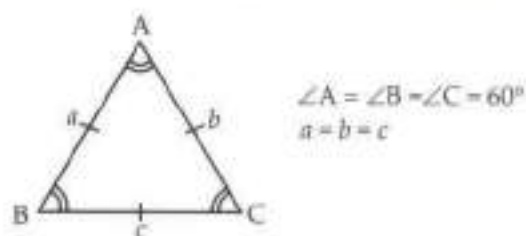
- The side opposite the right angle is called the hypotenuse. It is always the longest side of a right triangle. In the triangle below the hypotenuse is the side  $\overline{BC}$ .
- The remaining sides are named in relation to the angle being discussed. The side that meets the hypotenuse at the angle being discussed is called the adjacent side, and the side that does not meet the hypotenuse at the angle is called the opposite side.



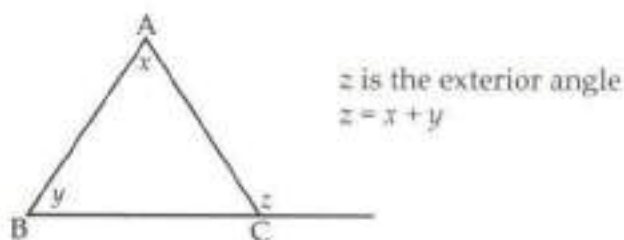
- ▶ An *isosceles triangle* is a triangle with two equal angles.



- ▶ An *equilateral triangle* is a triangle in which all three angles are  $60^\circ$ . The three sides of an equilateral triangle are the same length.



- ▶ An *exterior angle* is the angle that is formed when a side of a triangle is extended. The exterior angle is the supplement of the angle adjacent to it, which is in the triangle. As the angle measure of a triangle is 180 degrees, the exterior angle will be equal to the sum of the other two (non-adjacent) angles of the triangle, which is also the supplement of the previously mentioned adjacent angle.

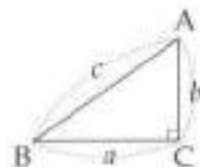


## 084 Question Topic

## THE PYTHAGOREAN THEOREM AND SPECIAL RIGHT TRIANGLES

- ▶ The Pythagorean Theorem gives the relationship between the lengths of the sides of a right triangle. It states that the sum of the square of the two non-hypotenuse sides of a right triangle is equal to the square of the hypotenuse. This theorem is given in the Reference Section at the start of each SAT Math Test.

The Pythagorean Theorem:  $a^2 + b^2 = c^2$



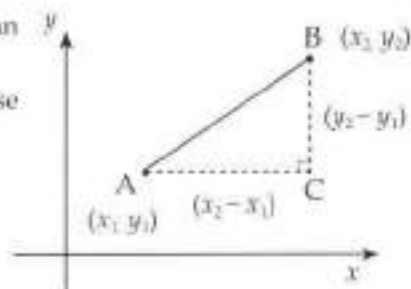
- ▶ The distance formula is used to calculate the distance between two points  $(x_1, y_1)$  and  $(x_2, y_2)$ , and is a special case of the Pythagorean theorem:

- Any two points (marked A and B in the figure to the right) can be used to form a right triangle.
- The distance between A and B is the length of the hypotenuse of the triangle with sides of length  $(x_2 - x_1)$  and  $(y_2 - y_1)$ :

$$d^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$$

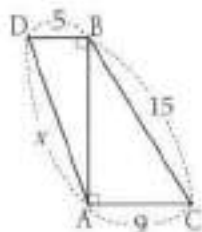
$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

The equation above is referred to as the distance formula.



- ▶ There are two right triangles that appear regularly on the SAT: they are the 3-4-5 right triangle and the 5-12-13 right triangle. The numbers 3-4-5 and 5-12-13 refer to ratios between the sides of the right triangles, and not necessarily the actual lengths of the sides.

## Example



In the figure above,  $\angle BAC$  and  $\angle ABD$  are right angles, and  $AC = 9$ ,  $BC = 15$ , and  $DB = 5$ . What is the length of  $AD$ ?

- (A) 17                      (C)  $5\sqrt{2}$   
 (B)  $\sqrt{74}$                 (D) 13



Solution:

$$\text{In } \triangle ABC, 15^2 - 9^2 + (AB)^2 \rightarrow (AB)^2 = 225 - 81 = 144 \rightarrow AB = 12$$

We can see that the non-hypotenuse sides of  $\triangle ABD$  are 5 and 12 units long. This means that  $\triangle ABD$  is a 5-12-13 right triangle, and  $\overline{AD} = 13$ . The correct choice is (D).



## TEACHER'S TIP

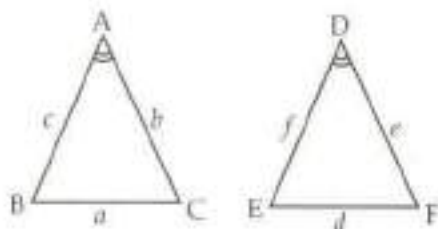
Two right triangles that appear regularly: the 3-4-5 and the 5-12-13 right triangles.

DU

**Congruence** between triangles is equivalent to a similarity transformation with scale factor 1. In other words, the angles and sides of two congruent triangles are exactly the same.

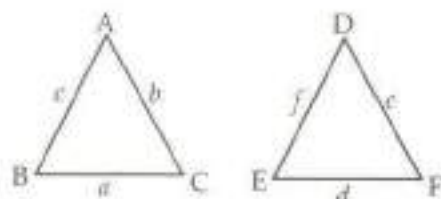
There are four ways to establish congruence between two or more triangles :

- **SAS** : If two triangles have two pairs of sides of equal length and the angles between the sides are equal, the triangles are congruent.



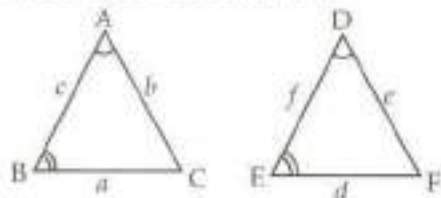
If  $c = f$ ,  $b = e$ , and  $\angle A = \angle D$ , then  
 $\triangle ABC = \triangle DEF$

- **SSS** : If two triangles have three pairs of sides of equal length, then the triangles are congruent.



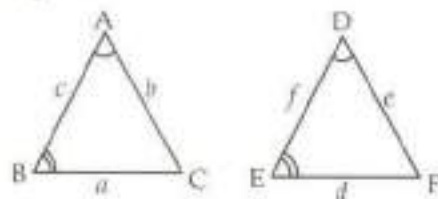
If  $a = d$ ,  $b = e$ , and  $c = f$ , then  
 $\triangle ABC = \triangle DEF$

- **ASA** : If two triangles have two pairs of equal angles and the sides between the angles are the same length, then the triangles are congruent.



If  $\angle A = \angle D$ ,  $\angle B = \angle E$ , and  $c = f$ , then  
 $\triangle ABC = \triangle DEF$

- **AAS** : If two triangles have two pairs of angles of equal size and one pair of sides of equal length, the triangles are congruent.

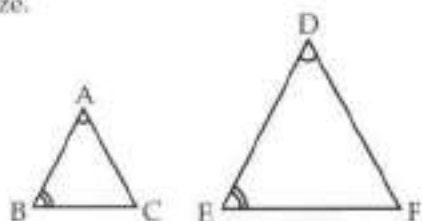


If  $\angle A = \angle D$ ,  $\angle B = \angle E$ , and  $a = d$ , then  
 $\triangle ABC = \triangle DEF$

**NOTE** : AAA and SSA are not sufficient to prove congruence between triangles.

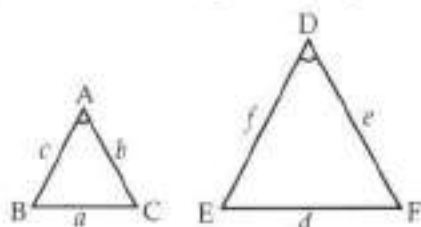
Similarity between two triangles indicates that corresponding angles are equal and corresponding sides are proportional. There are three ways to establish similarity between triangles:

- ▶ **AA** : It is sufficient to demonstrate similarity between two triangles if they have two pairs of angles that are the same size.



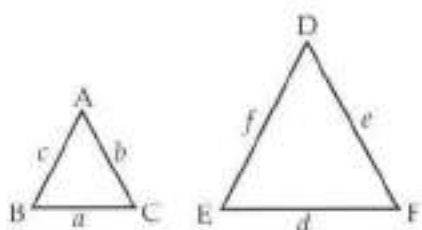
If  $\angle A = \angle D$ , and  $\angle B = \angle E$ , then  
 $\triangle ABC \sim \triangle DEF$   
 (the two triangles are similar)

- ▶ **SAS** : Two triangles are similar if they have one pair of angles that are equal and if the sides that are adjacent to that angle on the two triangles are proportional.



If  $\angle A = \angle D$ , and  $\frac{c}{f} = \frac{b}{e}$ , then  
 $\triangle ABC \sim \triangle DEF$

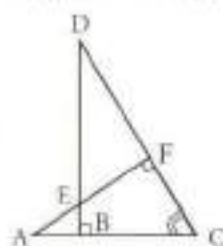
- ▶ **SSS** : Two triangles are similar if three pairs of corresponding sides on the triangles are proportional.



If  $\frac{a}{d} = \frac{b}{e} = \frac{c}{f}$ , then  $\triangle ABC \sim \triangle DEF$

### Example

In the figure below,  $AC = 12$ ,  $DC = 18$ , and  $DB = 15$ . What is the length of line segment  $AF$ ?



- (A) 8                      (C) 10  
 (B) 9                      (D) 11



### TEACHER'S TIP

Similarity between two triangles indicates that corresponding angles are equal and corresponding sides are proportional.



**Solution** :

Since  $\angle B = \angle F = 90^\circ$  and  $\angle C$  is an angle in both triangles,  $\triangle AFC$  is similar to  $\triangle DBC$  according to AA criteria. This means that corresponding sides are proportional, and we can write:

$$\frac{DB}{AF} = \frac{DC}{AC} = \frac{CB}{CF}$$

If  $AC = 12$ ,  $DC = 18$ , and  $DB = 15$ , then

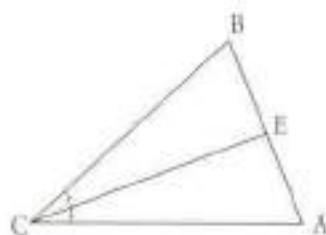
$$\frac{15}{AF} = \frac{18}{12} \rightarrow AF = \frac{12 \cdot 15}{18} = 10$$

The correct choice is (C).

## 086 Question Topic

### TRIANGLE THEOREMS

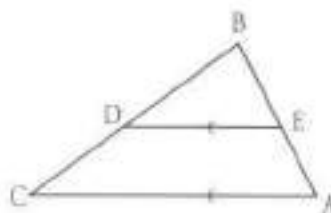
- **Angle Bisector Theorem:** An angle bisector of a triangle splits the opposite side into segments that have the same ratio of lengths as the sides adjacent to the angle.



If  $\angle BCE = \angle ACE$ , then

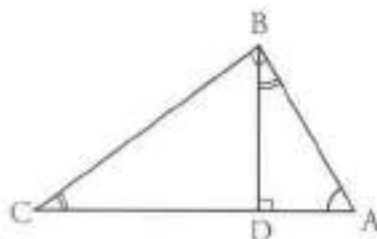
$$\frac{CB}{CA} = \frac{BE}{EA}$$

- **Triangle Side-Splitter Theorem:** Lines parallel to the side of a triangle and inside the triangle divide the other two sides into proportional segments.



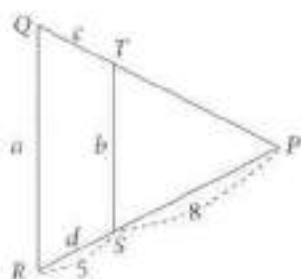
$$\frac{CD}{DB} = \frac{AE}{EB}$$

- The altitude of a right triangle drawn from the right angle creates three similar triangles. This is due to the fact that each of the two resultant smaller triangles shares a common acute angle with the largest triangle.



$$\triangle ABC \sim \triangle ADB \sim \triangle BDC$$

## Example



Note: Figure not drawn to scale.

Jim wants to measure the area of two plots of land bounded by four roads. Road  $a$  and Road  $b$  are parallel to each other, and Road  $c$  and Road  $d$  are transversals to the other two roads and meet each other at point  $P$ . Road  $b$  divides Road  $d$  into two parts of lengths 5 miles and 8 miles, as marked in the diagram. If the area of both plots together is 65 square miles, what is the area, in square miles, of the plot bounded by the points  $P$ ,  $S$ , and  $T$ ?

(A) 9.6

(C) 24.6

(B) 13.0

(D) 25.0



Solution:

Road  $b$  is parallel to Road  $a$ , so it creates two pairs of equivalent interior angles:  $\angle PST$  and  $\angle PRQ$ , and  $\angle PTS$  and  $\angle PQR$ . As the angle at  $P$  is common to  $\triangle PST$  and  $\triangle PQR$ , the two triangles are similar by the AA criteria. The areas of the two triangles are proportional according to the scale factor of the two triangles,  $k$ , squared. The scale factor for the two triangles is the ratio between the lengths of corresponding sides:

$$k = \frac{PS}{PR} = \frac{8}{13}$$

The ratio between the areas of the triangles is the scale factor squared:

$$k^2 = \left(\frac{8}{13}\right)^2 = \frac{64}{169}$$

Set this ratio equal to the areas of the triangles. According to the question, the area of  $\triangle PQR$  is 65 square miles. Solve for the area of the triangle  $\triangle PST$ :

$$\frac{64}{169} = \frac{\Delta PST}{\Delta PQR} \rightarrow \frac{64}{169} = \frac{\Delta PST}{65}$$

$$\frac{(64)(65)}{169} = \Delta PST$$

$$\Delta PST = 24.6$$

The correct choice is (C).



## TEACHER'S TIP

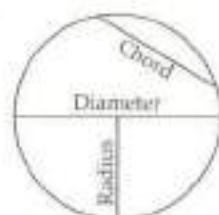
Look for similar triangles when solving complicated geometry questions.



## CIRCLES

A **circle** is the curved line formed by all points which are equidistant from a single point in two dimensions.

- ▶ **Radius:** A line segment that runs from the center point to a point on the circle.
- ▶ **Diameter:** A line segment that joins two points on the circle and passes through the center point. The diameter is twice the radius.
- ▶ **Chord:** A line segment that joins two points on the circle.



$$\text{Diameter} = 2 \times \text{Radius}$$

### Area and Circumference

- ▶ The circumference of a circle ( $C$ ) is equal to  $\pi$  multiplied by the diameter ( $d$ ) of the circle:

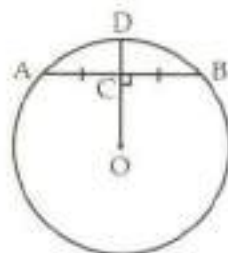
$$C = \pi d = 2\pi r$$

Both this formula and the formula for the area of a circle are given in the Reference Section at the beginning of each SAT Math Test.

- ▶ The area of a circle ( $A$ ) is  $\pi$  multiplied by the square of the radius:  $A = \pi r^2$ .

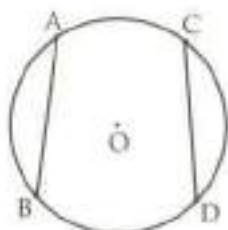
### Chords

- ▶ The perpendicular bisector of a chord passes through the center of the circle.



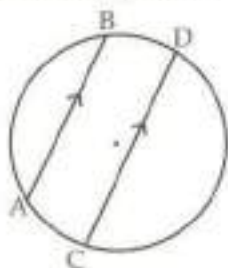
If  $\overline{AC} = \overline{CB}$  and  $\overline{OD} \perp \overline{AB}$ , then  $OD$  passes through the center of the circle.

- ▶ Congruent chords have congruent arcs; congruent arcs have congruent chords.



If  $\overline{AB} = \overline{CD}$  (that is, their lengths are equal), then  $\widehat{AB} = \widehat{CD}$ .

- ▶ Arcs between parallel chords are congruent.



If  $\overline{AB} \parallel \overline{CD}$ , then  $\widehat{AC} = \widehat{BD}$ .



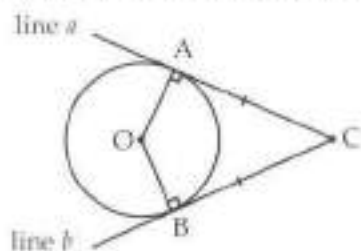
## 087 Question Topic

## TANGENTS TO A CIRCLE

- ▶ A tangent to a circle is a straight line which touches the circle at only one point.
- ▶ A tangent to a circle forms a right angle with the circle's radius at the point of contact with the tangent.



- ▶ Two separate tangents will meet at a point equidistant from their points of contact with the circle.



If line  $a$  and line  $b$  are tangent to the circle  $O$ , then  $\overline{AC} = \overline{BC}$

## Example



In the figure above,  $\overline{PQ}$  is tangent to circle  $O$  at point  $Q$ . If  $\overline{PQ} = 15$  and  $\overline{PR} = 5$ , what is the radius of circle  $O$ ?

- |        |        |
|--------|--------|
| (A) 12 | (C) 18 |
| (B) 15 | (D) 20 |



**Solution:**

As  $\overline{PQ}$  is tangent to the circle  $O$ ,  $\angle OQP = 90^\circ$  and  $\triangle OQP$  is a right triangle. According to Pythagorean theorem:

$$\overline{OP}^2 = \overline{OQ}^2 + \overline{QP}^2$$

Taking  $x$  as length of the radius, we can write:

$$(x + 5)^2 = x^2 + 15^2$$

$$x^2 + 10x + 25 = x^2 + 225$$

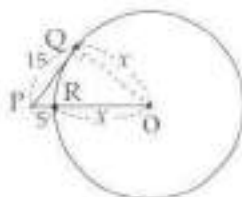
$$10x - 200 \rightarrow x = 20$$

The correct choice is (D).



## TEACHER'S TIP

Many students find that sketching a diagram helps them solve geometry problems. For example, a helpful sketch for the question on this page might look like this:



00

## ARCS, SECTORS, AND RADIAN MEASURE

### Definitions

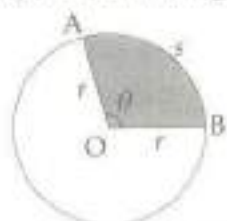
- ▶ An **arc**,  $s$ , is a continuous segment of a circle's circumference.
- ▶ If line segments are drawn from the endpoints of an arc to the center of the circle, the bounded region is called a **sector**. The line segments are radii.
- ▶ The angle formed by the two radii of a sector is called the **central angle**. The measure of this angle in unit radians is equal to the number of radius units (that is, some factor of the length of the radius) in the corresponding arc. This relationship is expressed in the formula  $\theta = \frac{s}{r}$ , where  $\theta$  is the measure of the central angle,  $s$  is the arc length, and  $r$  is the radius.
- ▶ If we use the equation above and take the arc length as the circumference of an entire circle, the result is the radian measure of a circle:

$$\theta = \frac{s}{r} = \frac{2\pi r}{r} = 2\pi$$

This result implies that a radian measure of  $\pi$  is equivalent to the radian measure of a semi-circle. As the degree measure of a circle is  $360^\circ$ , the following conversion factors can be used to convert radians into degrees and vice versa:

$$1 \text{ radian} = \frac{180}{\pi} \text{ degrees}$$

$$1 \text{ degree} = \frac{\pi}{180} \text{ radians}$$



## 088 Question Topic

### ARCS, SECTORS, AND CENTRAL ANGLES

- ▶ To determine the arc length of a sector,  $s$ , given the radius,  $r$ , and the measure of the central angle,  $\theta$ , in radians:  $s = \theta r$
- ▶ To determine the arc length of a sector,  $s$ , given the radius,  $r$ , and the measure of the central angle,  $\theta$ , in degrees:  $s = \frac{\theta}{180} \cdot \pi r$
- ▶ To determine the area of a sector,  $A$ , given the radius,  $r$ , the arc length of the sector,  $s$ , and the measure of the central angle,  $\theta$ , in radians:  $A = \frac{1}{2}rs$
- ▶ To determine the area of a sector,  $A$ , given the radius,  $r$ , and the measure of the central angle,  $\theta$ , in degrees:  $A = \frac{\theta}{360} \pi r^2$

### Example

A sector of a circle has an arc length of six centimeters and an area of 75 square centimeters. What is the radius of the circle? What is the measure of the central angle?





**Solution:**

$$\bullet \text{ Area} = \frac{1}{2}rs \rightarrow 75 = \frac{1}{2}r(6)$$

$$6r = 150, r = 25$$

The radius of the circle is 25 centimeters.

- To find the measure of the central angle, we use the formula  $s = \theta r$ :

$$6 = 25\theta \rightarrow \theta = \frac{6}{25} = 0.24$$

The measure of the central angle is 0.24 radians, or approximately 0.14 degrees.



**TEACHER'S TIP**

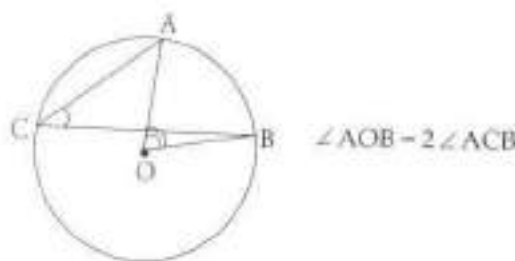
To convert degrees to radians, multiply by the conversion factor  $\frac{\pi}{180^\circ}$ .

## CIRCLE THEOREMS

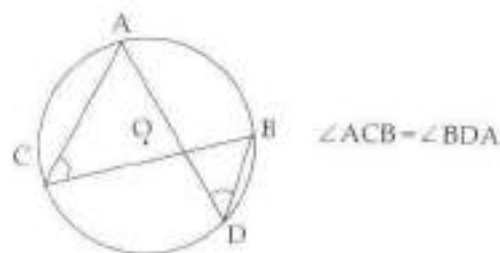
- **Thales' theorem:** If  $\overline{AB}$  is a diameter on which A, B, and C are inscribed, then  $\triangle ABC$  is a right triangle.



- **Inscribed angle theorem:** The measure of the central angle is twice the measure of any inscribed angle that intercepts the same arc.



- Angles inscribed in the same arc are congruent



## 089 Question Topic

### EQUATION OF A CIRCLE

- ▶ A circle can be defined in a coordinate plane as the set of all points that are equidistant from a given point in the plane.
- ▶ The standard form of the equation for a circle can be derived as follows:

- $(x, y)$  are the coordinates of a point on the circle below. The center is the point  $(h, k)$ , and  $r$  is the radius.
- The distance formula gives us the distance between any two points in the plane  $(x_1, y_1)$  and  $(x_2, y_2)$ :

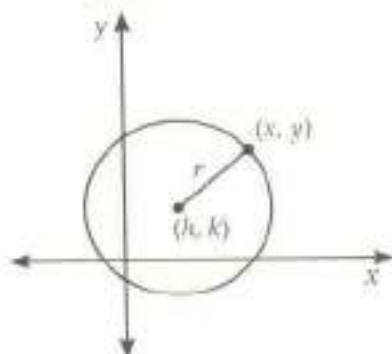
$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = d$$

- The distance formula is applied to the points on the circle with respect to the center:

$$\sqrt{(x - h)^2 + (y - k)^2} = r$$

- Squaring both sides, we have the standard form for the equation of a circle:

$$(x - h)^2 + (y - k)^2 = r^2$$



#### Example

Find the coordinates of the points at which the line  $y = 2x - 2$  and the circle  $x^2 + y^2 = 25$  intersect.



**Solution:**

A line and a circle can intersect once (if the line is tangent to the circle), twice (if the line passes through the circle), or not at all. Begin by solving the two equations simultaneously:

$$y = 2x - 2$$

$$x^2 + y^2 = 25$$

Substitute the first equation into the second equation:

$$x^2 + (2x - 2)^2 = 25 \rightarrow x^2 + (4x^2 - 8x + 4) = 25$$

$$5x^2 - 8x - 21 = 0 \rightarrow (5x + 7)(x - 3) = 0$$

$$x = -\frac{7}{5} \text{ and } x = 3$$

There are two points of intersection.

Substitute the  $x$ -values into the first equation to find the points of intersection:

$$\text{For } x = -\frac{7}{5},$$

$$y = 2\left(-\frac{7}{5}\right) - 2 = -\frac{24}{5}$$

$$\text{For } x = 3,$$

$$y = 2(3) - 2 = 4$$

The points of intersection are  $\left(-\frac{7}{5}, -\frac{24}{5}\right)$  and  $(3, 4)$ .



### TEACHER'S TIP

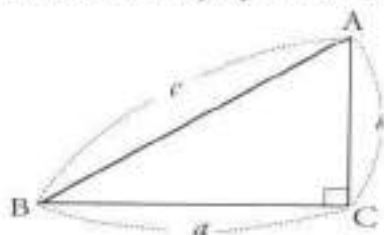
The standard form for the equation of a circle:

$$(x - h)^2 + (y - k)^2 = r^2$$

## TRIGONOMETRY

### Trigonometric Ratios

The trigonometric ratios are the ratios between the lengths of the sides in a right triangle. Similarity proves that the ratios associated with any given angle are constant for any right triangle with the same angle measures (the lengths of the sides are proportional so their ratios are constant).

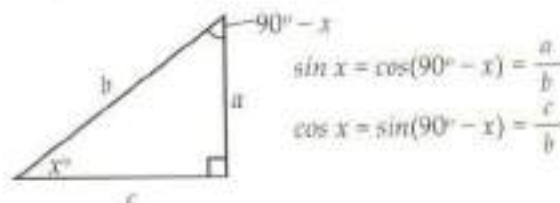


Trigonometric Ratio	Abbreviation	Definition
Sine of $\angle A$	$\sin A$	$\frac{\text{leg opposite } \angle A}{\text{hypotenuse}} = \frac{a}{c}$
Cosine of $\angle A$	$\cos A$	$\frac{\text{leg adjacent } \angle A}{\text{hypotenuse}} = \frac{b}{c}$
Tangent of $\angle A$	$\tan A$	$\frac{\text{leg opposite } \angle A}{\text{leg adjacent } \angle A} = \frac{a}{b}$

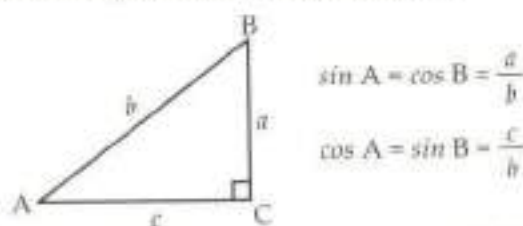
# 090 Question Topic

## SINE AND COSINE OF COMPLEMENTARY ANGLES

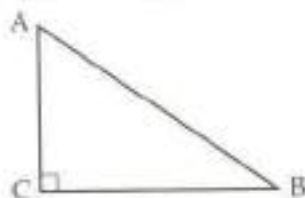
The sine and cosine of complementary angles in a right triangle are equal. This relationship appears consistently on the SAT, and is represented by the formulas:



We can also express this relationship by saying that the sine of one non-right angle in a right triangle is equal to the cosine of the other non-right angle in the right triangle:



### Example



In the triangle above, the sine of angle A is  $\frac{4}{5}$ . Which of the following is the value of the cosine of angle B?

- (A)  $\frac{3}{5}$                       (C)  $\frac{4}{5}$   
 (B)  $\frac{6}{10}$                     (D)  $\frac{10}{8}$



**Solution:**

Triangle ABC is a right triangle, and angles A and B are non-right angles in the right triangle. According to the formula  $\sin A = \cos B$ , the cosine of angle B is equal to the sine of angle

A,  $\frac{4}{5}$ . The correct choice is (C).



### TEACHER'S TIP



Here's an easy way to recall trigonometric ratios:

$o$  = side opposite angle  $\theta$

$h$  = hypotenuse

$a$  = side adjacent to angle  $\theta$

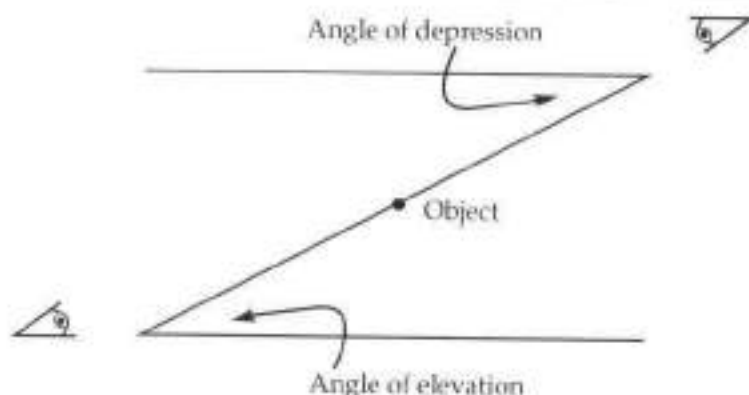
$$\sin \theta = \frac{o}{h} \rightarrow \text{SOH}$$

$$\cos \theta = \frac{a}{h} \rightarrow \text{CAH}$$

$$\tan \theta = \frac{o}{a} \rightarrow \text{TOA}$$

## 091 Question Topic

## ANGLES OF ELEVATION AND DEPRESSION



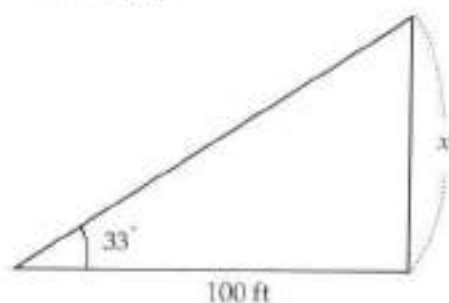
- ▶ The angles of elevation and depression to an object can be used to find the distance to the object.
- ▶ The tangent of the angle of elevation or depression is used to relate the height of the object to the distance to the object.

**Example**

John wants to measure the height of a tree. He walks exactly 100 feet from the base of the tree and measures the angle from the ground to the top of the tree as 33 degrees. How tall is the tree?



**Solution:**



$x = \text{height of the tree}$

$$\tan 33^\circ = \frac{x}{100} \rightarrow x = 100 \tan 33^\circ = 64.94$$

The height of the tree is 64.94 feet.

**TEACHER'S TIP**

Sketch the situation described to determine what you need to do to solve the question.

## COMPLEX NUMBERS

- ▶ The imaginary unit  $i$  is defined as having the following properties:

$$i = \sqrt{-1}, \quad i^2 = -1$$

- ▶ The square root of any negative number can be defined as follows:

$$\text{For } a > 0, \quad \sqrt{-a} = \sqrt{-1} \cdot \sqrt{a} = i\sqrt{a}$$

- ▶ Any number of the form  $a + bi$ —where  $a$  and  $b$  are real numbers,  $b \neq 0$ , and  $i$  is the imaginary unit—is called a *complex number*.
- ▶ In  $a + bi$ ,  $a$  is called the real part and  $bi$  the imaginary part of the complex number.

### 092 Question Topic

#### SIMPLIFYING EXPRESSIONS WITH COMPLEX NUMBERS

When a complex number is in the denominator of a fraction, it must be rationalized in the same way as a radical in the denominator. This is accomplished by multiplying the complex number by its conjugate. The conjugate of the complex number  $a + bi$  is the complex number  $a - bi$ . When conjugates are multiplied, they give as product the difference of two squares:

$$(a + bi)(a - bi) = a^2 - b^2(i^2) = a^2 + b^2$$

#### Example

Simplify the expression  $\frac{5 - 2i}{4 + 3i}$ .



**Solution:**

Rationalize the denominator by multiplying out the imaginary part of the complex number.

$$\begin{aligned}\frac{5 - 2i}{4 + 3i} &= \left(\frac{5 - 2i}{4 + 3i}\right) \left(\frac{4 - 3i}{4 - 3i}\right) \\ &= \frac{20 - 15i - 8i + 6i^2}{16 - 9i^2} \\ &= \frac{20 - 23i - 6}{16 + 9} \\ &= \frac{14 - 23i}{25}\end{aligned}$$



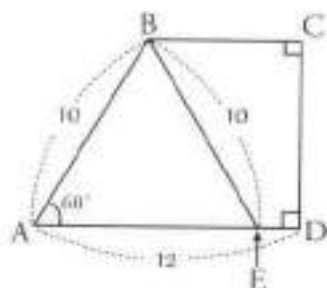
#### TEACHER'S TIP

The imaginary unit  $i$  is defined as  $i^2 = -1$ .



## Quick Practice

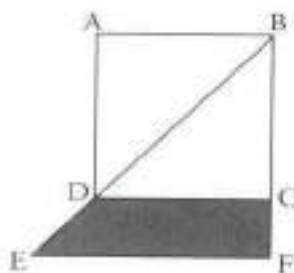
1.



What is the area of the trapezoid BCDE?

- (A)  $16\sqrt{3}$   
 (B)  $\frac{45}{2}\sqrt{3}$   
 (C)  $8+4\sqrt{3}$   
 (D)  $4+12\sqrt{3}$

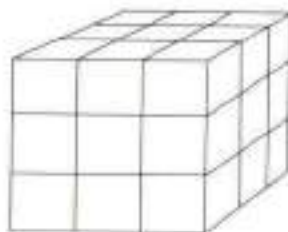
2.



In the figure above,  $\triangle BEF$  is an isosceles right triangle and ABCD is a square as shown. If  $AB = 1$  and  $EB = 2$ , what is the area of the shaded region CDEF?

- (A)  $\frac{1}{2}$   
 (B)  $\frac{\sqrt{2}}{2}$   
 (C) 1  
 (D)  $\sqrt{2}$

3.



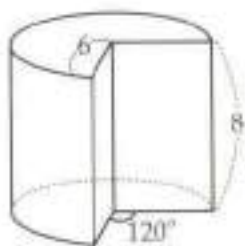
In the figure above, the cube is divided into twenty-seven smaller cubes of equal volume. If twelve of these smaller cubes have a combined volume of 36 cubic units, what is the volume in cubic units of the entire cube?

- (A) 54  
 (B) 81  
 (C) 108  
 (D) 135

4. A rectangular fish tank has a base four feet wide and nine feet long. While the tank is halfway filled with water, a heavy cube with an edge of three feet is placed in the tank. By how many inches will the water in the tank rise when the cube is completely submerged?

- (A) 2  
 (B) 4  
 (C) 6  
 (D) 9

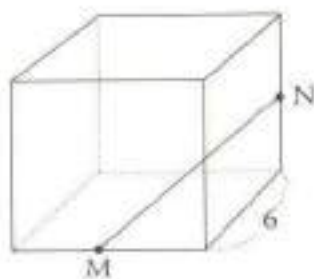
5.



Note: Figure not drawn to scale  
What is the volume of the solid in the figure above?

- (A)  $84\pi$   
(B)  $96\pi$   
(C)  $144\pi$   
(D)  $192\pi$

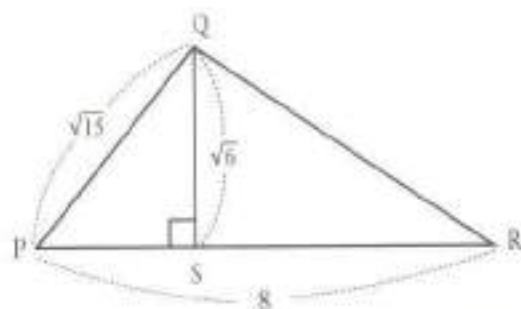
6.



The figure above is a cube with edges of length 6 units. Points M and N are the midpoints of two edges of the cube. Line segment  $\overline{MN}$  connects point M to point N. What is the length of  $\overline{MN}$ ?

- (A) 8  
(B)  $3\sqrt{6}$   
(C)  $2\sqrt{6}$   
(D)  $6\sqrt{2}$

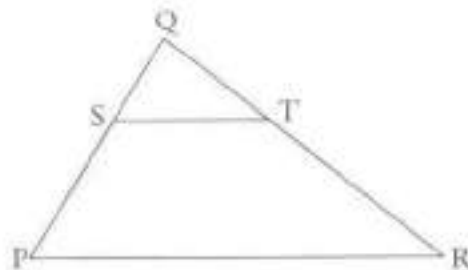
7.



In  $\triangle PQR$  above, what is the length of the side  $\overline{QR}$ ?

- (A)  $\sqrt{29}$   
(B)  $\sqrt{31}$   
(C)  $\sqrt{37}$   
(D) 7

8.

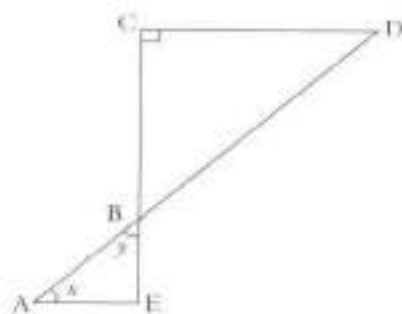


Note: Figure not drawn to scale

In the figure above,  $SQ = 4$ ,  $SP = 8$ ,  $QR = 15$ , and  $\overline{ST}$  is parallel to  $\overline{PR}$ . What is the length of  $\overline{TR}$ ?

- (A) 8  
(B) 9  
(C) 10  
(D) 12

## Quick Practice

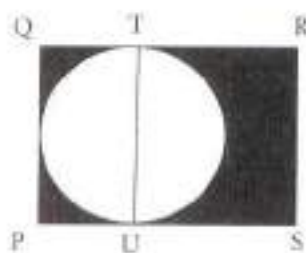
9. 

Note: Figure not drawn to scale

In the figure above,  $\overline{AE}$  and  $\overline{CD}$  are each perpendicular to  $\overline{CE}$ . If  $x = y$ ,  $\overline{AB} = 8$ , and the length of  $\overline{BD} = 16$ , what is the length of  $\overline{CE}$ ?

- (A)  $3\sqrt{2}$   
 (B)  $6\sqrt{2}$   
 (C)  $8\sqrt{2}$   
 (D)  $12\sqrt{2}$

10.



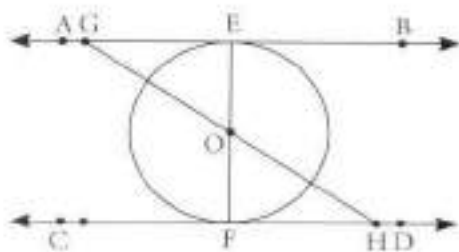
In the figure above, PQRS is a rectangle, and  $\overline{TU}$  is the diameter of the circle. If the length of  $\overline{RS}$  is six centimeters and the length of  $\overline{PS}$  is eight centimeters, what is the area of the shaded area in square centimeters?

- (A)  $48 - 6\pi$   
 (B)  $48 - 8\pi$   
 (C)  $24 - 6\pi$   
 (D)  $48 - 9\pi$

11. If  $\cos \frac{\pi}{3} = x - 1$ , then what is the value of  $x$ ?

- (A)  $\frac{1}{2}$   
 (B)  $\frac{3}{2}$   
 (C)  $\frac{\pi}{3} + 1$   
 (D)  $x$  has two values

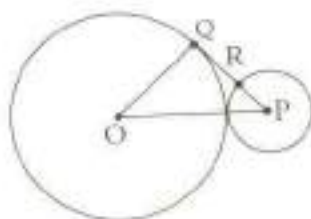
12.



In the figure above,  $\overline{AB} \parallel \overline{CD}$  and both lines are tangent to the circle O. The diameter of circle O is equal to the length of segment  $\overline{OH}$ . If the diameter of the circle O is 24, what is the measure of  $\angle BGH$ ?

- (A)  $30^\circ$   
 (B)  $45^\circ$   
 (C)  $60^\circ$   
 (D)  $75^\circ$

13.



Note: Figure not drawn to scale

In the figure above, the circle with center  $O$  has radius 8 units and the circle with center  $P$  has radius 2 units. The circles are tangent to each other. Segment  $\overline{PQ}$  is tangent to the larger circle and intersects the smaller circle at  $R$ . What is the length of segment  $\overline{QR}$ ?

- (A)  $\sqrt{12}$   
 (B)  $\sqrt{14} - 2$   
 (C)  $\sqrt{18}$   
 (D) 4

14. A bird sits on top of a lamppost. The angle of depression from the bird to the feet of an observer is  $35^\circ$ . The distance from the bird to the observer is 25 meters. How tall is the lamppost?



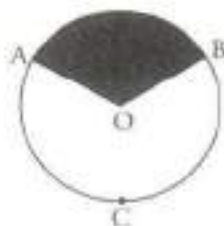
- (A) 14.34 meters  
 (B) 20.48 meters  
 (C) 17.5 meters  
 (D) 10.7 meters

15. Which of the following is equivalent to the term

$$\frac{2+i\sqrt{5}}{3-i\sqrt{5}}?$$

- (A)  $\frac{1}{14} + \frac{\sqrt{5}}{14}i$   
 (B)  $\frac{1}{14} - \frac{5\sqrt{5}}{14}i$   
 (C)  $\frac{1}{14} - \frac{\sqrt{5}}{14}i$   
 (D)  $\frac{1}{14} + \frac{5\sqrt{5}}{14}i$

16.



The radius of the circle shown is 9 units. If the area of the shaded sector is  $9\pi$  square units, what is the length of  $\widehat{ACB}$ ?

- (A)  $3\pi$   
 (B)  $15\pi$   
 (C)  $16\pi$   
 (D)  $18\pi$

# Quick Practice

17. What is the degree measure of an angle of 60 radians?



- (A)  $\frac{\pi}{6^\circ}$   
 (B)  $\frac{60^\circ}{\pi}$   
 (C)  $\frac{10800^\circ}{\pi}$   
 (D)  $\frac{1080^\circ}{\pi}$

18.  $(2a + b) + (3 - 5a)i = 1 + 8i$   
 If  $a$  and  $b$  are integers such that the equation above is true, what is their sum?

- (A) -3  
 (B) -2  
 (C) -1  
 (D) 2

19. What are the coordinates of the center of the circle represented by the following equation?

$$x^2 - 2x + y^2 - 6y - 9$$

- (A) (-1, -3)  
 (B) (1, 3)  
 (C) (-3, -1)  
 (D) (3, 1)

20. What are the coordinates at which the line  $3y + x = 6$  and the circle  $x^2 + y^2 = 10$  intersect?



- (A)  $\left(\frac{9}{5}, \frac{13}{5}\right), (3, 1)$   
 (B)  $\left(-\frac{9}{5}, \frac{13}{5}\right), (3, 1)$   
 (C)  $\left(-\frac{9}{5}, \frac{13}{5}\right), (-3, -1)$   
 (D)  $\left(\frac{9}{5}, -\frac{13}{5}\right), (-3, -1)$



**ANSWERS  
&  
EXPLANATIONS**

1-20



# Answers & Explanations...

## Mastering SAT Geometry



1.	(B)	6.	(B)	11.	(B)	16.	(C)
2.	(A)	7.	(B)	12.	(A)	17.	(C)
3.	(B)	8.	(C)	13.	(D)	18.	(D)
4.	(D)	9.	(D)	14.	(A)	19.	(B)
5.	(D)	10.	(D)	15.	(D)	20.	(B)

1) **⇒** B

The base angles  $\angle BAE = \angle BEA = 60^\circ$ , which means that  $\angle ABE = 60^\circ$ ,  $\triangle ABE$  is an equilateral triangle, and  $BA = BE = AE = 10$ . Therefore:

$$ED = AD - AE = 12 - 10 = 2$$

Because  $\triangle ABE$  is an isosceles (and equilateral) triangle, the altitude from the peak angle to the base bisects the base into two segments of 5 units each. As  $BC \parallel AD$ , we can infer that:

$$BC = 5 + ED = 5 + 2 = 7$$

BC and ED are the two bases of the trapezoid BCDE. Calculate the altitude of the trapezoid using the Pythagorean theorem:

$$\text{Altitude}^2 + 5^2 = 10^2 \rightarrow \text{Altitude} = \sqrt{75} = 5\sqrt{3}$$

The area of the trapezoid is:

$$\text{Area}_{BCDE} = \left( \frac{BC + ED}{2} \right) (\text{Altitude})$$

$$\left( \frac{7 + 2}{2} \right) (5\sqrt{3}) = \frac{45}{2} \sqrt{3}$$

2) **⇒** A

$\triangle BEF$  is a 45-45-90 right triangle, with a side to hypotenuse ratio of  $1:\sqrt{2}$ . The length of the sides is:

$$BF = EF = \frac{2}{\sqrt{2}} = \sqrt{2}$$

and the area of  $\triangle BEF$  is:

$$\text{Area}_{\triangle BEF} = \frac{1}{2} (\sqrt{2} \times \sqrt{2}) = 1$$

The area of the square ABCD is 1. The area of the triangle  $\triangle BCD$  is half the area of the square:

$$\text{Area}_{\triangle BCD} = \frac{1}{2}$$

The area of the shaded region is:

$$\text{Area}_{CDEF} = \text{Area}_{\triangle BEF} - \text{Area}_{\triangle BCD} = 1 - \frac{1}{2} = \frac{1}{2}$$

3) **⇒** B

Let  $x$  be the volume of the entire cube:

$$\frac{12 \text{ cubes}}{36 \text{ unit}^3} = \frac{27 \text{ cubes}}{x}$$

$$x = \frac{27}{12} \cdot 36 \text{ unit}^3 = 81 \text{ unit}^3$$

4) **⇒** D

The volume of the cube is equal to the amount of water displaced by the cube. This amount of

water will have the dimensions 4 feet  $\times$  9 feet  $\times$   $d$ .  
The volume of the cube is:

$$\text{Volume} = 3 \text{ feet} \times 3 \text{ feet} \times 3 \text{ feet} = 27 \text{ feet}^3$$

The water rises by  $d$ :

$$4 \text{ feet} \times 9 \text{ feet} \times d \text{ feet} = 27 \text{ feet}^3$$

$$d = \frac{27}{36} \text{ feet} = \frac{3}{4} \text{ feet} = 9 \text{ inches}$$

5) **D**

The general formula for the volume of a right solid is:

$$\text{Volume} = \text{Base area} \times \text{Height}$$

The base of this solid is a circle with one third removed (the central angle of the segment removed is  $120^\circ$ ). The volume of the solid is:

$$\text{Volume} = \left(\frac{2}{3}\pi r^2\right) \cdot h = \left(\frac{2}{3}\pi(6)^2\right) \cdot 8 = 192\pi$$

6) **B**

$\overline{MN}$  is the hypotenuse of a triangle which has one side half the edge of the cube and another side the distance from the vertex below N to the point M. This latter side is itself the hypotenuse of a triangle with one side which is the full length of the edge of the cube and another side one-half the edge of the cube. Calculate the square of this latter side, which we will label  $b^2$ :

$$b^2 = 3^2 + 6^2 = 45$$

Calculate the length of  $\overline{MN}$ :

$$\overline{MN}^2 = b^2 + 3^2 = 45 + 9 = 54$$

$$\overline{MN} = \sqrt{54} = \sqrt{9 \cdot 6} = 3\sqrt{6}$$

7) **B**

First calculate the length of  $\overline{PS}$  using the Pythagorean theorem:

$$(\overline{PS})^2 = (\overline{QS})^2 + (\overline{PQ})^2$$

$$15 = 6 + \overline{PS}^2$$

$$9 = \overline{PS}^2$$

$$\overline{PS} = 3$$

Calculate the length of  $\overline{RS}$ :

$$\overline{RS} = \overline{PR} - \overline{PS} = 8 - 3 = 5$$

Finally, calculate the length of  $\overline{QR}$  using the Pythagorean theorem:

$$\overline{QR}^2 = \overline{QS}^2 + \overline{RS}^2$$

$$\overline{QR}^2 = 5^2 + (\sqrt{6})^2$$

$$\overline{QR}^2 = 31$$

$$\overline{QR} = \sqrt{31}$$

8) **C**

According to the Triangle Side-splitter Theorem, lines parallel to the side of a triangle and within the triangle divide the other sides of the triangle into proportional segments. We can write the following ratios in order to solve for  $\overline{TR}$ :

$$\frac{\overline{SP}}{\overline{QP}} = \frac{\overline{TR}}{\overline{QR}} \rightarrow \frac{8}{12} = \frac{\overline{TR}}{15}$$

$$\overline{TR} = \frac{2}{3}(15) = 10$$

9) **D**

$$x = y = 45^\circ$$

$\angle CBD = 45^\circ$  (vertical angles are identical)

$\angle BDC = 45^\circ$  (sum of interior angles of a triangle)

Therefore,  $\triangle ABE$  is similar to  $\triangle DBC$  and both are 45-45-90 right triangles. For a 45-45-90 right triangle, the ratio of the side to the hypotenuse is:

$$\text{Side} = \frac{\text{Hypotenuse}}{\sqrt{2}}$$

The length of  $\overline{CE}$  can be written as:

$$\overline{CE} = \overline{CB} + \overline{BE}$$

$$\overline{CE} = \frac{16}{\sqrt{2}} + \frac{8}{\sqrt{2}} = \frac{24}{\sqrt{2}}$$

Rationalize the denominator:

$$\overline{CE} = \frac{24}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{24\sqrt{2}}{2} = 12\sqrt{2}$$



10) **⇒** D

The diameter of the circle is 6 centimeters. The radius is 3 centimeters, and the area of the circle is:

$$\text{AREA}_{\text{circle}} = \pi r^2 = \pi(3)^2 = 9\pi$$

The area of the shaded region is the difference between the areas of the rectangle and the circle:

$$\begin{aligned}\text{AREA}_{\text{shaded}} &= \text{AREA}_{\text{rect}} - \text{AREA}_{\text{circle}} \\ &= (6 \times 8) - 9\pi \\ &= 48 - 9\pi\end{aligned}$$

11) **⇒** B

$$\cos \frac{\pi}{3} = \cos 60^\circ = \frac{1}{2}$$

$$\frac{1}{2} = x - 1$$

$$x = \frac{3}{2}$$

The correct choice is (B).

12) **⇒** A

A tangent line to a circle is perpendicular to the radius of the circle at the point of contact, so  $\angle OFH$  is a right angle. The diameter of the circle is the line segment  $\overline{OH}$ , so the radius  $\overline{OF} = \frac{1}{2} \cdot \overline{OH}$ . This implies the ratio:

$$\sin \angle OHF = \frac{\overline{OF}}{\overline{OH}} = \frac{1}{2}, \text{ and } \angle OHF = 30^\circ$$

$\angle OHF$  and  $\angle BGH$  are alternate interior angles between parallel lines, so  $\angle OHF = \angle BGH = 30^\circ$

13) **⇒** D

The line  $\overline{PQ}$  is tangent to the circle  $O$ , so  $\angle OQP = 90^\circ$  and  $\triangle OQP$  is a right triangle. The

length of  $\overline{OP}$  is the sum of the radii of the two circles:

$$\overline{OP} = 8 + 2 = 10$$

Using the Pythagorean theorem, solve for  $\overline{QP}$ :

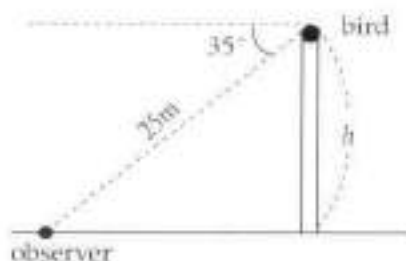
$$\overline{OP}^2 = \overline{OQ}^2 + \overline{QP}^2$$

$$10^2 = 8^2 + \overline{QP}^2$$

$$36 = \overline{QP}^2$$

$$6 = \overline{QP}$$

The length of  $\overline{QR}$  is:  $\overline{QR} = \overline{QP} - \overline{RP} = 6 - 2 = 4$

14) **⇒** A

(Diagram not to scale)

The angle of depression from the bird to the observer is equal to the angle of elevation from the observer to the bird because the two are interior alternate angles between parallel lines. The ratio of the height of the post to the distance from bird to observer is the sine of the angle of elevation:

$$\sin 35^\circ = \frac{h}{25}$$

$$\begin{aligned}h &= 25 \sin 35^\circ \\ &= 14.34 \text{ meters}\end{aligned}$$

15) **⇒** D

$$\begin{aligned} & \frac{2+i\sqrt{5}}{3-i\sqrt{5}} \cdot \frac{3+i\sqrt{5}}{3+i\sqrt{5}} \\ &= \frac{6+2\sqrt{5} \cdot i+3\sqrt{5} \cdot i+5i^2}{9-5i^2} \\ &= \frac{6+5\sqrt{5} \cdot i+5(-1)}{9-5(-1)} \\ &= \frac{1+5\sqrt{5} \cdot i}{14} \\ &= \frac{1}{14} + \frac{5\sqrt{5}}{14}i \end{aligned}$$

16) **⇒** C

The area and arc length of a segment are both proportional to the central angle. This allows us to write the proportion:

$$\frac{\text{Area of } \widehat{ACB}}{\text{Area of circle}} = \frac{\text{Length of } \widehat{ACB}}{\text{Circumference of circle}}$$

To find the area of the segment of  $\widehat{ACB}$ :

$$\begin{aligned} \text{Area of } \widehat{ACB} &= \text{Area of circle} - \text{Area of } \widehat{AB} \\ &= \pi(9)^2 - 9\pi = 81\pi - 9\pi = 72\pi \end{aligned}$$

As the circumference of the circle is  $18\pi$ , we can write the proportion above as:

$$\begin{aligned} \frac{72\pi}{81\pi} &= \frac{\widehat{ACB}}{18\pi} \\ \widehat{ACB} &= \frac{8}{9} \cdot 18\pi \\ &= 16\pi \end{aligned}$$

17) **⇒** C

$$60 \text{ radians} \cdot \frac{360^\circ}{2\pi \text{ radians}} = \frac{10800^\circ}{\pi}$$

18) **⇒** D

$$(2a + b) + (3 - 5a)i = 1 + 8i$$

Therefore,

$$2a + b = 1 \text{ and } 3 - 5a = 8$$

Solve the second equation:

$$-5a = 8 - 3 \rightarrow -5a = 5 \rightarrow a = -1$$

Solve for  $b$ :

$$2(-1) + b = 1 \rightarrow b = 3$$

Calculate their sum:  $a + b = -1 + 3 = 2$

19) **⇒** B

$$\begin{aligned} x^2 - 2x + y^2 - 6y - 9 \\ x^2 - 2x + 1 + y^2 - 6y + 9 = 9 + 1 + 9 \\ (x-1)^2 + (y-3)^2 = 19 \end{aligned}$$

The center of the circle has coordinates  $(1, 3)$

20) **⇒** B

To find points of intersection, solve the system of equations:

$$\begin{aligned} 3y + x - 6 &\rightarrow x = 6 - 3y \\ x^2 + y^2 &= 10 \end{aligned}$$

Substitute the first equation into the second:

$$\begin{aligned} (6 - 3y)^2 + y^2 &= 10 \\ 36 - 36y + 9y^2 + y^2 &= 10 \\ 10y^2 - 36y + 26 &= 0 \\ (2y - 2)(5y - 13) &= 0 \end{aligned}$$

There are two solutions:

$$2y - 2 = 0 \rightarrow y = 1$$

And,

$$5y - 13 = 0 \rightarrow y = \frac{13}{5}$$

Solve for  $x$ -coordinates:

For  $y = 1$ ,

$$3(1) + x - 6 \rightarrow x = 3$$

For  $y = \frac{13}{5}$ :

$$\begin{aligned} 3\left(\frac{13}{5}\right) + x - 6 \\ \frac{39}{5} + x - 6 \\ x = \frac{9}{5} \end{aligned}$$

The two points of intersection are:

$$\left(\frac{9}{5}, \frac{13}{5}\right) \text{ and } (3, 1)$$



## Mastering

*Data Analysis*

	<i>Section 1</i>
CATEGORICAL DATA	236
	<i>Section 2</i>
NUMERICAL DATA	240
	<i>Section 3</i>
POPULATION PARAMETERS	243
	<i>Section 4</i>
PROBABILITY	244
	<i>Section 5</i>
RATES	246
	<i>Section 6</i>
UNIT CONVERSION	249



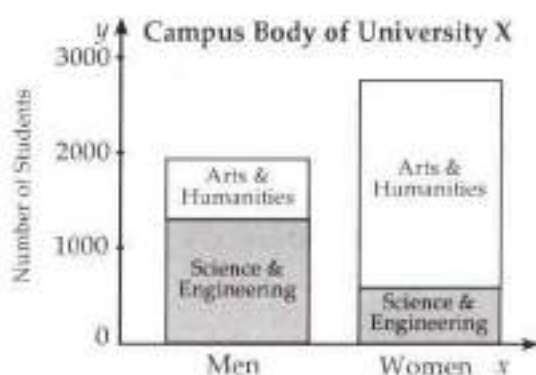
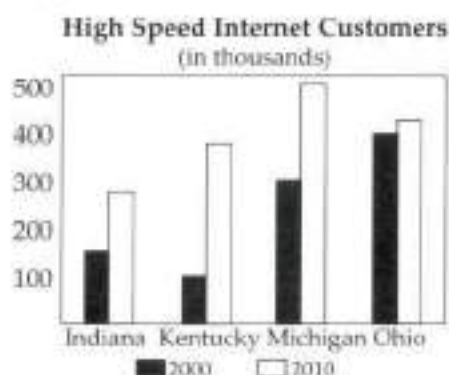
# Fundamental Concepts and Techniques

## CATEGORICAL DATA

**Categorical data** is data that can take on one of a fixed number of values or falls into a category. Examples of categorical data are polling results (how many people would vote for each of a group of political candidates), demographic information (groups by location, ethnicity, age, etc.), and quantitative measurements that are organized by range (such as boys in a grade-school class organized by weight ranges). This final example shows that quantitative data can be organized in two ways, either by plotting individual data points (each boy's weight is represented on a graph) or by category (the number of boys that are between 0 – 50 lbs., 51 – 60 lbs., 61 – 70 lbs., etc.). Only the latter of these is referred to as categorical data.

### Bar Graphs

- ▶ Bar graphs are used to represent categorical data only. A category is represented by a vertical or horizontal bar. One axis will have categories on it, and the other will indicate the number of individuals that are in each category.
- ▶ Below is an example of a vertical bar graph (on the left) with adjacent bars for each state representing different years:



- ▶ A segmented bar graph (above right) groups multiple categories in a single bar. In this way, a segmented bar graph divides larger category groupings further into subcategories.
- ▶ Above (on the right) is an example of a segmented bar graph that groups a campus body by gender and each gender by area of study.

### Pie Graphs

- ▶ Pie graphs are a way of representing categorical data by proportion. The proportions may be explicitly marked by way of percentages, and they will always be visible in the structure of the chart.

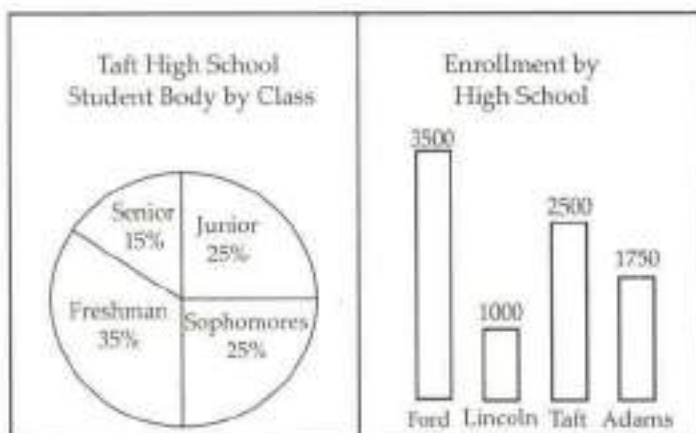
ANNUAL BUDGET BY DEPARTMENT



- ▶ When working with a bar graph, pay close attention to the axes: be clear on the categories and on the scale of the units provided. For example, on the bar graph of the Internet users on the previous page, data for two years are provided for each state, and a legend is provided below the horizontal axis. Be clear on which bar represents which year—the dark bars represent the year 2000 and the lighter bars represent the year 2010. On the horizontal axis, the number of users is presented in thousands, so that the number “200,” for example, that is on the vertical axis marks the level at which the number of internet users is 200,000.
- ▶ When working with a pie graph, look for the total number of elements (people, dollars, units) that is being divided up in the graph. As a pie graph displays proportions, the number of elements assigned to each category must be calculated according to the following formula:

$$\text{Number of Elements in a Group} = (\text{Total Number of Elements}) \times (\text{Proportion of Elements in a Group})$$

## Example



According to the graphs, how many more freshmen are enrolled than sophomores at Taft High School?

- (A) 125                      (C) 375  
(B) 250                      (D) 500



**Solution :**

To determine how many freshmen and sophomores are at Taft High School, first establish how many students are at Taft. This information is obtainable from the bar graph, which gives total student enrollments by high school. The third column from the left is labeled “Taft” and represents enrollment at Taft High School. It shows that enrollment at Taft is 2,500 students.

To calculate the number of freshmen and sophomores at Taft, consider the pie chart, which shows the proportion of students that belong to each class. The proportion of students that are freshmen and sophomores at Taft are 35% and 25% respectively. We can now calculate the numbers of each:

$$\text{Number of freshmen at Taft} = (0.35)(2500) = 875$$

$$\text{Number of sophomores at Taft} = (0.25)(2500) = 625$$

There are 250 more freshmen than sophomores at Taft. Choice (B) is correct.

## TWO-WAY TABLES

- ▶ Two-way tables present numerical values grouped into two types of intersecting categories, which are listed in the top row and leftmost column of the table.
- ▶ The two-way table below contains the number of undergraduate students enrolled in four California universities, organized by gender and school:

	UC Los Angeles	UC Berkeley	UC San Diego	UC Santa Cruz	Total
Female	15,849	13,495	11,535	8,384	49,263
Male	12,825	12,456	12,270	7,311	44,862
Total	28,674	25,951	23,805	15,695	94,125

- ▶ Review the table above and note the categories: The categorical variables are gender (male or female) and university (UC Los Angeles, UC Berkeley, UC San Diego, and UC Santa Cruz). This is seen more clearly when the numbers are removed (below):

	UC Los Angeles	UC Berkeley	UC San Diego	UC Santa Cruz
Female				
Male				

- ▶ Now review the table below. Note that the totals for each category are not included. The numerical values in the table below are called **joint frequencies**. They are the number of members that correspond simultaneously to two categorical variables:

	UC Los Angeles	UC Berkeley	UC San Diego	UC Santa Cruz
Female	15,849	13,495	11,535	8,384
Male	12,825	12,456	12,270	7,311

For example, the single cell below tells us that there are 15,849 female undergraduates at UC Los Angeles. The value 15,849 is a joint frequency.

	UC Los Angeles
Female	15,849

- ▶ Review the table below. All joint frequencies have been removed and the totals have been reinstated. These totals, which are the sum totals of each of the categories, are called **marginal frequencies**:

	UC Los Angeles	UC Berkeley	UC San Diego	UC Santa Cruz	Total
Female					49,263
Male					44,862
Total	28,674	25,951	23,805	15,695	94,125

The marginal frequency for a column or row corresponds to, and maybe calculated as, the sum of all the joint frequencies in a given column or row. Below, the total number of undergraduates at UC Los Angeles corresponds to the sum of the number of females and the number of males:

	UC Los Angeles
Female	15,849
Male	12,825
Total	28,674

## 094 Question Topic

### ANALYSIS OF TWO-WAY TABLES

Two-way tables are useful for summarizing large amounts of information and organizing them in purposeful ways. Information is presented in the following ways:

- ▶ Joint frequencies are the numbers of members that belong at once to two categories.
- ▶ Marginal frequencies are the totals of the categories named by columns and rows.
- ▶ Relative frequencies are calculated by dividing joint frequencies by marginal frequencies. For example, the relative frequency of female students at UC Los Angeles is calculated by taking joint and marginal frequencies from the fragment below and doing the subsequent calculation:

	UC Los Angeles
Female	15,849
Male	12,825
Total	28,874

$$\text{Relative Frequency of Females at UCLA} = \frac{\text{Joint Frequency of Females at UCLA}}{\text{Total Students at UCLA}} = \frac{15,849}{28,674} = 0.55$$

- ▶ Some two-way tables will contain relative frequencies instead of joint frequencies. Tables of this type will list relative frequencies with respect to the total number of members in all categories. The table below is a version of the table on the previous page, but with relative frequencies in place of joint frequencies:

	UC Los Angeles	UC Berkeley	UC San Diego	UC Santa Cruz	Total
Female	0.17	0.14	0.12	0.09	0.52
Male	0.14	0.13	0.13	0.08	0.48
Total	0.31	0.27	0.25	0.17	1.00



**Example**

According to the table to the right, how many more female undergraduates attend UC Santa Cruz than male undergraduates?

	UC Los Angeles	UC Berkeley	UC San Diego	UC Santa Cruz	Total
Female	15,849	13,495	11,535	8,384	49,263
Male	12,825	12,456	12,270	7,311	44,862
Total	28,674	25,951	23,805	15,695	94,125

**Solution:**

Locate the number of female undergraduates and male undergraduates at UC Santa Cruz. There are 8,384 female and 7,311 male undergraduates at UC Santa Cruz. To calculate their difference:

$$8,384 - 7,311 = 1,073$$

There are 1,073 more female than male undergraduates at UC Santa Cruz.

## NUMERICAL DATA

- ▶ **Numerical data** consists of data points that are numerical values. Examples of numerical data include individual test scores and height/weight data for individuals.

## 095 Question Topic

### MEASURES OF CENTER AND SPREAD

- ▶ **Mean:** The mean of a set of data is the sum of the numbers in the set divided by the number of members of that set.
- ▶ **Weighted mean:** A weighted mean is a mean that is calculated from data points that contribute unequally to the mean. In a regular mean, each of the data points is counted once. In a weighted mean, some data points are counted more than others in the calculation of the mean. For example, frequency data and numerical data can be combined to give a weighted mean: data points contribute to the mean proportionally based on how frequently they occur. When calculating a weighted mean, the combined frequency of all data points is used as the divisor.
- ▶ **Median:** The median of a data set is the middle value when the set is arranged in order of increasing value. If there are an odd number of values in the set, the median is the average of the two middle values.
- ▶ **Mode:** The mode of a set of data is the number that occurs most often in the set.
- ▶ **Range:** The range is the difference between the greatest and least values of the set.
- ▶ **Standard deviation:** The standard deviation is a general measure of deviation of data points from the mean. It shows how spread out a data set is; in other words, it is a measure of how concentrated data points are around a certain point (the mean). A small standard deviation indicates that the data are collected around the mean, since the deviations from the mean are small. A large standard deviation indicates that data are spread out from each other, since the deviations from the mean are large. You will not be asked to calculate standard deviation on the SAT—only to make qualitative judgements.

- Consider the following set of integers:

4, 14, 13, 11, 5, 10, 8, 6, 14

The set contains nine members. Written in ascending order of value, the set becomes:

4, 5, 6, 8, 10, 11, 13, 14, 14

The statistical measures for this set are calculated below:

$$\text{Mean} = \frac{4+5+6+8+10+11+13+14+14}{9} = 9.4$$

$$\text{Median} = 10$$

$$\text{Mode} = 14$$

$$\text{Range} = 14 - 4 = 10$$

- Consider the following scenario as an example of the calculation of a weighted mean:

- In a set of data, 30% of data points have a value of 2, 45% of data points have a value of 3, and 25% of data points have a value of 5.

The percentages are frequency data, and as they sum to 100%, the combined frequency of all data points in this case is 1:

$$\text{Weighted Mean} = \frac{(0.3)(2) + (0.45)(3) + (0.25)(5)}{1} = 0.6 + 1.35 + 1.25 = 3.2$$

### Example

The average score for a class on a biology quiz was 80. If twenty percent of the class scored 90 and thirty percent scored 70, what was the average score for the rest of the class?

(A) 176

(B) 78

(C) 80

(D) 82



**Solution:**

Assume the number of students in the class is one hundred. Assuming a total number of one hundred is a useful way of approaching questions involving percentages. Twenty percent of the class scored 90, so twenty students scored 90.

The total points of these students is  $(20)(90) = 1800$ .

Thirty students (thirty percent) scored 70, so their total points is  $(30)(70) = 2100$ .

Let  $x$  be the average score of the remaining fifty students:

$$\frac{1800 + 2100 + 50x}{100} = 80$$

$$\frac{3900 + 50x}{100} = 80$$

$$50x = 4100$$

$$x = 82$$

The correct choice is (D).



### TEACHER'S TIP

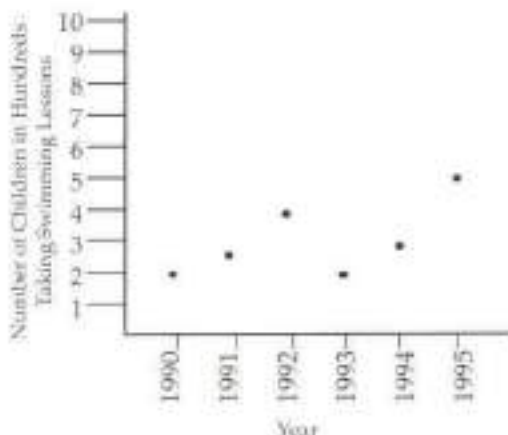
This question could also have been solved by calculating a weighted mean as follows:

$$\frac{(0.2)(90) + (0.3)(70) + (0.5)x}{1} = 80$$

$$39 + 0.5x = 80$$

$$x = 82$$

- ▶ Determine first if the data points are rising or falling as they go from left to right. A rising trend indicates a positive association between the variables; a falling trend indicates a negative association.
- ▶ Determine if the association is linear (constant slope) or non-linear. If non-linear, determine if the data points represent an exponential or a logarithmic relationship. A logarithmic relationship can be distinguished from an exponential relationship because data points will approach a  $y$ -value limit.
- ▶ To make predictions for values beyond the data set, determine the equation for the line of best fit. Then input the value for which you need to make a prediction. To calculate a line of best fit, sketch a line that follows the course of the data points. Then choose two points that lie on or are very close to this line, and use the coordinates to find the slope and equation of the line.
- ▶ Outliers are data points that do not follow the pattern of the other data points. If the outlier is much higher in value than expected, it will skew the slope of the line of best fit upwards. If it is lower than expected, it will skew the slope of the line of best fit downwards.

**Example**

Based on the graph above, the relationship between year and number of students taking swimming lessons is best described as

- (A) Positive and linear      (C) Negative and linear  
 (B) Positive and non-linear      (D) Negative and non-linear



**Solution:**

The data points rise from left to right. We determine that the relationship between year and students taking lessons is positive. To determine if the relationship is linear or non-linear, consider the two types of non-linear positive relationships between variables: an exponential relationship will show data points curving upwards; a logarithmic relationship will show data points leveling-off to a  $y$ -value limit. Neither of those patterns describes the scatterplot above. The data points do, however, increase more-or-less steadily, suggesting a linear relationship between variables.

The correct choice is (B).

## POPULATION PARAMETERS

- ▶ **Population parameters** refer to numbers that represent an entire population. A population is the collection of all individuals in a certain group. Examples of population parameters are the mean and standard deviation of a population.
- ▶ In many cases, population parameters cannot be measured directly or are impossible to determine empirically. An example of this type of population parameter is the mean age of persons living in the United States. To arrive at an exact value for this parameter, we would have to account for every person in the United States and verify their age—an impossible task.
- ▶ **Statistical parameters** are statistics that are drawn from samples taken from a population. Statistical parameters are used to estimate population parameters. Statistical parameters can provide very precise and helpful measures of population parameters because of their methods of accounting for error.
- ▶ As a general rule, the larger the size of the sample drawn from the population, the closer the sample statistic will be to the actual population parameter.
- ▶ To obtain a sample statistic even closer to the population statistic, the sampling process can be repeated and the individual sample statistics averaged to produce a single average sample statistic. It can be assumed that the higher the number of samples—that is, the more times the process of sampling is repeated—the more the average sample statistic approaches the actual population parameter.

## 097 Question Topic

### MEASURES OF ERROR

- ▶ **Confidence intervals** describe the accuracy of the sampling method in terms of an interval. If samples of a certain size are taken from a population, a 95% confidence interval is the interval around each sample statistic such that 95% of those intervals contain the actual population parameter.
- ▶ You will not be asked to calculate confidence intervals on the SAT Math Test. Only a conceptual understanding is required. The most important things to remember are:
  - The smaller the confidence interval at a given confidence level (either 90%, 95%, or 99%), the more accurate the sampling method.
  - The larger the sample size, the smaller the confidence interval, and the more accurate the sampling method.
- ▶ **Measurement Error/Margin of Error:** These terms refer to the same quantity. The margin of error is related to the confidence interval as follows:

$$\text{Confidence interval} = \text{sample statistic} \pm \text{margin of error}$$

- ▶ **Margins of error** reflect the confidence level: the higher the confidence level, the smaller the margin of error. For example, all other factors being equal, a 90 percent confidence interval will have a larger margin of error than a 95 percent confidence interval.
- ▶ Margins of error are also dependent on the sample size and the standard deviation of the sample. The greater the standard deviation, the greater the margin of error. The greater the sample size, the smaller the margin of error. This last relationship between sample size and margin of error is reflected in the relationship between sample size and confidence level discussed above.

**Example**

The Center for Disease Control and Prevention obtains anthropometric data to study the prevalence of disease with respect to certain characteristics of the population. The mean and standard error of a large sample of women ( $n = 5753$ ) are used to produce a 95% confidence interval for upper-arm measurements of  $35.8 \pm 0.12$  cm. This confidence interval can be interpreted as meaning that

- (A) the mean upper-arm length of all women in the United States is in the range  $35.8 \pm 0.12$  cm.
- (B) there is a 95% probability that the mean upper-arm length of all women in the United States is in the range  $35.8 \pm 0.12$  cm.
- (C) 95% of upper-arm measurements of women in the United States will fall within this range.
- (D) there is a 95% chance that if this process is repeated, it will produce the same result.

**Solution :**

According to the definition of “confidence interval,” 95% of confidence intervals calculated from samples of this size will contain the true population mean. The confidence interval above, then, has a 95% probability of being one of those samples that contains the population mean. Therefore, there is a 95% probability that the true mean upper-arm length of all women in this population is in the range  $35.8 \pm 0.12$  cm. The correct choice is (B).

The remaining choices are incorrect or incomplete interpretations of confidence intervals.

## PROBABILITY

- An **event** is a set of outcomes. The probability of an event (E) is  $P(E)$ , and is calculated as follows:

$$P(E) = \frac{\text{number of outcomes in } E}{\text{total number of possible outcomes}}$$

- If event A and event B are mutually exclusive (that is, the fulfillment of one event excludes the possibility of the other), then the probability of the two occurring is the sum of their individual probabilities:

$$P(A \text{ or } B) = P(A) + P(B)$$

**Independent events**

- ▶ Independent events are events wherein the occurrence of one event does not affect the probability of the other occurring.
- ▶ For any two independent events A and B, the probability of both occurring together is the product of their individual probabilities:

$$P(A \text{ and } B) = P(A) \cdot P(B)$$

**Dependent events**

- ▶ Dependent events change the probability of the other(s) occurring once one event has happened. For any two dependent events, the probability of both occurring together is the product of the probability of event A occurring and the probability of event B occurring given event A has occurred.

$$P(A \text{ and } B) = P(A) \cdot P(B|A)$$

- ▶ An event that is certain to happen has a probability of 1.
- ▶ An event that is impossible has a probability of 0.

**Example**

If  $n$  and  $m$  are positive integers, chosen at random and each less than or equal to 12, what is the probability that  $3(n + m) + 5 \leq 19$ ?



**Solution:** 

Solve the inequality:

$$3(n + m) + 5 \leq 19$$

$$3(n + m) \leq 14$$

$$n + m \leq 4.667$$

Possible values for  $n$  and  $m$  that may satisfy the equality are 1, 2, and 3. The selections of integers are independent events, so the probability of selecting any given combination of two numbers is  $\left(\frac{1}{12}\right)\left(\frac{1}{12}\right) = \frac{1}{144}$ . There are a total of 144 possibilities. Of these, there are six combinations that sum to less than or equal to 4.667: 1 and 1; 1 and 2; 1 and 3; 2 and 1; 2 and 2; 3 and 1. The probability that any sum  $n + m$  satisfies the inequality is  $\frac{6}{144}$  (simplified to  $\frac{1}{24}$ ) or 0.041.

## RATES

- ▶ Rates are a measure of the change in some quantity per unit time.
- ▶ A commonly seen rate is average speed. It is calculated using the formula:

$$\text{Average Speed} = \frac{\text{total distance}}{\text{total time}}$$

- ▶ **Uniform Motion:** An object that moves at a constant speed, or rate, is said to be in uniform motion.

### 099 Question Topic

#### WORK PROBLEMS

Work problems deal with the rate of work; that is, they deal with the amount of work that can be completed in a certain period of time. The following formula is the rate formula above rewritten in terms of work:

$$(\text{rate of work}) \cdot (\text{time worked}) = \text{amount of work completed}$$

SAT work problems will often have the following form:

- Assume two workers, worker A and worker B, are on the same job. Worker A can finish the job in  $x$  hours when working alone and worker B can finish the job in  $y$  hours when working alone. This means that worker A completes  $\frac{1}{x}$  of the job per hour and worker B completes  $\frac{1}{y}$  of the job per hour. If they work together, their rate of work is  $\frac{1}{x} + \frac{1}{y}$  of the job per hour. The number of hours they need to complete the job together is given by the following formula:

$$\text{Time to complete} = \frac{1}{\frac{1}{x} + \frac{1}{y}}$$

#### Example

Peter can build two sand castles in one hour. David can build two sand castles in forty minutes. How long will it take them to make one sand castle together?



**Solution:**

The job consists of making two sand castles. The time it takes Peter to complete the job is 1 hour and the time it takes David to complete the job is 40 minutes, or  $\frac{2}{3}$  hour. Plugging in Peter's time to complete for  $x$  and David's time to complete for  $y$  in the equation above gives the time it takes for Peter and David to complete the job together:

$$\text{Time to complete} = \frac{1}{\frac{1}{x} + \frac{1}{y}} = \frac{1}{\frac{1}{1} + \frac{1}{\left(\frac{2}{3}\right)}} = \frac{1}{1 + \frac{3}{2}} = \frac{1}{\left(\frac{5}{2}\right)} = \frac{2}{5}$$

The time to complete the job is  $\frac{2}{5}$  hour, or 24 minutes. As the job consists of making two sand castles, the time to make one sand castle is half this time, 12 minutes.

**Ratios**

- ▶ A ratio is a quantitative relationship between two numbers and can be written in the following ways:
  - $a : b$
  - $\frac{a}{b}$
  - $a$  to  $b$
- ▶ A ratio between two quantities must express the measures in the same unit. For example, to write a ratio between one quantity in hours and another in seconds, the first quantity must be converted to seconds or the second quantity must be converted to hours, or they both must be converted to a common unit (minutes).
- ▶ When comparing two ratios to each other, the order in which the ratios are written is crucial. The ratio  $a : b$  is not the same as the ratio  $b : a$ .

**Proportions**

- ▶ A proportion is an equation that sets two ratios equal to each other. A proportion is usually written in the following form:
  - $\frac{a}{b} = \frac{c}{d}$

The expression above can be read as " $a$  is to  $b$  as  $c$  is to  $d$ ."

**Percentages**

- ▶ Percentages are a way of representing parts of a whole in terms of hundredths. For example 85% is equivalent to  $\frac{85}{100}$ ,  $\frac{17}{20}$ , and 0.85.
- ▶ A percent change is calculated as follows:
  - Percent change =  $\frac{\text{amount of change}}{\text{original amount}} \times 100\%$



# 100 Question Topic

## MIXTURE PROBLEMS

Mixture problems are similar to rate problems because they involve concentrations, and concentrations are conceptually similar to rate. A **concentration** implies a mixture of at least two different substances. A concentration can be defined as the amount of one substance per unit measure of another substance. This is expressed in the following formula:

$$\text{Concentration of } A = \frac{\text{Amount of Substance } A}{\text{Amount of Substance } B}$$

Substance B is almost always present in greater quantity than Substance A.

### Example

At a grocery store, nuts are sold at \$4.00 per kilogram and raisins are sold at \$5.20 per kilogram. How many kilograms of each are in a three kilogram batch sold for \$13.56?



Solution:

The 3-kilogram mixture is sold for \$13.65. The cost of the mixture per kilogram is  $\frac{\$13.65}{3\text{kg}} = \$4.52$  per kilogram. Let  $n$  be the number of kilograms of nuts, and  $3 - n$  be the number of kilograms of raisins. Setting up a table helps keep track of this information (shaded boxes contain information taken directly from the question):

	Kilograms	Price per kilogram	Total Value
Nuts	$n$	4	$4n$
Raisins	$3 - n$	5.2	$5.2(3 - n)$
Mixture	3	4.52	13.56

The sum of the values of the ingredients is equal to the total value of the mixture:

$$4n + 5.2(3 - n) = 13.56$$

$$4n + 15.6 - 5.2n = 13.56$$

$$-1.2n = -2.04$$

$$n = 1.7$$

The mixture is made up of 1.7 kilograms of nuts and 1.3 kilograms of raisins.



### TEACHER'S TIP

Mixture problems are similar to rate problems because concentration is conceptually similar to rate.

## UNIT CONVERSION

When a question requires you to convert a quantity from one unit to another, use a conversion ratio and dimensional analysis to complete the calculation. Dimensional analysis involves arranging the units in such a way that multiplication cancels out certain units and leaves only the desired units.

### 101 Question Topic

#### DENSITY

Density is a measure of mass per unit volume. The formula for calculating density is

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

#### Example

A metal alloy has a density of  $20 \text{ g/cm}^3$ . Which of the following represents the mass of a piece of alloy 10 inches long, 3 inches wide, and one inch deep? (one inch = 2.54 centimeters)

(A)  $(10)(3)(16.4)(20)$

(C)  $\frac{(10)(3)(2.54)}{20}$

(B)  $(10)(3)(2.54)(20)$

(D)  $\frac{(10)(3)(20)}{2.54}$



**Solution:**

Sketch the piece of alloy:



**Solution:** From the density formula we derive the following formula:

$$\text{Mass} = (\text{density})(\text{volume})$$

The volume of the piece of alloy is equivalent to the expression  $(10)(3)(1) \text{ in}^3$ . The given density is  $20 \text{ g/cm}^3$ , but this must be converted to  $\text{g/in}^3$  by multiplying the density by a conversion factor. The density is in terms of  $\text{cm}^3$ , so the conversion factor must also be cubed:

$$\text{Density} = \left(\frac{20 \text{ g}}{\text{cm}^3}\right)\left(\frac{2.54 \text{ cm}}{\text{in}}\right)^3 = \left(\frac{20 \text{ g}}{\text{cm}^3}\right)\left(\frac{16.4 \text{ cm}^3}{\text{in}^3}\right) = (20)(16.4) \frac{\text{g}}{\text{in}^3}$$

We get an expression for mass by multiplying the expression for volume by the expression for density. This leads us to the expression  $(10)(3)(1)(16.4)(20)$ , which corresponds to choice (A).



#### TEACHER'S TIP

Dimensional analysis involves arranging the units so that multiplication cancels out certain units and leaves only the desired units.

# Quick Practice

1. It takes four minutes to raise the temperature of a 10 kilogram iron pot from 4 to 140 degrees Celsius. If mass is directly proportional to heating time, how long will it take to heat a 2.3 kilogram iron pot over the same temperature range using the same heat source?

- (A) 5.8 seconds  
(B) 55 seconds  
(C) 58 seconds  
(D) 6 minutes

2. A person slices a pie into  $p$  equal slices and eats three of them. In terms of  $p$ , what percentage of the pie is left?

- (A)  $100(p-3)\%$   
(B)  $\frac{100(p-3)}{p}\%$   
(C)  $\frac{100}{p-3}\%$   
(D)  $\frac{p-3}{100}\%$

3. A secretary had a typing speed of fifty-five words per minute. After practicing, he raised his typing speed to 4,620 words per hour. By what percent did the secretary's typing speed increase?

- (A) 10%  
(B) 20%  
(C) 30%  
(D) 40%

4. Tickets to a community concert cost three dollars for seniors and five dollars for adults. If a total of 180 tickets are sold for \$810, what is the ratio of seniors' tickets to adults' tickets sold?

- (A) 1 to 4  
(B) 1 to 3  
(C) 1 to 2  
(D) 4 to 7

5. JULIA'S HORSE EXPENSES

	Boarding	Lessons	Total
January		\$50	
February		\$40	
March		\$80	
Total			\$260

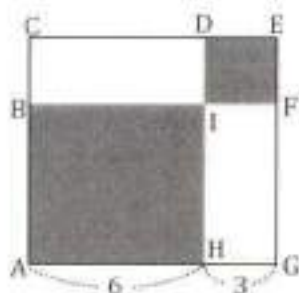
The table above has information on Julia's expenses for keeping a horse, but it is missing some numbers. If her boarding costs are the same each month, what are her total expenses for February?

- (A) \$30  
(B) \$50  
(C) \$70  
(D) \$80

6. Janina handles finances for her band. They are currently touring, and have an arrangement whereby they receive 20% of ticket sales. If tickets are \$15 each, and she hopes to make \$300 per show, how many people need to attend each show for her to meet her goal?
- (A) 100  
(B) 350  
(C) 400  
(D) 500
7. Due to a particularly dry season, ecologists measured a 25% drop in a local bird population. They attributed this to a concurrent drop in vegetative food sources. If the drop in bird numbers was caused by a 5% drop in vegetation, by what percentage would the bird population drop as a result of an 8% drop in vegetation?
- (A) 16%  
(B) 40%  
(C) 50%  
(D) 62%
8. If a bus averages sixty miles per hour on a certain route, it will arrive at the terminal two hours early. If the bus averages forty miles per hour on the same route, it will arrive two hours late. What is the distance of the trip?
- (A) 9 miles  
(B) 90 miles  
(C) 125 miles  
(D) 480 miles
9. John has twenty milliliters of a 20 percent salt solution. How much salt should he add to make it a 30 percent solution? (Assume that 1 gram of solid is equivalent to 1 milliliter of fluid.)
- (A) 1.8 grams  
(B) 2.0 grams  
(C) 2.7 grams  
(D) 2.9 grams
10. Peter can type a manuscript in three hours. David takes six hours to type the same manuscript. If Peter and David begin working on the manuscript together, how long will they take to finish?
- (A) 1 hour, 54 minutes  
(B) 2 hours  
(C) 2 hours, 10 minutes  
(D) 2 hours, 30 minutes

# Quick Practice

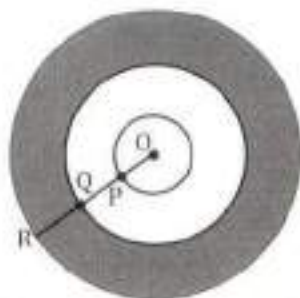
11.



In the figure above, ACEC, DEFI, and ABIH are squares. If a point in ACEG is chosen at random, what is the probability that the point will be in a shaded region?

- (A)  $\frac{1}{3}$
- (B)  $\frac{1}{2}$
- (C)  $\frac{4}{9}$
- (D)  $\frac{2}{3}$

12.



Note: Diagram not to scale

The diagram above shows three circles that share a common origin  $O$ . If the lengths of segments  $\overline{PQ}$  and  $\overline{QR}$  are both equal to the diameter of the smallest circle, what is the probability that a randomly selected point within the diagram falls within the shaded region?

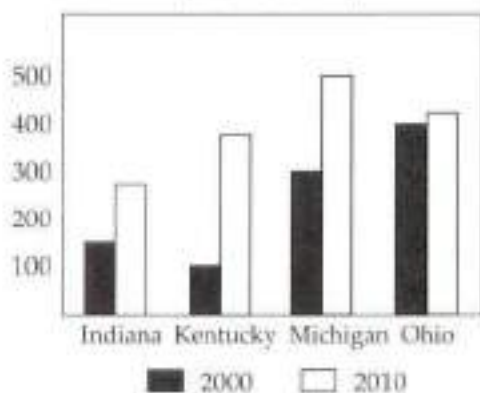
- (A)  $\frac{8}{25}$
- (B)  $\frac{9}{25}$
- (C)  $\frac{1}{9}$
- (D)  $\frac{16}{25}$

13. The shoe sizes of ten men are 8, 10, 9, 12, 7, 10, 11, 6 and 7. How much greater is the mode than the median?

- (A) 0
- (B) 0.5
- (C) 5
- (D) 9.5

Questions 14 and 15 refer to the information below.

High Speed Internet Customers  
(in thousands)



14. The table above is of high speed internet customers for a cable company in four states in the years 2000 and 2010. The number of customers in Kentucky in 2000 was approximately what percent of the number of customers in Ohio in the same year?

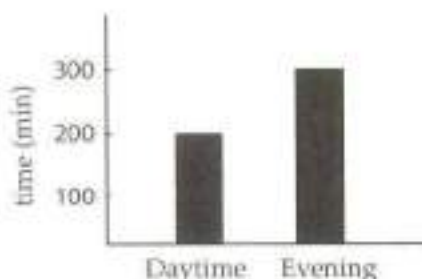
- (A) 15%
- (B) 20%
- (C) 25%
- (D) 30%

15. From 2000 to 2010, the total number of high speed internet customers in the four states was increased by approximately what percent?



- (A) 25%  
 (B) 33%  
 (C) 50%  
 (D) 67%

16. Cellphone Usage for Month Y



The graph above shows Vivian's cellphone use for the month. Her plan charges her a fee of \$20 per month in addition to 10 cents per minute for daytime calls and 5 cents per minute for evening calls after the first 200 minutes (the first 200 evening minutes are included in the fee). What is her cellphone bill for the month?

- (A) \$25  
 (B) \$40  
 (C) \$45  
 (D) \$70

Questions 17 and 18 refer to the information below.

Poverty data in the United States from 2012 (numbers are in millions)

	Under 18 in families	18-54	55-64	65 and older	All ages
# Poor	15.4	22.5	4.1	3.9	46.5
Total Population	72.4	155.3	38.5	43.3	310.7

17. Which group had the highest percentage of poor in 2012?



- (A) Under 18  
 (B) 18 - 4  
 (C) 55 - 64  
 (D) 65 and older

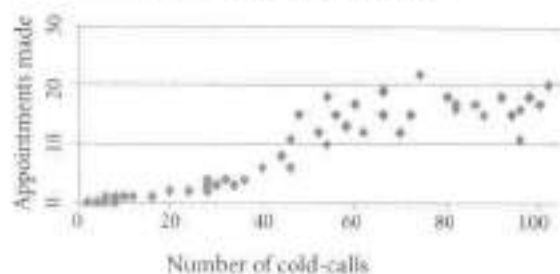
18. Which of the following best describes the relationship between percentage of people in poverty and total population?

- (A) Weakly Positive  
 (B) Strongly Positive  
 (C) Weakly Negative  
 (D) No correlation

# Quick Practice

Questions 19 and 20 refer to the information below.

**Cold-call Success Rate**



19. For two months, a sales manager tracked the number of cold-calls made per day against the number of appointments set as a result of the call. This data is expressed in the scatterplot above. Which of the following best describes the relationship between number of calls and appointments made?
- (A) Linear positive
  - (B) Linear negative
  - (C) Exponential
  - (D) Logistic
20. Shortly after this period, the sales manager decides that she will make 140 cold-calls in a single day. Based on her data, roughly how many appointments can she expect to make?
- (A) 10
  - (B) 20
  - (C) 30
  - (D) 40



# ANSWERS & EXPLANATIONS

1-20





# Answers & Explanations...

## Mastering Data Analysis



1. (B)	6. (A)	11. (C)	16. (C)
2. (B)	7. (B)	12. (D)	17. (A)
3. (D)	8. (D)	13. (B)	18. (C)
4. (B)	9. (B)	14. (C)	19. (D)
5. (C)	10. (B)	15. (D)	20. (B)

1) **⇒** B

Convert heating time to seconds:

$$4 \text{ min.} \left( \frac{60 \text{ sec.}}{1 \text{ min.}} \right) = 240 \text{ sec.}$$

As heating time is proportional to mass, we can write the proportion:

$$\frac{240x}{10\text{kg}} = \frac{x}{2.3\text{kg}}$$

$$x = \frac{(240x)(2.3\text{kg})}{10\text{kg}} = 55x$$

2) **⇒** B

The proportion of slices left is:  $\frac{p-3}{p}$

To convert this into percentage:

$$\left( \frac{p-3}{p} \right) \times 100\% = \frac{(p-3)100}{p}\%$$

3) **⇒** D

$$\text{Typing speed} = \frac{4,260 \text{ words}}{\text{hour}} \times \frac{\text{hour}}{60 \text{ minute}} = \frac{71 \text{ words}}{\text{minute}}$$

$$\text{Percent increase} = \frac{22 \text{ words per minute}}{55 \text{ words per minute}} \times 100\% = 40\%$$

4) **⇒** B

Let  $x$  be the number of senior tickets sold and  $y$  be the number of adult tickets sold:

$$x + y = 180$$

$$3x + 5y = 810$$

Multiply the first equation by a factor of 3, and subtract from the second:

$$\begin{array}{r} 3x + 5y = 810 \\ - (3x + 3y = 540) \\ \hline 2y = 270 \\ y = 135 \end{array}$$

Therefore,  $x + 135 = 180 \rightarrow x = 45$

The ratio  $x : y$  is  $\frac{45}{135} = \frac{1}{3}$

5) **⇒** C

Total spent on lessons = \$50 + \$40 + \$80 = \$170

Total spent on boarding = \$260 - \$170 = \$90

As boarding expenses were the same for each of 3 months:

$$\text{Boarding expenses per month} = \frac{\$90}{3 \text{ months}} = \frac{\$30}{1 \text{ month}}$$

Total expenses for February = Boarding + Lessons  
= \$30 + \$40 = \$70

6) **⇒** A

$x$  = number of tickets sold per show

Revenue =  $(0.20)(15)x$

To make at least \$300 per show:

$$(0.20)(15)x \geq 300$$

$$x \geq \frac{300}{(0.20)(15)}$$

$$x \geq 100$$

7) **⇒** B

The drop in the bird population is proportional to the drop in food sources. We can write the proportion:

$$\frac{5\%}{25\%} = \frac{8\%}{x}$$

$$x = (25\%) \left( \frac{8\%}{5\%} \right) = 40\%$$

8) **⇒** D

Let  $x$  be the scheduled time in hours that it takes to make the trip. As the distance is constant regardless of speed, we can use the formula  $\text{Distance} = (\text{velocity})(\text{time})$  and set the two routes equal to each other:

$$60(x - 2) = 40(x + 2)$$

$$60x - 120 = 40x + 80$$

$$20x = 200$$

$$x = 10$$

Finally, calculate for distance:

$$\text{Distance} = 60(8) = 480$$

9) **⇒** B

Let  $x$  be the number of grams or milliliters of salt that must be added to make a 30% solution (assume grams are equivalent to milliliters). The amount of salt in the 20% solution is:

$$\text{Amount of salt} = (20\text{mL})(0.2) = 4\text{g}$$

The volume of the solution stays the same, though  $x$  grams of salt are added:

$$0.3 = \frac{4\text{g} + x}{20\text{mL}}$$

$$(0.3)(20\text{mL}) = 4\text{g} + x$$

$$6\text{mL} = 4\text{g} + x$$

$$x = 2.0\text{g}$$

10) **⇒** B

Peter can type  $\frac{1}{3}$  of the manuscript in one hour.

David can type  $\frac{1}{6}$  of the manuscript in one hour.

Let  $x$  be the time, in hours, that it takes them to type the manuscript together:

$$\frac{1}{3}x + \frac{1}{6}x = 1$$

$$\frac{1}{2}x = 1$$

$$x = 2$$

11) **⇒** C

$$\text{Probability} = \frac{\text{Area of } ABFH + \text{Area of } DEFI}{\text{Area of } ACEG}$$

$$= \frac{36 + 9}{81} = \frac{45}{81} = \frac{5}{9}$$

12) **⇒** D

Let the radius of the smallest circle,  $\overline{OP}$ , be  $r$ . Then,

$$\overline{OQ} = 3r$$

$$\overline{OR} = 5r$$

The areas of the circles are:

$$\text{Area of circle with radius } OQ = \pi(3r)^2 = 9\pi r^2$$

$$\text{Area of circle with radius } OR = \pi(5r)^2 = 25\pi r^2$$

The probability of the point being in the shaded region is:

$$\text{Probability} = \frac{25\pi r^2 - 9\pi r^2}{25\pi r^2} = \frac{16}{25}$$

13) **⇒** B

In order, the shoe sizes are: 6, 7, 7, 8, 9, 10, 10, 10, 11, 12. The mode is 10. Because there are an even number of sizes, the median is the average of the middle two sizes:

$$\text{Mode} = 10, \text{Median} = \frac{9 + 10}{2} = 9.5$$

Therefore,

$$\text{Mode} - \text{Median} = 10 - 9.5 = 0.5$$

14) **⇒** C

Customers in KY in 2000 = 100,000

Customers in OH in 2000 = 400,000

There are 25% as many customers in Kentucky than in Ohio in the year 2000.

15) **⇒** D

Total users in 2000 (thousands)

$$= 125 + 100 + 275 + 400 = 900$$

Total users in 2010 (thousands)

$$= 250 + 350 + 475 + 425 = 1500$$

Increase from 2000 to 2010(thousands) = 600

$$\% \text{ increase} = \frac{600}{900} \times 100\% = 67\%$$

16) **⇒** C

From the graph, we can see that the number of daytime minutes used is 200, and the number of evening minutes used is 300. The total bill is:

$$\text{Fee} + (\text{Daytime minutes})(0.10) + (\text{Evening minutes}$$

$$- 200)(0.05)$$

$$= 20 + (200)(0.10) + (300 - 200)(0.05) = 45$$

17) **⇒** A

The percentage poor for each age group is calculated by taking the “# Poor” value for that group, dividing it by the “Total Population” for the group, and multiplying the result by “100 percent”:

$$\% \text{ Poor} = \frac{\# \text{ of Poor}}{\text{Total Population}} \times 100\%$$

Using this formula, it can be shown that the “Under 18” group has the highest percentage poor, with 21.3%.

18) **⇒** C

To answer this question, calculate the percentage poor (according to the formula in the explanation for #17) for each age group, and note whether or not there is a trend in the percentage as age increases:

$$\text{Under 18: } \% \text{ Poor} = 21.3\%$$

$$18 - 52: \% \text{ Poor} = 14.5\%$$

$$55 - 64: \% \text{ Poor} = 10.6\%$$

$$65 \text{ and older: } \% \text{ Poor} = 9.0\%$$

It is apparent that as age increases, the percentage poor decreases. This result describes a negative

relationship between the factors of age and percentage poor. We describe the relationship in this particular case as “weakly negative” because the relationship is not proportional.

19) **⇒** D

A logistic curve demonstrates exponential growth early, followed by a slowing down and plateauing of growth. This pattern most accurately describes the data expressed in the graph.

20) **⇒** B

It is apparent from the scatterplot that if call volume exceeds 70 calls per day, the number of appointments made does not increase with more calls. If the sales manager extended her number of calls in a single day to 140, we would expect the number of appointments to remain around 20.

# Math Formulas

- ▶ The slope of a line containing points  $(x_1, y_1)$  and  $(x_2, y_2)$ :

$$\text{Slope (m)} = \frac{y_2 - y_1}{x_2 - x_1}$$

- ▶ The distance between two points,  $(x_1, y_1)$  and  $(x_2, y_2)$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

- ▶ *Confidence interval = sample statistic  $\pm$  margin of error*

- ▶ The probability of an event P(E):

$$P(E) = \frac{\text{number of outcomes in } E}{\text{total number of possible outcomes}}$$

- ▶ *Average Speed =  $\frac{\text{total distance}}{\text{total time}}$*

- ▶ *Percent change =  $\frac{\text{amount of change}}{\text{original amount}} \times 100\%$*

- ▶ *Density =  $\frac{\text{mass}}{\text{volume}}$*

- ▶ *Volume of a cylinder or prism = Area of base  $\times$  Height*

- ▶ *Volume of a cone or pyramid =  $\frac{1}{3} \times$  Area of base  $\times$  Height*

- ▶ *Volume of a sphere =  $\frac{4}{3} \pi r^3$*

- ▶ Area of a circle:  $A = \pi r^2$

- ▶ Measure of a central angle  $\theta$  in radians:  $\theta = \frac{s}{r}$

- ▶ The standard form for the equation of a circle:

$$(x - h)^2 + (y - k)^2 = r^2$$

- ▶ The midpoint between two points  $(x_1, y_1)$  and

$$(x_2, y_2) \text{ is the point } \left[ \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right]$$

- ▶ Pythagorean Theorem:

$$(\text{Hypotenuse})^2 = (\text{side 1})^2 + (\text{side 2})^2$$

- ▶ Trigonometric Ratios:

$$\sin A = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos A = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan A = \frac{\text{opposite}}{\text{adjacent}}$$

- ▶ Sine and cosine of complementary angles:

$$\sin x = \cos(90^\circ - x)$$

$$\cos x = \sin(90^\circ - x)$$

- ▶ Converting between radians and degrees:

$$1 \text{ radian} = \frac{180}{\pi} \text{ degrees}$$

$$1 \text{ degree} = \frac{\pi}{180} \text{ radians}$$

- ▶ The quadratic formula:  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$



# SAT® Practice Test #1

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1

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**TEST BOOKLET**

- You may open the booklet to ONLY the section that is currently being tested. You may NOT browse upcoming sections, nor can you review your answers in past sections.
- You MAY write in your test booklet, but you will not receive any credit for answers that you indicate in the booklet. When the time for a section is over, you may NOT transfer answers from your booklet to the answer sheet.
- You may NOT take any part of the test booklet out of the room.

**ANSWER SHEET**

- Machines will scan your answer sheet by checking your pencil marks. Using a No. 2 pencil, fill in the circles that correspond to your answers completely and darkly.
- Do not make any marks on the answer sheet outside of these circles. If you need to erase anything, make sure to do it thoroughly.

**SCORING**

- Each correct answer is worth one point.
- There is no penalty for incorrect answers. Even if you are unsure about a particular answer, it is a good strategy to mark one of the choices.

9	<b>TEST ID</b>					
	(Copy from back of test book.)					

8	<b>FORM CODE</b>					
	(Copy and grid as on back of test book.)					
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G	G	G	G	6	6	6
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# SAT Practice Test

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Remove (or photocopy) this answer sheet and use it to complete the SAT Practice Test.  
See the answer key and explanations following the test when finished.

Start with number 1 for each section.

If a section has fewer questions than answer spaces, leave the extra spaces blank.

SECTION 1

**1**

1. (A) (B) (C) (D)
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Section 1

SECTION 2

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SECTION

**3**

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SECTION

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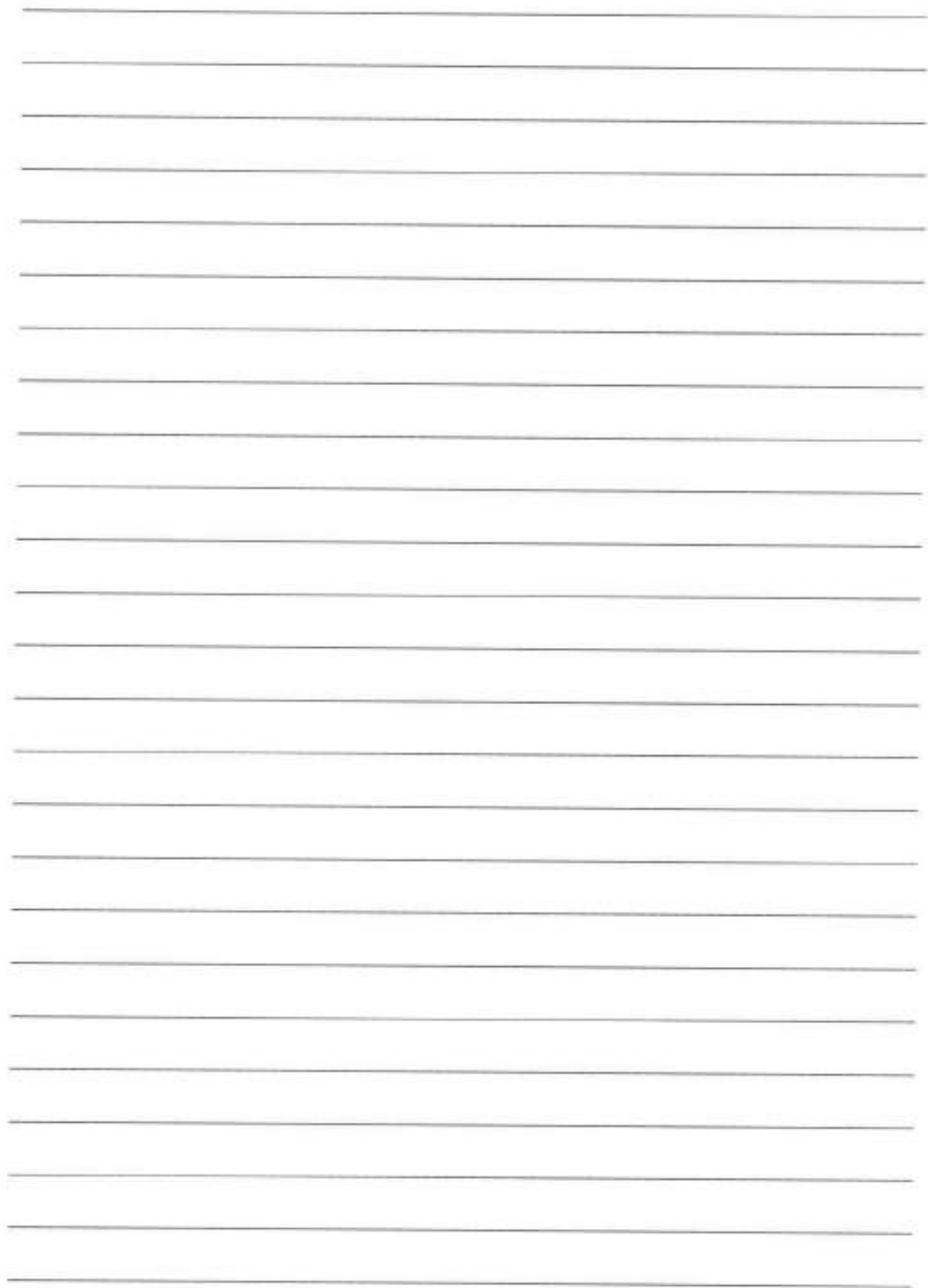
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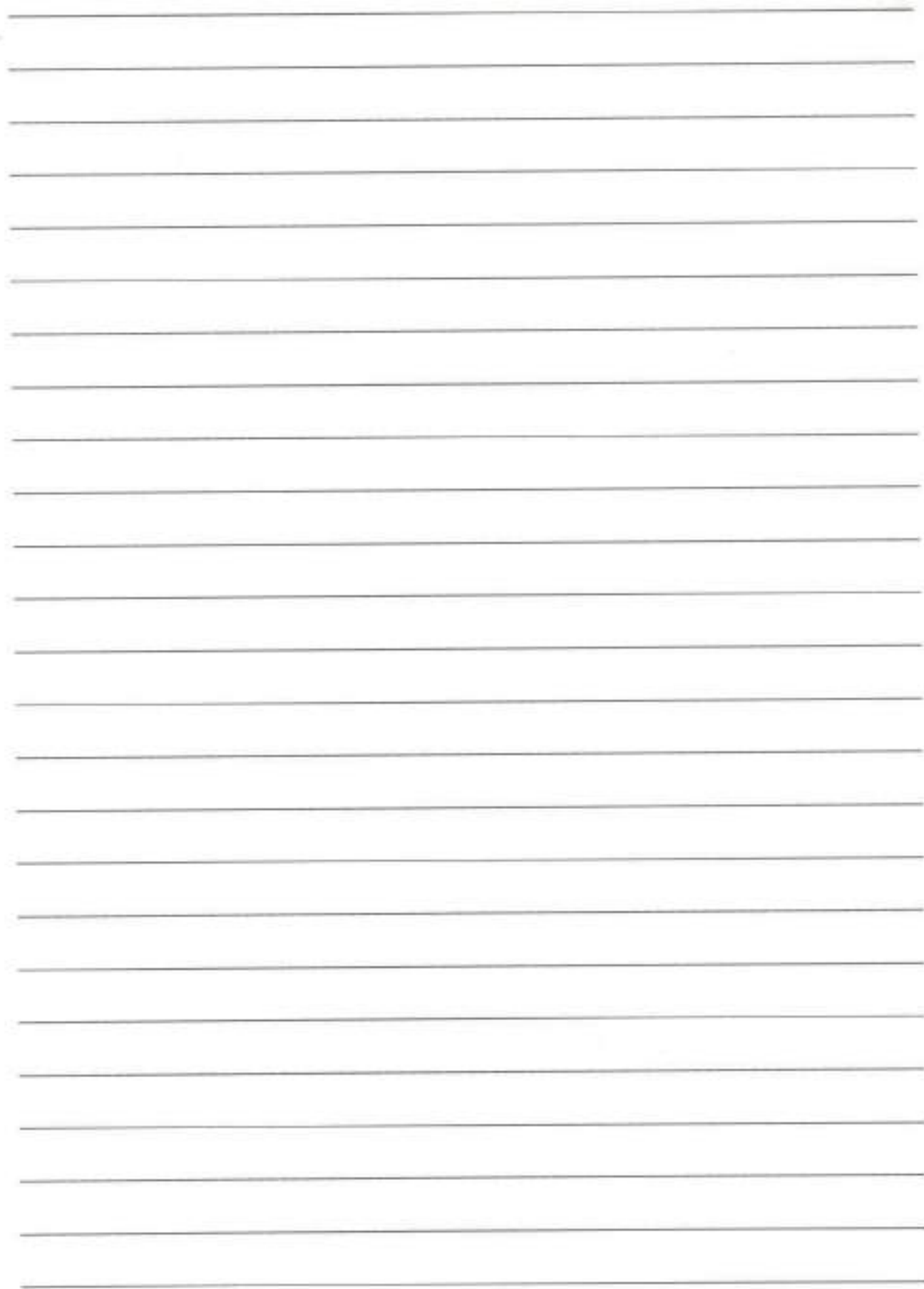
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# SAT Scoring Guide

## KALLIS Scoring Guides

The College Board has not yet released a scoring guide for the Redesigned SAT. However, we at KALLIS understand that students want some idea of how they will score on the official SAT—especially after putting in the hours of practice required to finish one of these practice tests. For this reason, KALLIS has developed a scoring guide that should correspond closely with the scoring guide that the college Board will release in 2016.

## Creating the Scoring Guides

To create the following scoring guide, we first had high-school students who had already taken the current version of the SAT take our tests. We developed our scoring guide by comparing the students' official SAT scores to their results on our Redesigned SAT practice tests. In other words, we adjusted our scoring so that a student who scored a 1500, for example, on the current Sat received that score's equivalent on KALLIS' Redesigned SAT. Of course, this method is by no means foolproof, and we cannot guarantee that the College Board will develop their scoring guide the same way. Nevertheless, the following scoring guides should give you an accurate impression of how you will perform on the Redesigned SAT.

## How to Score Your SAT

To determine your score on each portion of the SAT, determine how many questions you answered correctly on each Test (Reading, Writing and Language, and Math). The number correct is your Raw Score. Refer to the charts on the following pages to convert this Raw Score into a Scaled Score. After doing so for each portion of the SAT, you will have three Scaled Scores; add these together to determine your total score. Remember, the minimum score is 400, and the maximum is 1600.

# Reading Test Scoring Guide      Writing and Language Test Scoring Guide

Number correct on the SAT Reading Test: \_\_\_\_\_  
(Raw Score)

Number correct on the SAT Writing and  
Language Test: \_\_\_\_\_  
(Raw Score)

Raw Score	Scaled Score
52 – 51	400
50 – 49	390
48	380
47	370
46 – 45	360
44 – 43	350
42 – 41	340
40 – 38	330
37	320
36 – 35	310
34 – 33	300
32 – 30	290
29 – 28	280
27	270
26	260
25 – 24	250
23 – 22	240
21	230
20 – 19	220
18	210
17 – 16	200
15	190
14	180
13 – 12	170
11	160
10 – 9	150
8	140
7	130
6	120
5	110
4 – 1	100

Raw Score	Scaled Score
44	400
43	390
42	380
41	370
40 – 38	360
37	350
36	340
35 – 34	330
33 – 32	320
31	310
30 – 28	300
27 – 26	290
25 – 24	280
23 – 22	270
21	260
20	250
19	230 – 240
18	220
17	210
16	200
15	190
14	180
13	170
12	160
11	150
10	140
9	130
8	120
7	110
6 – 1	100

# Math Test Scoring Guide

Number correct on the SAT Writing Test: \_\_\_\_\_  
(Raw Score)

Raw Score	Scaled Score		
58 – 57	800	25	510
56 – 55	790	24 – 23	500
54	780	22 – 21	490
53	770	20	480
52	750	19	470
51	740	18 – 17	460
50	730	16	450
49	710	15 – 14	440
48	700	13	420 – 430
47	690	12 – 11	400 – 410
46	680	10 – 9	380 – 390
45	670	8 – 6	350 – 370
44	660	5 – 4	310 – 340
43	650	3	290 – 300
42	640	2	250 – 280
41	630	1	210 – 240
40 – 39	620	0	200
38 – 37	610		
36 – 34	600		
33 – 32	590		
31 – 30	570		
29	560		
28 – 27	550		
26	530		

Reading Test Scaled Score: \_\_\_\_\_  
 +  
 Writing Test Scaled Score: \_\_\_\_\_  
 +  
 Math Test Scaled Score: \_\_\_\_\_  
 =  
 Total SAT Practice Test Score: \_\_\_\_\_

# Reading Test 1



65 MINUTES, 52 QUESTIONS

Turn to Section 1 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each passage or pair of passages is accompanied by 10 or 11 questions. Read each passage or pair of passages, and then select the most appropriate answer to each question. Some passages may include tables or graphs that require additional analysis.

Refer to the passage below to answer questions 1 – 11.

This passage is adapted from P.G. Wodehouse, *Love Among Chickens*, originally published in 1920. The narrator, who is helping his friend with a new chicken farm in the country, has chased a chicken named Aunt Elizabeth into a tall shrub.

*line* I was in the middle of it, very hot, tired, and dirty, when from the other side I heard a sudden shout of "Mark over! Bird to the right!" and the next moment I found myself emerging with  
5 a black face and tottering knees on the gravel path of a private garden. Beyond the path was a croquet lawn, and on this lawn I perceived, as through a glass darkly, three figures. The mist cleared from my eyes, and I recognized two of  
10 them.

One was the middle-aged Irishman who had traveled down with us in the train. The other was his blue-eyed daughter.

The third member of the party was a man, a stranger to me. By some miracle of adroitness he had captured Aunt Elizabeth, and was holding her in spite of her protests in a workmanlike manner behind the wing.  
15

There are moments and moments. The present one belonged to the more painful variety.

Even to my exhausted mind it was plain that there was a need here for explanations. An Irishman's croquet-lawn is his castle, and strangers cannot plunge in through hedges  
20 without inviting comment.

Unfortunately, speech was beyond me. ... The conversation was opened by the other man, in whose restraining hand Aunt Elizabeth now lay, outwardly resigned but inwardly, as I, who knew  
25 her haughty spirit, could guess, boiling with baffled resentment. I could see her looking out of the corner of her eye, trying to estimate the

chances of getting in one good hard peck with her aquiline beak.

35 "Come right in," said the man pleasantly. "Don't knock."

I stood there, gasping. I was only too well aware that I presented a quaint appearance. I had removed my hat before entering the hedge,  
40 and my hair was full of twigs and other foreign substances. My face was moist and grimy. My mouth hung open. My legs felt as if they had ceased to belong to me.

"I must apol— ..." I began, and ended the  
45 sentence with gulps.

The elderly gentleman looked at me with what seemed to be indignant surprise. His daughter appeared to my guilty conscience to be  
50 looking through me. Aunt Elizabeth sneered. The only friendly face was the man's. He regarded me with a kindly smile, as if I were some old friend who had dropped in unexpectedly.

"Take a long breath," he advised.

I took several, and felt better.

55 "I must apologize for this intrusion," I said successfully. "Unwarrantable" would have rounded off the sentence neatly, but I would not risk it. It would have been mere bravado to attempt unnecessary words of five syllables. I took  
60 in more breath. "The fact is, I did—didn't know there was a private garden beyond the hedge. If you will give me my hen ..."

I stopped. Aunt Elizabeth was looking away, as if endeavoring to create an impression of  
65 having nothing to do with me. I am told by one who knows that hens cannot raise their eyebrows, not having any; but I am prepared to swear that at this moment Aunt Elizabeth raised hers. I will go further. She sniffed.

70 "Here you are," said the man. "Though it's hard to say good-bye."





He held out the hen to me, and at this point a hitch occurred. He did his part, the letting go, all right. It was in my department, the taking hold, that the thing was bungled. Aunt Elizabeth slipped from my grasp like an eel, stood for a moment eyeing me satirically with her head on one side, then fled and entrenched herself in some bushes at the end of the lawn.

- 75
- 80
- The words "adroitness" and "workmanlike" (lines 15–17) help establish the narrator's first impression of the stranger as
    - a rather harsh person.
    - a longtime chicken farmer.
    - a person similar to the narrator in tastes.
    - at ease with rural life.
  - The statement "There are moments and moments. The present one belonged to the more painful variety," (lines 19–20) serves to
    - reveal the nature of the relationship between the narrator and the Irishman.
    - indicate that the tone of the passage is about to change.
    - foreshadow the narrator's awkward exchange with the man holding Aunt Elizabeth.
    - introduce the idea that hard work and painstaking efforts are rewarded.
  - The statement "An Irishman's croquet-lawn is his castle," (line 23) functions in the passage primarily to
    - mock the Irishman for valuing his croquet lawn so highly.
    - cause the reader to associate croquet with wealth and royalty.
    - describe the circumstances that inspired the narrator's apology.
    - imply that the Irishman lives on his croquet lawn rather than inside his house.
  - As used in line 25, "inviting" most nearly means
    - preventing.
    - provoking.
    - appealing.
    - summoning.
  - Based on the passage, the narrator's descriptions of Aunt Elizabeth serve primarily to
    - depict her as possessing human characteristics.
    - suggest that she has outsmarted the narrator.
    - elicit sympathy for Aunt Elizabeth.
    - contrast with the narrator's descriptions of himself.
  - Which choice provides the best evidence for the answer to the previous question?
    - Lines 31–34 ("I could see...aquiline beak.")
    - Lines 37–41 ("I stood there...other foreign substances.")
    - Lines 65–69 ("I am told...She sniffed.")
    - Lines 72–75 ("He held out...the thing was bungled.")
  - The sentences "'Unwarrantable' would have... words of five syllables" (lines 56–59) primarily serve to convey the idea that the narrator
    - is still exhausted from his physical exertions.
    - does not want to seem pretentious.
    - enjoys talking to strangers.
    - does not want to bore his audience.
  - What is the narrator's attitude toward the Irishman, his daughter, and the stranger holding Aunt Elizabeth?
    - Earnest and mortified
    - Resentful and intimidated
    - Foolish and presumptuous
    - Respectful and demure
  - As used in line 72, "hitch" most nearly means
    - barrier.
    - interlude.
    - setback.
    - catch.
  - In regards to the narrator's relationship with Aunt Elizabeth, the narrator can be compared to
    - romantic pursuing his unrequited love.
    - hunter being outmaneuvered by his prey.
    - warrior meeting his opponent on a battlefield.
    - clown performing tricks for an audience.



11. The narrator would most likely agree with which of the following statements regarding Aunt Elizabeth?

- (A) She is more cooperative than most other chickens.
- (B) She is less intelligent than others believe her to be.
- (C) She eludes the narrator out of resentment and obstinacy.
- (D) She would rather live with the Irishman and his daughter than with the narrator.

Refer to the passage below to answer questions 12–21.

This passage is adapted from Frederick Douglass' speech, "The Meaning of July Fourth to the Negro," delivered on July 4, 1852. Douglass, an African American, escaped from slavery as a young man. He became a famous orator, author, and newspaper publisher. At the time of this Independence Day speech, slavery was still legal in southern states.

line Fellow citizens, pardon me, and allow me to ask, why am I called upon to speak here today? What have I or those I represent to do with your national independence? Are the great principles  
5 of political freedom and of natural justice, embodied in that Declaration of Independence, extended to us? And am I, therefore, called upon to bring our humble offering to the national altar, and to confess the benefits, and express devout  
10 gratitude for the blessings resulting from your independence to us?

...Would to God\*, both for your sakes and ours, that an affirmative answer could be truthfully returned to these questions. But such is  
15 not the state of the case. I say it with a sad sense of the disparity between us. I am not included within the pale of this glorious anniversary! Your high independence only reveals the immeasurable distance between us. The blessings  
20 in which you this day rejoice are not enjoyed in common. The rich inheritance of justice, liberty, prosperity, and independence bequeathed by your fathers is shared by you, not by me. The sunlight that brought life and healing to you has brought stripes\* and death to me. This Fourth of  
25 July is yours, not mine. You may rejoice, I must mourn. To drag a man in fetters into the grand illuminated temple of liberty, and call upon him to join you in joyous anthems, were inhuman  
30 mockery and sacrilegious irony.

...Would you have me argue that man is entitled to liberty? That he is the rightful owner of his own body? You have already declared

35 it. Must I argue the wrongfulness of slavery? Is that a question for republicans\*? Is it to be settled by the rules of logic and argumentation, as a matter beset with great difficulty, involving a doubtful application of the principle of justice, hard to understand? How should I look today  
40 in the presence of Americans, dividing and subdividing a discourse, to show that men have a natural right to freedom, speaking of it relatively and positively, negatively and affirmatively? To do so would be to make myself ridiculous, and to offer an insult to your  
45 understanding. There is not a man beneath the canopy of heaven who does not know that slavery is wrong for him.

What! Am I to argue that it is wrong to make men brutes, to rob them of their liberty, to work them without wages, to keep them ignorant of their relations to their fellow men, to beat them with sticks, to flay their flesh with the  
50 lash, to load their limbs with irons, to hunt them with dogs, to sell them at auction, to sunder\* their families, to knock out their teeth, to burn their flesh, to starve them into obedience and submission to their masters? Must I argue that a system thus marked with blood and stained  
55 with pollution is wrong? No - I will not. I have better employment for my time and strength than such arguments would imply.

What, then, remains to be argued? Is it that slavery is not divine; that God did not establish it; that our doctors of divinity\* are mistaken? There is blasphemy in the thought. That which  
65 is inhuman cannot be divine. Who can reason on such a proposition? They that can, may - I cannot. The time for such argument is past.

70 At a time like this, scorching irony, not convincing argument, is needed. Oh! had I the ability, and could I reach the nation's ear, I would today pour out a fiery stream of biting ridicule, blasting reproach, withering sarcasm, and stern rebuke. For it is not light that is  
75 needed, but fire; it is not the gentle shower, but thunder. We need the storm, the whirlwind, and the earthquake.

80 The feeling of the nation must be quickened; the conscience of the nation must be roused; the propriety of the nation must be startled; the hypocrisy of the nation must be exposed; and its crimes against God and man must be denounced....

\* would to God: I wish very much

\* stripes: whippings

\* republicans: people who live under a representative government

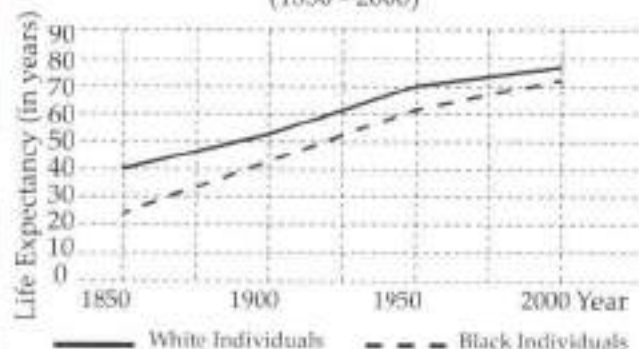
\* sunder: split apart

\* doctors of divinity: people who hold doctoral degrees in theological fields



## Life Expectancy in the United States

(1850 - 2000)



Source: Michael Haines. "Fertility and Mortality in the United States," 2008.

12. In paragraph 1 (lines 1 - 11), Douglass asks why he has been invited to speak primarily to
- catch the listeners' attention.
  - surprise the event's organizers.
  - set an irreverent tone.
  - introduce an irony.
13. As used in line 16, "disparity" most nearly means
- opposition.
  - exception.
  - gap.
  - shift.
14. In lines 16 - 30 the main rhetorical effect of the listing of contrasts is to
- increase understanding by becoming more explicit with each sentence.
  - escalate the emotional pitch of his speech through a series of increasingly blunt truths.
  - clarify the differences in wealth between Douglass's audience and himself.
  - repeat and emphasize Douglass's confusion about why he was invited to speak.
15. The passage strongly suggests that Douglass shares which assumption regarding members of the audience?
- They are familiar with the contents of the Declaration of Independence.
  - They are descended from the original founders of the United States of America.
  - They already know about Douglass through his writings and previous speeches.
  - They are fully aware of how slaves live and what slaves feel.
16. Which choice provides the best evidence to answer the previous question?
- Lines 3 - 7 ("What have I...to us?")
  - Lines 14 - 16 ("But such...between us.")
  - Lines 27 - 30 ("To drag a man... sacrilegious irony.")
  - Lines 31 - 32 ("Would you have...to liberty?")
17. Which claim would be best supported by what Douglass says in lines 39 - 46 ("How should I look...understanding.")?
- Americans should learn about slavery before they discuss it.
  - Explaining the moral complications of slavery in a speech would be impossible.
  - There are more than two sides to the question of a natural right to freedom.
  - Slavery is so obviously wrong that there is no point in making a case against it.
18. According to the graph, in 1850, when most black Americans were slaves,
- many slaves died in infancy, adding to a low average life expectancy.
  - on average, white people could expect to live nearly twice as long as black people.
  - most slaves died in their early 20s; slave owners were usually dead before their early 40s.
  - slave-owning families tended to be older than most of their slaves.
19. In lines 63 - 67, what does Douglass imply about the era's theologians?
- They do not really have the education that they claim to have.
  - They do not have any authority over Douglass.
  - They disapprove of people arguing over slavery.
  - They claim that God established slavery.
20. As used in line 75, the phrase "stern rebuke" most nearly means
- angry outburst.
  - harsh reprimand.
  - solemn disapproval.
  - exacting criticism.



21. In lines 70 – 78, Douglass includes fire- and storm-related words such as “scorching,” “fiery,” “blasting,” and “thunder,” primarily to

- (A) warn people about civil war.  
 (B) exhort people to civil disobedience.  
 (C) ignite the audience’s passion for change.  
 (D) describe his own feelings of anger.

**Refer to the passage below to answer questions 22 – 32.**

This passage is adapted from Henri Bergson, *Dreams*, originally published in 1914. Bergson is describing studies that attempt to discover the physiological processes behind dreaming.

line Thirty or forty years ago, M. Alfred Maury and, about the same time, M. d’Hervey, of St. Denis, had observed that at the moment of falling asleep these colored spots and moving forms  
 5 consolidate, fix themselves, take on definite outlines, the outlines of the objects and of the persons which people our dreams. But this is an observation to be accepted with caution, since it emanates from psychologists already half asleep.  
 10 More recently an American psychologist, Professor Ladd, of Yale, has devised a more rigorous method, but of difficult application, because it requires a sort of training. It consists in acquiring the habit on awakening in the morning  
 15 of keeping the eyes closed and retaining for some minutes the dream that is fading from the field of vision and soon would doubtless have faded from that of memory. Then one sees the figures and objects of the dream melt away little by little  
 20 into phosphenes, identifying themselves with the colored spots that the eye really perceives when the lids are closed. One reads, for example, a newspaper; that is the dream. One awakens and there remains of the newspaper, whose definite  
 25 outlines are erased, only a white spot with black marks here and there: that is the reality. Or our dream takes us upon the open sea—round about us the ocean spreads its waves of yellowish gray with here and there a crown of white foam. On  
 30 awakening, it is all lost in a great spot, half yellow and half gray, sown with brilliant points. The spot was there, the brilliant points were there. There was really presented to our perceptions, in sleep, a visual dust, and it was this dust which served  
 35 for the fabrication of our dreams.

Will this alone suffice? Still considering the sensation of sight, we ought to add to these visual

sensations which we may call internal all those which continue to come to us from an external source. The eyes, when closed, still distinguish light from shade, and even, to a certain extent, different lights from one another. These sensations of light, emanating from without, are at the bottom of many of our dreams. A candle  
 45 abruptly lighted in the room will, for example, suggest to the sleeper, if his slumber is not too deep, a dream dominated by the image of fire, the idea of a burning building. Permit me to cite to you two observations of M. Tissié on this subject:

50 “B— — Léon dreams that the theater of Alexandria is on fire; the flame lights up the whole place. All of a sudden he finds himself transported to the midst of the fountain in the public square; a line of fire runs along the chains which connect the great posts placed around the margin. Then he finds himself in Paris at the exposition, which is on fire. He takes part in terrible scenes, etc. He wakes with a start; his eyes catch the rays of light projected by the dark lantern which the night nurse flashes toward his  
 60 bed in passing. M— — Bertrand dreams that he is in the marine infantry where he formerly served. He goes to Fort-de-France, to Toulon, to Lorient, to Crimea, to Constantinople. He sees lightning, he hears thunder, he takes part in a combat in which he sees fire leap from the mouths of cannon. He wakes with a start. Like B., he was awakened by a flash of light projected from the dark lantern of the night nurse.” Such are often the dreams  
 70 provoked by a bright and sudden light.

Very different are those which are suggested by a mild and continuous light like that of the moon. A. Krauss tells how one day on awakening he perceived that he was extending his arm  
 75 toward what in his dream appeared to him to be the image of a young girl. Little by little this image melted into that of the full moon which darted its rays upon him. It is a curious thing that one might cite other examples of dreams where  
 80 the rays of the moon, caressing the eyes of the sleeper, evoked before him virginal apparitions. May we not suppose that such might have been the origin in antiquity of the fable of Endymion—Endymion the shepherd, lapped in perpetual  
 85 slumber, for whom the goddess Selene, that is, the moon, is smitten with love while he sleeps?



22. Based on the passage, it can be inferred that the author views dreams as
- highly metaphorical and dependent on poetical language.
  - dependent on the dreamer's cultural and historical environment.
  - experiences unique to every individual.
  - phenomena that can be attributed to rational causes.
23. As used in line 7, "people" most nearly means
- crowd.
  - populate.
  - individualize.
  - humanize.
24. The author's stance on Maury's and d'Hervey's work—outlined in paragraph 1—is best described as
- plainly critical.
  - generally positive.
  - deeply intrigued.
  - highly skeptical.
25. According to paragraph 2 (lines 10–35), Professor Ladd's main contention about dreams is that
- dreams develop from the colors that we discern during sleep.
  - dreams consist of muted hues with shining spots.
  - training can help people remember dreams on awakening.
  - we visualize materials in dreams that are common in our lives.
26. Which choice provides the best evidence for the answer to the previous question?
- Lines 13–18 ("It consists in...memory.")
  - Lines 18–22 ("Then one sees...closed.")
  - Lines 22–26 ("One reads...reality.")
  - Lines 31–32 ("The spot...were there.")
27. As used in line 34, the word "dust" most nearly means
- leather.
  - dross.
  - mist.
  - trickle.
28. Which choice most clearly states the author's own proposal in the passage about dreams and light?
- Dreams are about light-related events that penetrate our eyelids.
  - People's dreams in the author's era were quite frequently about fire.
  - External light can combine with memories to create dreams.
  - Sudden flashes of fire cause nightmares; moonlight is preferable.
29. Which choice provides the best evidence for the answer to the previous question?
- Lines 42–44 ("These sensations...dreams.")
  - Lines 52–57 ("All of a sudden...fire.")
  - Lines 64–66 ("He sees lightning...cannon.")
  - Lines 73–76 ("A. Krauss tells...girl.")
30. In paragraph 4 (lines 50–70), the author quotes descriptions of
- the effects of night nurses on two patients.
  - the terrible memories that two military veterans relive.
  - two fiery nightmares involving real world events.
  - two hospital patients' nightmares in settings that are familiar to them.
31. The main rhetorical effect of the phrase "it is a curious thing" (line 78) is to
- convey a sense of wonder.
  - communicate confusion.
  - express disapproval.
  - encourage future thinkers.
32. The author refers to the fable of Endymion (lines 82–86) primarily to
- celebrate a pair of famous lovers.
  - distinguish between dreams arising from bright and dim light.
  - demonstrate that dreams represent our deepest longings.
  - suggest that some dreams may have inspired mythology.



Refer to the passage below to answer questions 33 – 43.

Passage 1 is adapted from Sun Tzu, *The Art of War*, written around 500 BCE and translated in 1910 by Lionel Giles. Passage 2 is adapted from Niccolò Machiavelli *The Prince*, published in 1532 and translated in 1908 by William K. Marriot.

### Passage 1

line The art of war is of vital importance to the State. It is a matter of life and death, a road either to safety or to ruin. Hence it is a subject of inquiry which can on no account be neglected.

5 All warfare is based on deception. Hence, when able to attack, we must seem unable; when using our forces, we must seem inactive; when we are near, we must make the enemy believe we are far away; when far away, we must make him believe we are near.

Hold out baits to entice the enemy. Feign disorder, and crush him.

If he is secure at all points, be prepared for him. If he is superior in strength, evade him.

15 If your opponent is of choleric\* temper, seek to irritate him. Pretend to be weak, that he may grow arrogant.

If he is taking his ease, give him no rest. If his forces are united, separate them. Attack him where he is unprepared, appear where you are not expected.

In war, practice dissimulation, and you will succeed.

25 Rapidity is the essence of war: take advantage of the enemy's unreadiness, make your way by unexpected routes, and attack unguarded spots. Keep your army continually on the move, and devise unfathomable plans.

30 Forestall your opponent by seizing what he holds dear, and subtly contrive to time his arrival on the ground.

Walk in the path defined by rule, and accommodate yourself to the enemy until you can fight a decisive battle.

\* choleric: irritable, angry

### Passage 2

35 Every one admits how praiseworthy it is in a prince to keep faith, and to live with integrity and not with craft\*. Nevertheless our experience has been that those princes who have done great things have held good faith of little account, and have known how to circumvent the intellect of men by craft, and in the end have overcome those who have relied on their word.

If men were entirely good this precept

45 would not hold, but because they are bad, and will not keep faith with you, you too are not bound to observe it with them. Nor will there ever be wanting to a prince legitimate reasons to excuse this non-observance. Of this endless modern examples could be given, showing how many treaties and engagements have been made void and of no effect through the faithlessness of princes; and he who has known best how to employ the fox has succeeded best.

55 But it is necessary to know well how to disguise this characteristic, and to be a great pretender and dissembler, and men are so simple, and so subject to present necessities, that he who seeks to deceive will always find someone who will allow himself to be deceived. One recent example I cannot pass over in silence. Alexander the Sixth did nothing else but deceive men, nor ever thought of doing otherwise, and he always found victims; for there never was a man who had greater power in asserting, or who with greater oaths would affirm a thing, yet would observe it less; nevertheless his deceits always succeeded according to his wishes, because he well understood this side of mankind.

70 And you have to understand this, that a prince, especially a new one, cannot observe all those things for which men are esteemed, being often forced, in order to maintain the state, to act contrary to fidelity, friendship, humanity, and religion. Therefore it is necessary for him to have a mind ready to turn itself accordingly as the winds and variations of fortune force it, yet, as I have said above, not to diverge from the good if he can avoid doing so, but, if compelled, then to know how to set about it.

\*craft: the skill of deceiving others



33. The author of Passage 1, Sun Tzu, and the author of Passage 2, Machiavelli, could both accurately be described as
- (A) advocates trying to start wars.
  - (B) critics of war and ruthless leadership.
  - (C) allies devising battle plans for a leader.
  - (D) pragmatists concerned with longevity.
34. The lack of examples or explanations in Passage 1 primarily serves to
- (A) create an impersonal and axiomatic tone.
  - (B) undermine the passage's central claim.
  - (C) draw attention to the writer's high status and authority.
  - (D) emphasize the emotional toughness that is necessary to win wars.
35. As used in line 11, "feign" most nearly means
- (A) exaggerate.
  - (B) conceal.
  - (C) pretend.
  - (D) forge.
36. How would Sun Tzu most likely respond to Machiavelli's claim that great leaders "circumvent the intellect of men by craft" (lines 40 – 41)?
- (A) With dispassionate concurrence
  - (B) With some misgivings
  - (C) With faint praise
  - (D) With conditional assent
37. Which choice provides the best evidence for the answer to the previous question?
- (A) Lines 1 – 2 ("The art...State.")
  - (B) Line 5 ("All warfare...deception.")
  - (C) Lines 13 – 14 ("If he...evade him.")
  - (D) Lines 15 – 16 ("If your...irritate him.")
38. In Passage 1, Sun Tzu's advice to "Keep your army continually on the move, and devise unfathomable plans" (lines 27 – 28) most clearly implies that
- (A) one's troops will succeed only if they remain in top physical condition.
  - (B) one's plans for proceeding should be physically and mentally challenging.
  - (C) one's troops will be more motivated to follow their leader if battle plans are explained.
  - (D) even one's own troops should be surprised by one's tactics in war.
39. As used in line 46, "observe" most nearly means
- (A) commemorate.
  - (B) pronounce.
  - (C) maintain.
  - (D) notice.
40. In paragraph 3 of Passage 2 (lines 54 – 68), Machiavelli identifies which of the following as a reason that people are prone to believing lies?
- (A) They want to solve immediate problems.
  - (B) They tend to be self-centered.
  - (C) They focus on details rather than seeing the big picture.
  - (D) They are unsophisticated.
41. Sun Tzu's advice in lines 22 – 23 ("In war...succeed") most closely resembles Machiavelli's advice to
- (A) act like Alexander VI.
  - (B) discern people's motivations.
  - (C) heed advice from elders.
  - (D) cultivate a flexible mind.
42. Which choice provides the best evidence for the answer to the previous question?
- (A) Lines 43 – 46 ("If men were...them.")
  - (B) Lines 63 – 67 ("for there never...wishes.")
  - (C) Lines 69 – 74 ("And you...religion.")
  - (D) Lines 74 – 79 ("Therefore...about it.")
43. On which of the following points would the authors of both passages most likely agree?
- (A) Most people are good on a fundamental level.
  - (B) A leader must always keep in mind the security of future generations.
  - (C) Leaders must demonstrate courage in order to inspire loyalty.
  - (D) Maintaining stable government is not always a noble task.



Refer to the passage below to answer questions 44 – 52.

This passage is adapted from "A 'Smoking Gun' for Dinosaur Extinction," Jet Propulsion Laboratory, California Institute of Technology, published in 2003.

line It is hard to imagine that one of the largest impact craters on Earth, 180 kilometers (112 mile) wide and 900 meters (3,000 feet) deep, could all but disappear from sight, but it did.

5 Chicxulub,\* located on Mexico's Yucatán peninsula, eluded detection for decades because it was hidden (and at the same time preserved) beneath a kilometer of younger rocks and sediments. Size isn't the only thing that makes  
10 Chicxulub special. Most scientists now agree it's the "smoking gun" – evidence that a huge asteroid or comet indeed crashed into Earth's surface 65 million years ago causing the extinction of more than 70 percent of the living species on  
15 the planet, including the dinosaurs. This idea was first proposed by the father and son team of Luis and Walter Alvarez in 1980.

Though the buried giant can't be seen, the impact crater has left subtle clues of its existence  
20 on the surface. "When I talk to school children, I describe it like this," says Dr. Gary Kinsland, a geology professor at the University of Louisiana at Lafayette who has been doing research on Chicxulub since 1994. "Put a bowl on your bed,  
25 then throw the sheets and blankets over it. All you'll probably see of the bowl now is a subtle depression."

"There is not a big hole anymore," he continues, "but if you look at the rim of the depression on your bed, you'll see that it is still in  
30 the same position as the rim of the bowl beneath. That's how surface expression allows us to interpret something about the buried structure."

The view from space lets scientists see some  
35 of Chicxulub's surface features that are not nearly so obvious from the ground. Satellite images showing a necklace of sink holes, called cenotes, across the Yucatán's northern tip are what first caught the attention of NASA researchers Drs.  
40 Kevin Pope, Adriana Ocampo and Charles Duller in 1990. They were among the first to propose Chicxulub as the impact site linked to the mass extinctions that occurred at the end of the Cretaceous and beginning of the Tertiary  
45 geological ages, called the K/T boundary.

"We were ignorant of the existence of a crater," says Pope, now an independent geologist. "We were working on a project on surface water and Mayan archaeology when we saw this  
50 perfect semi-circular structure in images from the Landsat<sup>†</sup> Thematic Mapper. We were fascinated and got the magnetic and gravity data from the area collected earlier by the Mexican petroleum

company, who had been looking for oil. Their data showed a large, remarkably circular structure that they had identified as an impact crater." Pope and his colleagues reasoned that the cenotes resulted from fractures in the buried crater's rim and that the area within the cenote ring corresponded with the crater's floor.

60 Further studies by other researchers of the magnetic and gravity data plus analysis of rocks and ocean sediments published in 1991 helped convince the scientific world that Chicxulub was  
65 the site of the impact that sent life on Earth in a new direction, from the age of dinosaurs to the age of mammals.

Scientists continue to comb through the clues the impact has left behind, some of which show up best from space. "The classic spaceborne  
70 synoptic<sup>‡</sup> view," says Pope, "is what you need to see a large structure like this." Maps of the region's wetlands, produced by the spaceborne imaging radar-C (SIR-C) mission in 1994,  
75 identified zones of groundwater discharge that correlate with the crater's structure.

Now researchers are getting their first look at detailed, three-dimensional topographical data from the Shuttle Radar Topography Mission.

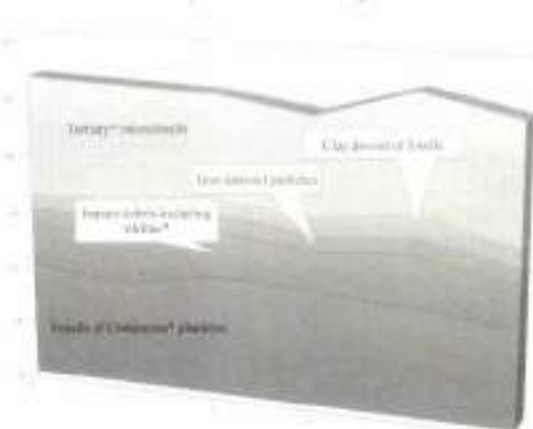
80 "This new image gives us both corroboration of what we expected and also shows up things we haven't seen before," says Kinsland. "We'll be working to get as much out of the data as possible. Anything we learn at the surface tells us  
85 more about the buried crater."

\*Chicxulub: pronounced "CHICK-sah-lube"

†Landsat: satellite program that collect images of Earth

‡synoptic: taking a thorough view

Deep-Sea Sediment Layers



Layers of sediment below Blake Nose, a spot off the coast of Florida, as indicated by a core sample taken from 370 feet below the sea bed in 1997 by the Joint Oceanographic Institutions for Deep Earth Sampling

\*terrestrial: glacial condensation from vaporized rock

†Cretaceous: last "dinosaur" period

‡Tertiary: first "mammal" period





44. Which choice best summarizes the passage?
- (A) A father-son scientific team amassed evidence of a huge asteroid collision with Earth.  
 (B) Satellite images of Earth helped researchers deduce an event in geologic history.  
 (C) An asteroid or comet was responsible for the extinction of the dinosaurs.  
 (D) Researchers have found a large hole that they had not noticed before.
45. The author's central claim that the Chicxulub crater is a "smoking gun" means that it is
- (A) a steaming physical remnant of one of the biggest explosions imaginable.  
 (B) an exhilarating discovery, yet extremely controversial among researchers.  
 (C) persuasive evidence, similar to a just-used gun found on a murder suspect.  
 (D) just a bare physical trace of a violent event, like smoke left behind at a shooting.
46. What function does paragraph 2 (lines 5 – 17) serve in the passage as a whole?
- (A) It explains the strange fact that is introduced in the first paragraph.  
 (B) It places NASA's later findings in a context of earlier discoveries.  
 (C) It describes Chicxulub's historical background.  
 (D) It introduces Chicxulub and explains its significance to science.
47. As used in line 32, "expression" most nearly means
- (A) form.  
 (B) face.  
 (C) iteration.  
 (D) narrative.
48. In paragraph 3 (lines 18 – 27), the crater is compared to a blanket-covered bowl primarily to
- (A) mimic the way ice formed over and obscured the crater.  
 (B) model the object that formed the crater using simple household objects.  
 (C) demonstrate how some of the features of the crater were recognized.  
 (D) provide an exercise the reader can perform to better understand the scenario.
49. In the context of the passage, the author's use of the figurative phrase "a necklace of sinkholes" (line 37) describes
- (A) intricate connections among caverns.  
 (B) the presence of a string of sparkling ponds.  
 (C) natural wells occurring in an arc.  
 (D) a ring of land that encircles a lower area.
50. Which choice provides the best evidence for the answer to the previous question?
- (A) Lines 48 – 51 ("We were...Mapper.")  
 (B) Lines 51 – 54 ("We were...for oil.")  
 (C) Lines 57 – 60 ("Pope and his...floor.")  
 (D) Lines 70 – 72 ("The classic...like this.")
51. According to the author, space technology has supported the Chicxulub hypothesis by recording the
- (A) orbits of comets and asteroids.  
 (B) number of wetlands in the Yucatan.  
 (C) flow of water underground.  
 (D) composition of the soil in the region.
52. Does the diagram provide support for the hypothesis that a meteorite struck at Chicxulub?
- (A) Yes, because its layers of debris indicate a super-massive impact.  
 (B) Yes, because it adds to the fossil record on dinosaur-era extinction.  
 (C) No, because it does not describe sediment composition precisely.  
 (D) No, because it does not indicate the source for the debris.



# Writing and Language Test 1



35 MINUTES, 44 QUESTIONS

Turn to Section 2 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each of the following passages is accompanied by approximately 11 questions. Some questions will require you to revise the passages in order to improve coherence and clarity. Other questions will require you to correct grammatical errors. Passages may be accompanied by graphs, charts, or tables that you must consider when making revisions. For most questions, you may select the "NO CHANGE" option if you believe that portion of the passage is clear, concise, and grammatically correct as is.

Within the passages, highlighted numbers followed by underlined text indicate which part of the text corresponds with each question. Bracketed numbers [1] indicate sentence number. These bracketed numbers are only relevant to problems that require you to add or rearrange sentences in a paragraph.

Refer to the passage below to answer questions 1–11.

### Carpenters

[1] Carpentry is one of the [2] most resourceful construction occupations. Unlike electricians or plumbers, carpenters participate in all phases of building construction. Some insulate office [3] buildings; while others install drywall or kitchen cabinets in homes. Carpenters who help construct tall buildings or bridges often install the concrete forms for cement footings or pillars. Some carpenters erect temporary shoring and scaffolding for buildings.

Because they are involved in many types of [4] construction: from building highways to framing doors, carpenters work both indoors and outdoors. Carpenters may work in cramped spaces in which frequent lifting, standing, and kneeling can be tiring. Those who work outdoors are subject to variable weather conditions.

- (A) NO CHANGE  
(B) A carpenter is one of  
(C) Carpenters are among  
(D) Being a carpenter means that you are one of
- (A) NO CHANGE  
(B) handiest  
(C) most versatile  
(D) most multifaceted
- (A) NO CHANGE  
(B) buildings—others  
(C) buildings, or others  
(D) buildings; others
- (A) NO CHANGE  
(B) construction, from building highways to framing doors, carpenters  
(C) construction. From building highways to framing doors, carpenters  
(D) construction, from building highways to framing doors; carpenters



**5** In fact, carpenters have higher rates of injury and illness than national averages. **6**

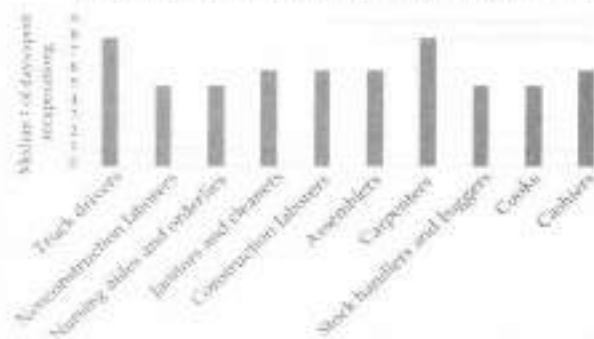
Most carpenters earn **7** a high school diploma and then learn their trade through 3- or 4-year apprenticeships. For each year of the program, apprentices complete both technical and on-the-job training. In their technical training, apprentices learn carpentry basics, blueprint reading, mathematics, building code requirements, and safety practices.

**8** A carpenter, having finished an apprenticeship, is considered a journeyman and may perform tasks on his or her own. Several groups, including unions and contractor associations, sponsor apprenticeship programs, and some contractors have their own carpenter-training programs.

**9** Becoming an independent contractor affords greater flexibility and the potential to raise income. General construction supervisors plan, coordinate, budget, and supervise construction projects from development to completion. Carpenters seeking advancement often undergo additional training provided by associations, unions, or employers.

The Bureau of Labor Statistics (BLS) **10** projects a growth in carpentry positions of 24 percent from 2012 to 2022, much faster than the average for all occupations. **11** It predicts that population growth will result in new-home construction—the largest segment employing carpenters—which drives the need for more workers. Home remodeling needs should also spur demand. Construction and maintenance of roads and bridges, though dependent on government spending, is another factor that is expected to contribute to job growth.

Median Number of Days Spent Recovering Among Occupations with the Highest Instances of Injury and Illness



Source: US Department of Labor, Bureau of Labor Statistics, *Survey of Occupational Injuries and Illnesses*, 1994.

5. (A) NO CHANGE  
(B) However,  
(C) Ultimately,  
(D) As a result,
6. Which choice most effectively concludes the paragraph with relevant and accurate information based on the graph?
- (A) In fact, carpenters are eight times more likely to become sick or injured while working than the national average.  
(B) Carpenters miss more workdays due to injury and illness than any other profession.  
(C) Surprisingly, working as a cook or cashier can also be quite hazardous.  
(D) Even among high-risk professions, the average recovery period for an injured carpenter is matched only by that of a truck driver.
7. (A) NO CHANGE  
(B) a diploma  
(C) diplomas  
(D) high school diplomas
8. (A) NO CHANGE  
(B) After an apprenticeship is finished by the carpenter, he or she is  
(C) After finishing an apprenticeship, a carpenter is  
(D) The apprenticeship being finished, a carpenter is
9. Which of the following sentences most effectively introduces the topic of paragraph 4?
- (A) Carpentry is a physically demanding job, but most carpenters find the work rewarding.  
(B) Some people mistakenly assume that the rise of technology-oriented careers has reduced interest in manual labor jobs, such as carpentry.  
(C) Because they are exposed to the entire construction process, carpenters usually have more opportunities than other construction workers to become independent contractors or general construction supervisors.  
(D) Carpenters must know how to use a wide variety of power tools.
10. (A) NO CHANGE  
(B) project  
(C) will project  
(D) projected
11. (A) NO CHANGE  
(B) They predict  
(C) This predicts  
(D) We predict



Refer to the passage below to answer questions 12 – 22.

## Antikythera Mechanism

The **12** cyclical motions of the Sun, the Moon, and the planets determined many aspects of **13** normal, everyday life in ancient civilizations. Solar and lunar cycles often regulated communal activities, such as festivals and religious ceremonies; religious authorities **14** expressed certain astronomical events, such as solar and lunar eclipses, as harbingers of either doom or good fortune. As a result, nearly every ancient culture developed remarkably accurate methods for tracking the motions of celestial bodies. Possibly the most **15** impressive (and the most puzzling) astronomical measurement device from the ancient world comes to us from the Greeks.

[1] From 1900 to 1901, **16** artifacts were recovered from a shipwreck off the coast of the Greek island of Antikythera. [2] Among the ruins, they discovered 82 bronze fragments that once made up a single device. [3] For more than half a century, the fragments remained little more than an archaeological curiosity. [4] Appropriately, the device that the fragments once belonged to was named the “Antikythera Mechanism.” [5] When they were discovered, the fragments were too corroded for researchers to decipher any of their details. [6] However, beginning in the 1970s, researchers returned to the perplexing fragments armed with x-ray technology. [7] X-ray scans of the fragments revealed that they once belonged to an astronomical measurement device. [8] Essentially, the device measured the movements of a number of noteworthy heavenly bodies. **17**

[1] However, the x-ray images of the fragments still left many features **18** unclear, whereas inscriptions on the Antikythera Mechanism’s fragments remained indecipherable, and its inner workings remained obscured. [2] Then, in 2006, modern technology revealed more of the secrets hidden within the fragments. [3] Researchers at Cardiff University in Wales took CT scans (computerized x-ray scans) of the Antikythera Mechanism’s fragments. [4] Analysis of these scans revealed more information about the mechanics and origins of the elusive device. **19**

Thus, after spending over a century shrouded in

12. (A) NO CHANGE  
(B) cynical  
(C) seismic  
(D) sinister
13. (A) NO CHANGE  
(B) your life  
(C) daily life  
(D) how people normally lived
14. (A) NO CHANGE  
(B) discovered  
(C) deduced  
(D) interpreted
15. (A) NO CHANGE  
(B) impressive – and the most puzzling astronomical  
(C) impressive; and the most puzzling astronomical  
(D) impressive, and the most puzzling astronomical
16. (A) NO CHANGE  
(B) archaeologists, finding artifacts, recovered them  
(C) archaeologists recovered artifacts  
(D) archaeologists were finding artifacts and recovering them
17. For the sake of the cohesion of paragraph 2, where should sentence 3 be placed?  
(A) Where it is now  
(B) After sentence 4  
(C) After sentence 5  
(D) After sentence 6
18. (A) NO CHANGE  
(B) unclear: inscriptions  
(C) unclear, inscriptions  
(D) unclear; despite that, inscriptions
19. To maintain the cohesion of paragraph 3, where should the following sentence be placed?  
Consequently, most researchers chose to ignore the device rather than stoop to speculation and guesswork.  
(A) After sentence 1  
(B) After sentence 2  
(C) After sentence 3  
(D) After sentence 4



mystery, the Antikythera Mechanism is finally being recognized as **20** an amazing intricate analog computer. The Antikythera Mechanism was about the size of a jewelry box, and probably **21** looks similar to a modern analog clock. The circular face accommodated at least **22** seven hands, they marked the motions of the Sun, the Moon, and the planets visible to the naked eye (Mercury, Venus, Mars, Jupiter, and Saturn). Thus, each hand rotated at a different rate and moved by means of a series of interconnected bronze gears. The device was powered by winding two dials, which connected to the gears. On the back of the device, small pins followed grooved paths that marked the dates of major athletic festivals. Most researchers suspect that the Antikythera Mechanism was created in the 2nd or 3rd century BCE and was probably based on similar, now-lost devices.

20. (A) NO CHANGE  
(B) a complex  
(C) an incredibly  
(D) a remarkable
21. (A) NO CHANGE  
(B) had looked  
(C) was looking  
(D) looked
22. (A) NO CHANGE  
(B) seven hands, marking  
(C) seven hands, which marked  
(D) seven hands, that marked



Refer to the passage below to answer questions 23–33.

## Leitmotifs

An audience has certain expectations when watching a film. A rousing brass fanfare should accompany a hero's arrival, and sinister strings should **23** underscore a villain's speech. These recurrent musical themes, commonly called "leitmotifs," have pervaded film since its infancy. Leitmotifs are miniature "theme songs" that play whenever a particular character, object, or situation is present on **24** screen. Leitmotifs can provide an audience with information not conveyed directly through dialogue. If an audience wants to know whether a character is good or evil, **25** they need only listen to that character's leitmotif.

The use of leitmotifs begins with 19th century German opera, and one of the most extensive uses of leitmotifs is found in **26** German composer Richard Wagner's, *The Ring Cycle*. **27** Composed over the course of 26 years, *The Ring Cycle* actually consists of four connected operas meant to be performed back-to-back over the course of four days. In total, *The Ring Cycle* takes approximately 15 hours to perform. As the title suggests, the story of *The Ring Cycle* centers on a magical ring that gives its owners the power to dominate the world. Influenced heavily by Norse mythology, the plot **28** includes three generations in which gods, mortals, and mythical creatures vie for possession of the ring. At the center of the struggle is Wotan, **29** ruler and leader of the gods in *The Ring Cycle*, who tries to retrieve the ring from two giants. Over the course of its 15-hour running time, *The Ring Cycle* introduces a huge cast of characters, many of **30** them have leitmotifs.

23. (A) NO CHANGE  
(B) undermine  
(C) undercut  
(D) understand
24. Which choice most effectively combines the sentences at the underlined portion?  
(A) screen, so they  
(B) screen; however, leitmotifs  
(C) screen, and consequently they  
(D) screen, meaning that these leitmotifs
25. (A) NO CHANGE  
(B) a person  
(C) it  
(D) someone
26. (A) NO CHANGE  
(B) German composer, Richard Wagner's *The Ring Cycle*.  
(C) German composer, Richard Wagner's, *The Ring Cycle*.  
(D) German composer Richard Wagner's *The Ring Cycle*.
27. (A) NO CHANGE  
(B) Being composed  
(C) Having been composed  
(D) Composing it
28. (A) NO CHANGE  
(B) traverses  
(C) encloses  
(D) spans
29. (A) NO CHANGE  
(B) ruler of the gods,  
(C) who rules over the rest of the gods  
(D) who leads the other gods as their ruler
30. (A) NO CHANGE  
(B) which  
(C) who  
(D) whom



As one would expect, Wagner uses leitmotifs to suggest characters' allegiances. A soaring horn leitmotif introduces Siegfried, Wotan's grandson and a major hero in *The Ring Cycle*, while a lumbering percussive leitmotif announces the presence of the evil giants. **31** Moreover, Wagner occasionally uses leitmotifs to express a character's thoughts or feelings. At the beginning of *The Ring Cycle*, a triumphant-sounding leitmotif introduces the wise and powerful god Wotan. However, by the midpoint of the opera, when his fortunes have turned for the worse, Wotan's leitmotif switches to a minor key, giving it a mournful sound that matches his own despair.

From these examples, one can conclude that Wagner's leitmotifs serve two concurrent functions. Superficially, leitmotifs provide musical cues that help audiences orient themselves to the events of the opera; audiences know which characters to expect on stage based on the leitmotifs that precede their arrival. **32** Consequently, leitmotifs add emotional weight to the events of *The Ring Cycle*. Wotan's despair is heightened by the melancholy reflected in his leitmotif. Thus, it should come as no surprise that the use of leitmotifs has endured for nearly a century and a half. **33** leitmotifs are especially prominent in action and adventure films.

31. Which choice most effectively sets up the information that follows?
- (A) NO CHANGE  
 (B) Most composers agree that leitmotifs effectively introduce important themes and characters.  
 (C) However, it is fairly uncommon for a minor character to have a leitmotif.  
 (D) Furthermore, different instruments may play a leitmotif each time it repeats.
32. (A) NO CHANGE  
 (B) Additionally  
 (C) Conversely  
 (D) Quizzically
33. Which choice most effectively concludes the passage?
- (A) NO CHANGE  
 (B) leitmotifs are also employed in literature, where recurrent phrases replace musical themes.  
 (C) leitmotifs convey a wealth of information using nothing more than a musical phrase.  
 (D) film composer John Williams has created some of the most recognizable leitmotifs.



Refer to the passage below to answer questions 34–44.

## Planetary Formation

[1] Since the Big Bang, the universe has produced an incredible number of stars and planets. [2] Scientists estimate that, in the Milky Way alone, hundreds of billions of planets orbit approximately one hundred billion stars. [3] Although no two of these heavenly bodies are identical, they all share at least one common **34** feature; their shape. [4] To determine why this is, it helps to understand how stars and planets form. **35**

Most solar systems, including our own, form in a swirling cloud of particles called a nebula. The nebula's gravity **36** draws other nearby particles, causing the nebula to grow. Gradually, particles **37** cluster in the middle of the nebula, drawn together by their mutual gravitational attraction. As more particles gravitate toward the center of the nebula, it begins to spin **38** more faster. This is the same process that causes an ice skater to accelerate when she brings her arms and legs closer to her body while spinning. The center of the nebula continues to spin, accelerating as it **39** has acquired more mass. The center of the nebula becomes a star when the cluster of spinning particles is massive enough—and **40** its gravitational field is strong enough—to undergo nuclear fusion.

34. (A) NO CHANGE  
(B) feature, their shape!  
(C) feature (their shape).  
(D) feature—their shape.
35. To maintain the cohesion of paragraph 1, where should the following sentence be placed?  
Even the largest known star, which is millions of times larger than the Sun, has the same spherical shape as Earth.  
(A) After sentence 1  
(B) After sentence 2  
(C) After sentence 3  
(D) After sentence 4
36. (A) NO CHANGE  
(B) captivates  
(C) evokes  
(D) lures
37. (A) NO CHANGE  
(B) rally  
(C) convene  
(D) assemble
38. (A) NO CHANGE  
(B) rapider  
(C) more fast  
(D) faster
39. (A) NO CHANGE  
(B) acquiring  
(C) acquired  
(D) acquires
40. (A) NO CHANGE  
(B) it's  
(C) its'  
(D) it is





The newly formed star sits at the center of the **41** nebula being surrounded by a spinning cloud of particles that includes gases and space debris. Because they have a greater gravitational pull, the heavier particles in this cloud cluster together, heating up as they form the molten cores of rocky planets. Gas giants, on the other hand, form much like stars.

**42** but gas giants never acquire a sufficient amount of mass to undergo the process of fusion.

Ultimately, gravity is the key player in the formation of nebulae, stars, and planets. Gravity ensures that, during formation, every particle tries to get as close to the center as possible, evenly distributing gravitational pull. The only three-dimensional shape that allows for this configuration is a **43** sphere. All points on the outside of a sphere are equidistant, after all. Celestial objects smaller than 100 miles in diameter generally lack sufficient mass, and therefore sufficient gravity, to compress into spheres.

**44**

41. (A) NO CHANGE  
(B) nebula, surrounded  
(C) nebula, surrounding itself  
(D) nebula, the star is surrounded
42. (A) NO CHANGE  
(B) but gas giants never become massive enough to undergo fusion.  
(C) yet, in terms of mass, gas giants never have enough to go through fusion.  
(D) but gas giants can never begin the process of fusion because they are not massive enough.
43. Which of the following most effectively combines the sentences at the underlined portion?  
(A) sphere, this is because all points  
(B) sphere, indicating that the points  
(C) sphere, yet every point  
(D) sphere; all points
44. Which sentence best concludes the final paragraph of the passage?  
(A) This explains why comets and asteroids have irregular, non-spherical appearances.  
(B) However, forces other than gravity contribute to the formation of spheres, too.  
(C) The strength of an object's gravitational field is proportional to the object's mass.  
(D) Without Isaac Newton's pioneering research into the nature of gravity, all this information might remain unknown even today.





# Math Test 1 – No Calculator



25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

## DIRECTIONS

For questions 1–15, find the solution to each problem and select the most appropriate answer from the choices provided. For questions 16–20, find the solution to each problem and write your answer in the space provided. You may use the blank space in your test booklet for scratch work.

## NOTES

1. The use of a calculator on any part of this section is forbidden.
2. Unless otherwise indicated, all variables and expressions used in this test represent real numbers.
3. Unless otherwise indicated, all figures used in this test are drawn to scale.
4. Unless otherwise indicated, all figures used in this test lie on a plane.
5. Unless specified otherwise, a given function,  $f$  has the domain the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE



$$A = \frac{1}{2}bh$$



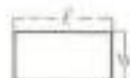
$$c^2 = a^2 + b^2$$



Special Right Triangles



$$A = \pi r^2$$
$$C = 2\pi r$$



$$A = lw$$



$$V = lwh$$



$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}lwh$$

The arc of a circle is 360 degrees or  $2\pi$  radians.  
A triangle has angles that sum to 180 degrees.





1. Jenny has a job that pays \$8 per hour plus tips ( $t$ ). Jenny worked for 4 hours on Monday and made \$65 in all. Which equation could be used to find  $t$ , the amount Jenny made in tips?

- (A)  $65 = 4t + 8$   
 (B)  $65 = 8t + 4$   
 (C)  $65 = 8t + 4$   
 (D)  $65 = 8(4) + t$

2. Anna burned 15 calories per minute running for  $x$  minutes and 10 calories per minute hiking for  $y$  minutes. She spent a total of 60 minutes running and hiking and burned 700 calories. The system of equations shown below can be used to determine how much time Anna spent on each exercise:

$$\begin{aligned} 15x + 10y &= 700 \\ x + y &= 60 \end{aligned}$$

How many minutes  $x$ , did Anna spend running?

- (A) 10  
 (B) 20  
 (C) 30  
 (D) 40
3. Solve  $\sqrt{13-x} = x-1$ .

- (A) {4}  
 (B) {4, -3}  
 (C) {-3}  
 (D) {9}

4. A baseball team has \$1,000 to spend on supplies. One baseball bat costs \$185. New baseballs are \$4 each. The inequality  $185 + 4b < 1,000$  is used to determine the number of new baseballs  $b$  that the team can purchase. Which statement about the number of new baseballs that can be purchased is true?

- (A) The team can purchase 204 new baseballs.  
 (B) The minimum number of new baseballs that can be purchased is 185.  
 (C) The maximum number of new baseballs that can be purchased is 185.  
 (D) The team can purchase 185 new baseballs, but this number is neither the maximum nor the minimum.

5. Which statement best describes the relationship between the graphs of  $y = 2$  and  $x = 2$ ?

- (A) The two lines have the same slope.  
 (B) The lines are perpendicular.  
 (C) The lines are parallel.  
 (D) The lines intersect at  $(2, 0)$ .



6. What is the solution set of this system of equations?

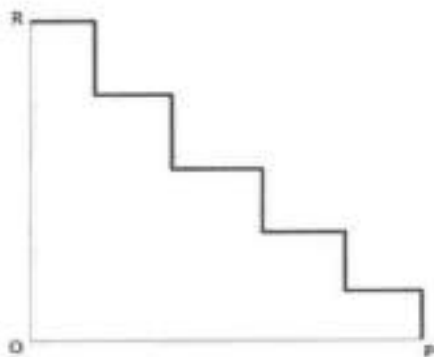
$$\begin{aligned}x^2 + y - 1 &= 0 \\x - y + 1 &= 0\end{aligned}$$

- (A)  $\{(-1, -1), (-1, 0)\}$   
(B)  $\{(-1, 0), (-1, 1)\}$   
(C)  $\{(-1, 0), (0, 1)\}$   
(D)  $\{(1, 0), (1, 1)\}$
7. A set of data has 10 values, no two of which are the same. If the smallest value is removed from the set, which of the following statements **MUST** be true?
- (A) The range of the first data set is greater than the range of the second data set.  
(B) The mode of the first data set is greater than the mode of the second data set.  
(C) The medians of the two data sets are the same.  
(D) The mean of the first data set is greater than the mean of the second data set.
8. Hattie went to a candle store in the mall and saw all the candles in the store were on sale for 17% off. She had her calculator with her and programmed it to give her the sale price based on the original price. What expression did she use to find the sale price, if the original price in dollars is represented by  $m$ ?
- (A)  $m + 0.17m$   
(B)  $-0.17m$   
(C)  $0.17m$   
(D)  $m - 0.17m$
9. Which of the following describes the graph of the function  $f(x) = (-x + 3)(x - 5)$ ?
- (A) Opens up with  $x$ -intercepts at  $(-5, 0)$  and  $(3, 0)$   
(B) Opens up with  $x$ -intercepts at  $(5, 0)$  and  $(3, 0)$   
(C) Opens down with  $x$ -intercepts at  $(-5, 0)$  and  $(-3, 0)$   
(D) Opens down with  $x$ -intercepts at  $(5, 0)$  and  $(3, 0)$
10. A board 79 inches long is cut into 3 pieces. The second piece is 5 inches longer than the first. The third piece is twice as long as the second. If  $x$  represents the length of the first piece, then which equation can be used to determine the length of the first piece?
- (A)  $79 = 5x + 15$   
(B)  $79 = x + (x + 5) + 2x$   
(C)  $79 = 3x + 12$   
(D)  $79 = x + (x + 5) + 2(x + 5)$





11.



In the figure above, the heavy segmented line from  $P$  to  $R$  is composed of line segments that are parallel to either  $\overline{OR}$  or  $\overline{OP}$ . If the length of  $\overline{OR}$  is  $x$  and the length of  $\overline{OP}$  is  $y$ , what is the total length of the heavy broken line from  $P$  to  $R$ ?

- (A)  $\sqrt{x^2 - y^2}$   
 (B)  $x + y$   
 (C)  $2(x + y)$   
 (D)  $x^2 + y^2$

12. Copper production increased at a rate of about 4.9% per year between 1988 and 1993. In 1993, copper production was approximately 1.801 billion kilograms. If this trend continues, which equation best models the copper production ( $P$ ), in billions of kilograms since 1993? (Let  $t = 0$  for 1993.)

- (A)  $P = 1.801(4.900)^t$   
 (B)  $P = 1.801(1.490)^t$   
 (C)  $P = 1.801(1.049)^t$   
 (D)  $P = 1.801(0.049)^t$

13. If the range of  $f(x) = x^2 + 4$  is all real numbers from 13 to 29, what positive numbers lie in the domain of  $f(x)$ ?

- (A)  $3 \leq x \leq 5$   
 (B)  $5 \leq x \leq 21$   
 (C)  $9 \leq x \leq 25$   
 (D)  $13 \leq x \leq 29$

14. Which quadrants contain the solutions to this system of inequalities?

$$\begin{aligned} y - 2x &\leq -3 \\ 3y - x &\geq -4 \end{aligned}$$

- (A) Quadrants I and IV  
 (B) Quadrants II and III  
 (C) Quadrants III and IV  
 (D) Quadrants II, III, and IV

15. If  $i = \sqrt{-1}$ , which of the following is equivalent

to  $\frac{2}{5+i}$ ?

- (A)  $\frac{5-i}{12}$   
 (B)  $\frac{5+i}{12}$   
 (C)  $\frac{5-i}{13}$   
 (D)  $\frac{5+i}{13}$





**DIRECTIONS**

For questions 16 – 20, find the solution to the problem and enter your answer as demonstrated below.

1. Only the answer that is bubbled in on the answer sheet will be credited. The blank spaces above the bubbles are for you to record your answers for accuracy.
2. Only fill in one bubble in any given column.
3. None of the answers on this portion of the test are negative values.
4. If a problem appears to have more than one answer, only enter one answer. If the answer you enter is one of the correct solutions, you will receive full credit for that question.
5. If the correct answer can be expressed as a mixed number, it must be entered as a decimal or an improper fraction.
6. If the correct answer is a decimal that cannot fit into the grid space, you must fill the grid with enough digits to completely fill the space. The number can be rounded or simply shortened but must fill every blank space.

Write answer → in boxes.

Grid in result.

Answer:  $\frac{5}{36}$

	5	/	3	6
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	0	0	0	0
1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Answer: 4.5

	4	.	5
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3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

← Fraction line  
← Decimal point

Acceptable ways to grid  $\frac{1}{6}$  are:

	1	/	6
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	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	0	0
1	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	.	1	6	6
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	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	0	0	0
1	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	.	1	6	7
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	0	0	0	0
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2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

Answer: 302 - either position is correct

	3	0	2
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	0	0	0
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	3	0	2
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2	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
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4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**NOTES**

Begin entering answers in any column that accommodates your answer. If you do not need a column do not enter anything in that column.





16. If  $h(x+1) = \frac{3h(x)+4}{3}$  for all positive integers  $x$  and  $h(1) = -\frac{2}{3}$ , what is the value of  $h(3)$ ?

ANSWER: \_\_\_\_\_

17. If  $x+y=5$  and  $x^2+3xy+2y^2=40$ , find the value of  $2x+4y$ .

ANSWER: \_\_\_\_\_

18.

$$\begin{aligned}y &= 11x + 3x^2 \\ y &= 11x^2 - 3x\end{aligned}$$

Consider the system of equations above for  $x > 0$ . What is the value of  $x$ ?

ANSWER: \_\_\_\_\_

19. The equation  $\frac{x-3}{2} = \frac{1}{x-4}$  has two solutions.

What is their product?

ANSWER: \_\_\_\_\_

20. When the polynomial  $x^4 - 3x^3 - 7x^2 + 7x + 2$  is divided by  $x+2$ , the quotient is  $x^3 + Bx^2 + Cx + 1$ .

Find the value of  $|B+C|$ .

ANSWER: \_\_\_\_\_





# Math Test 1 – Calculator



55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

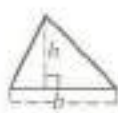
## DIRECTIONS

For questions 1 – 30, find the solution to each problem and select the most appropriate answer from the choices provided. For questions 31 – 38, find the solution to each problem and write your answer in the space provided. You may use the blank space in your test booklet for scratch work.

## NOTES

1. The use of a calculator on this section is allowed.
2. Unless otherwise indicated, all variables and expressions used in this test represent real numbers.
3. Unless otherwise indicated, all figures used in this test are drawn to scale.
4. Unless otherwise indicated, all figures used in this test lie on a plane.
5. Unless specified otherwise, a given function,  $f$  has the domain the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE



$$A = \frac{1}{2}bh$$



$$c^2 = a^2 + b^2$$

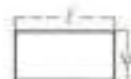


Special Right Triangles



$$A = \pi r^2$$

$$C = 2\pi r$$



$$A = lw$$



$$V = lwh$$



$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}lwh$$

The arc of a circle is 360 degrees or  $2\pi$  radians.

A triangle has angles that sum to 180 degrees.







1.

ANNUAL BUDGET BY DEPARTMENT



The pie graph above shows the annual budget for the Heavy Equipment Company. If the total budget is \$60,000,000, what amount is budgeted for the Market Support and Engineering departments combined?

- (A) \$18 million  
 (B) \$22 million  
 (C) \$24 million  
 (D) \$28 million

2. A climber measures the oxygen content of the air

at 2,000 feet above sea level at 18%. The climber measures it again at 4,500 feet, this time at 14%. By how much does the oxygen content of the air change for every 1,000 feet of elevation?

- (A) -1.6%  
 (B) +1.6%  
 (C) -2.0%  
 (D) +2.0%

3. Which of the following expresses the complete solution to the inequality  $3x - 5 > 5x - 9$ ?

- (A)  $x > -\frac{7}{4}$   
 (B)  $x > 2$   
 (C)  $x < 2$   
 (D)  $x > -2$

4. The owner of a store displays a large jar of nickels and dimes and offers the value of the coins to the person who guesses how many dimes there are. If there are 1,130 coins valued at \$100, how many dimes are there?

- (A) 130  
 (B) 260  
 (C) 870  
 (D) 970

5. If  $y + 3$  and  $\frac{3x}{y}$  is a prime integer greater than 2, which of the following must be true?

- I.  $x = y$   
 II.  $y = 1$   
 III.  $x$  and  $y$  are prime integers.

- (A) None  
 (B) I only  
 (C) II only  
 (D) I and III





6. Cynthia is sailing from Florida to Massachusetts and back to Florida. She will make two stops along the way, in North Carolina and at the New Jersey shore. It costs \$1.45 per foot to dock in North Carolina, \$2.50 per foot to dock in Southern New Jersey, and \$300/night to dock at Cape Cod, Massachusetts. Which of the following choices models how much she will spend on docking fees if she plans on spending 3 nights in Massachusetts, making the same stops on the way back, and sails a boat that requires  $x$  feet of dockage?
- (A)  $2x(1.45 + 2.5) + 900$   
(B)  $x(1.45 + 2.5) + 300$   
(C)  $x(1.45 + 2.5) - 300$   
(D)  $\frac{1.45 + 2.50}{x} + 900$
7. Which of the following is the equation of the line that passes through the points  $(-5, -2)$ ,  $(3, -1)$ ?
- (A)  $y = \frac{1}{8}x + \frac{11}{8}$   
(B)  $y = \frac{1}{8}x - \frac{11}{8}$   
(C)  $y = -\frac{1}{8}x - \frac{11}{8}$   
(D)  $y = -\frac{1}{8}x + \frac{11}{8}$
8. At a banquet of 36 people, each person has the choice of roast beef, chicken divan, and linguine primavera. If 25% choose roast beef and 17 people choose chicken divan, how many people choose linguine primavera?
- (A) 7  
(B) 8  
(C) 9  
(D) 10
9. A scientist performs an experiment in which she measures four values two times each, with the following results:
- |                    | $w$ | $x$ | $y$ | $z$ |
|--------------------|-----|-----|-----|-----|
| First Measurement  | 0.2 | 6   | 0.5 | 10  |
| Second Measurement | 0.6 | 3   | 1   | 30  |
- Which of the following conclusions is supported by the data?
- (A)  $w$  and  $y$  are directly proportional.  
(B)  $w$  and  $z$  are inversely proportional.  
(C)  $x$  and  $y$  are inversely proportional.  
(D)  $x$  and  $z$  are inversely proportional.
10. Martha picked out a pair of shoes that were 30% off the original price. After 5% sales tax, the final cost was \$58.80. What was the original price?
- (A) \$70  
(B) \$75  
(C) \$80  
(D) \$85
11. Of the 126 students who applied for a full scholarship to Kent College, 9 were successful. What is the ratio of students receiving a scholarship to those who are not?
- (A) 1 to 11  
(B) 1 to 12  
(C) 1 to 13  
(D) 1 to 14



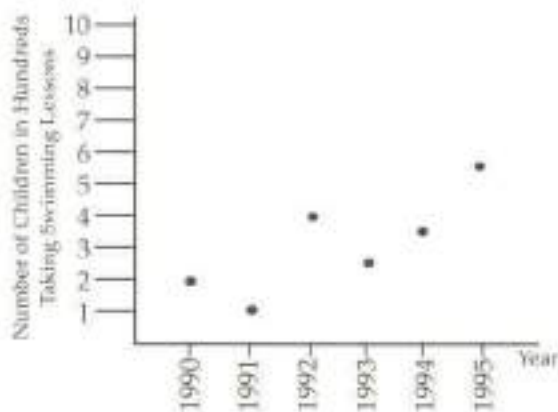


12. If  $p$  percent of 250 is 75, what is 75% of  $p$ ?
- (A) 22.5  
(B) 25  
(C) 75  
(D) 225
13. This semester, Gerry scored an average of 93 on his five history exams. He got the same score on his first two exams, and then a 94, an 85, and a 90 on the remaining exams. What score did he receive on his first two exams?
- (A) 95  
(B) 96  
(C) 97  
(D) 98
14. Logan runs  $x$  miles per day. Which of the following represents the total distance he runs in a year, if he takes one day off per week, and a week off every 3 months?
- (A)  $(52 - \frac{12}{3})(6)x$   
(B)  $(52 - \frac{52}{3})(6)x$   
(C)  $\left[ (365) \left( \frac{6}{7} \right) - \frac{12}{3} \right] x$   
(D)  $\left[ (365) \left( \frac{6}{7} \right) - 21 \right] x$
15. If  $f(x) = a(x - 2)^2 + 15$  and  $f(1) = 2$ , then  $a =$
- (A) -13  
(B) -10  
(C) 10  
(D) 13
16. Where are the points  $(1, 2)$  and  $(-1, 1)$  in relation to the line  $3x + 4y = 7$ ?
- (A) Both are on the line.  
(B) One is on the line and the other is off the line.  
(C) Both are above the line.  
(D) One is above the line and the other is below the line.
17. If  $f(x) = 3x + 2$ , then  $f(a + b) =$
- (A)  $3a + 3b + 2$   
(B)  $3a + 3b + 4$   
(C)  $3a + 2 + a + b$   
(D)  $3a + 4 + 3a + 3b$





Refer to the graph below to answer questions 18 and 19.



18. Between which years did the largest decrease in children taking swimming lessons occur?
- (A) 1990 – 1991  
(B) 1991 – 1992  
(C) 1992 – 1993  
(D) 1993 – 1994
19. What was the approximate average number of children taking swim lessons from 1990 to 1995?
- (A) 250  
(B) 308  
(C) 385  
(D) 450
20. What is the length of a line segment drawn from  $(-3, 7)$  to  $(6, -5)$  on the coordinate plane?
- (A) 15  
(B) 16  
(C) 17  
(D) 18
21. If  $f(x)$  is a function for which  $f(2+k) = f(2-k)$ , and  $f(-3) = 0$ , for which of the following is  $f(x)$  also equal to zero?
- (A)  $x - 7$   
(B)  $x - 5$   
(C)  $x - 3$   
(D)  $x - 1$
22. David is staying at a hotel that charges \$79.50 per night plus tax for a room. A tax of 7.2% is applied to the room rate, and there is an additional one-time untaxed fee of \$10.00. Which of the following represents David's total charges, in cents, for a stay of  $x$  nights?
- (A)  $(7950 + 0.072x) + 1000$   
(B)  $1.072(7950x) + 1000$   
(C)  $1.072(7950x + 1000)$   
(D)  $1.072(7950 + 1000)x$





23. At 1:00 PM, a car leaves St. Louis for Chicago, traveling at a constant speed of 65 miles per hour. At 2:00 PM, a truck leaves Chicago for St. Louis, traveling at a constant speed of 55 miles per hour. If it is a 305-mile drive between St. Louis and Chicago, at what time the car and truck pass each other?
- (A) 2:30 PM  
 (B) 3:00 PM  
 (C) 4:00 PM  
 (D) 4:30 PM
24. To celebrate a colleague's retirement, the coworkers in an office agree to contribute equally to a catered lunch that costs a total of  $b$  dollars. If there are  $a$  coworkers in the office, and if  $c$  coworkers fail to contribute, which of the following represents the extra amount, in dollars, that each of the remaining coworkers must contribute to cover the cost of lunch?
- (A)  $\frac{b}{c}$   
 (B)  $\frac{b}{a-c}$   
 (C)  $\frac{bc}{a-c}$   
 (D)  $\frac{bc}{a(a-c)}$
25. A store charges \$39 per pair for a certain type of pants. This price is 30% more than the wholesale price. At a Thanksgiving sale, store employees can purchase any remaining items at 40% off the wholesale price. How much would it cost an employee to purchase a pair of pants of this type at this sale?
- (A) \$12.00  
 (B) \$14.00  
 (C) \$18.00  
 (D) \$21.00
- 26.
- | Quiz Score | Number of Students |
|------------|--------------------|
| 0          | 2                  |
| 10         | 4                  |
| 20         | 13                 |
| 30         | 6                  |
- A class of 25 students took a 3-question quiz. The table shows the possible scores on this quiz and the number of students who received each of these scores. What is the average (arithmetic mean) of the scores for this class?
- (A) 18.9  
 (B) 19.1  
 (C) 19.2  
 (D) 19.7





27. A manufacturing company processes raw ore. The number of tons of refined material the company can produce during  $t$  days using Process A is  $A(t) = t^2 + 2t$  and using Process B is  $B(t) = 10t$ . The company has only 7 days to process ore and must choose one of the processes. What is the maximum output of refined material, in tons, for this time period?
- (A) 10  
(B) 51  
(C) 63  
(D) 70
28. The angle created by an individual's line of vision from sea level to the top of a lighthouse is  $60^\circ$ . The lighthouse is known to rise 180 feet above sea level. What is the distance (to the nearest foot) between the observer and the base of the lighthouse?
- (A) 104 feet  
(B) 180 feet  
(C) 208 feet  
(D) 254 feet
29. If  $i = \sqrt{-1}$ , which of the following is equivalent to  $\frac{2i}{1+i}$ ?
- (A)  $-2$   
(B)  $-1 + 2i$   
(C)  $1 - i$   
(D)  $1 + i$
30. If  $\sin x = \frac{1}{2}$  and  $x$  is between  $\frac{\pi}{2}$  and  $\frac{3\pi}{2}$ , what is the value of  $\frac{x}{2}$ ?
- (A)  $\frac{5\pi}{6}$   
(B)  $\frac{7\pi}{12}$   
(C)  $\frac{5\pi}{12}$   
(D)  $\frac{\pi}{12}$





## DIRECTIONS

For questions 31 – 38, find the solution to the problem and enter your answer as demonstrated below.

1. Only the answer that is bubbled in on the answer sheet will be credited. The blank spaces above the bubbles are for you to record your answers for accuracy.
2. Only fill in one bubble in any given column.
3. None of the answers on this portion of the test are negative values.
4. If a problem appears to have more than one answer, only enter one answer. If the answer you enter is one of the correct solutions, you will receive full credit for that question.
5. If the correct answer can be expressed as a mixed number, it must be entered as a decimal or an improper fraction.
6. If the correct answer is a decimal that cannot fit into the grid space, you must fill the grid with enough digits to completely fill the space. The number can be rounded or simply shortened but must fill every blank space.

Write answer → in boxes

Grid in result.

Answer:  $\frac{5}{36}$

	5	/	3	6
	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	<input checked="" type="radio"/>	3
4	4	4	4	4
5	<input checked="" type="radio"/>	5	5	5
6	6	6	6	<input checked="" type="radio"/>
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

Answer: 4.5

		4	.	5
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	<input checked="" type="radio"/>	4	4
5	5	5	5	<input checked="" type="radio"/>
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

← Fraction line  
← Decimal point

Acceptable ways to grid  $\frac{1}{6}$  are:

	1	/	6
	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	0	0
1	<input checked="" type="radio"/>	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	<input checked="" type="radio"/>

	.	1	6	6
	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	0	0	0
1	<input checked="" type="radio"/>	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	<input checked="" type="radio"/>	<input checked="" type="radio"/>

	.	1	6	7
	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	0	0	0
1	<input checked="" type="radio"/>	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	<input checked="" type="radio"/>	<input checked="" type="radio"/>

Answer: 302 – either position is correct

	3	0	2
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	<input checked="" type="radio"/>	0
1	1	1	1
2	2	2	<input checked="" type="radio"/>
3	<input checked="" type="radio"/>	3	3
4	4	4	4
5	5	5	5
6	6	6	6

	3	0	2
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	<input checked="" type="radio"/>	0
1	1	1	1
2	2	2	<input checked="" type="radio"/>
3	<input checked="" type="radio"/>	3	3
4	4	4	4
5	5	5	5
6	6	6	6

## NOTES

Begin entering answers in any column that accommodates your answer. If you do not need a column do not enter anything in that column.





31. What is the slope of the line  $9x - 3y = 10$ ?

ANSWER: \_\_\_\_\_

32. Angel works part-time as an underwear fit model for \$50 an hour, and part-time as a pastry chef for \$12.50 an hour. This past week, he worked for 25 hours and made \$625. How many hours did he work as a chef?

ANSWER: \_\_\_\_\_

33. At a convenience store, two candy bars and two bags of potato chips cost \$4.00, and three candy bars and two bags of potato chips cost \$4.75. What is the price, in dollars, of one bag of potato chips?

ANSWER: \_\_\_\_\_

34. A two-digit number from 10 to 99, inclusive, is chosen at random. What is the probability that this number is divisible by 5?

ANSWER: \_\_\_\_\_







35. If Aaron can do a job in 8 days, and Ben can do the same job in 12 days, how long does it take, in hours, for the two men, working together, to complete the same job? (Round your answer to the nearest hour.)

ANSWER: \_\_\_\_\_

36. The base of a pyramid has the same area as the base of a cylinder, and the cylinder is twice the height of the pyramid. What is the ratio of the volume of the pyramid to the volume of the cylinder?

ANSWER: \_\_\_\_\_

37. **PART 1**

Karen runs a flower shop. She determines that it takes her two hours of online marketing to bring in five new orders. If each order bills an average of \$30, how many hours of marketing are necessary for her business to bill \$10,000 a month? (Round your answer to the nearest hour.)

ANSWER: \_\_\_\_\_

38. **PART 2**

Karen hires a marketing assistant to bolster her online presence, and finds that it now takes only one hour of online marketing to bring in five new orders. If she pays her assistant \$15 per hour, and the cost to fill an order is \$5, how many hours must her assistant work each month for Karen's business to make a monthly profit of \$10,000?

ANSWER: \_\_\_\_\_



# Essay Test 1



50 MINUTES, Prompt-based essay

Turn to Section 5 of your answer sheet to answer the question in this section.

## DIRECTIONS

As you read the passage below, consider how Susanna Heckman uses

- evidence, such as facts or examples, to support claims.
- reasoning to develop ideas and to connect claims and evidence.
- stylistic or persuasive elements, such as word choice or appeals to emotion, to add power to the ideas expressed.

Adapted from “Misusing Personality Tests” by Susanna Heckman. Copyright 2015 KALLIS EDU.

Personality is ephemeral. Yet, humans seem to want to understand personality through sorting and labeling. We would like to borrow the sorting hat from J.K. Rowling’s Harry Potter series: it can instantly assess characters’ entire past lives and thoughts, and place each one with a group of kindred spirits.

So it is perhaps natural that people have begun to put more stock in computer-based multiple choice “tests.” More and more, business and government are adopting such tests with the serious purpose of evaluating someone for a job or an academic program. A person’s answers on a multiple choice questionnaire, test, or quiz, supposedly pins down his or her personality traits, laying them out for inspection like butterflies in a glass case.

Of course, personality questionnaires can be useful for self-reflection, and can even be fun. Many people happen to know their own Zodiac “sign,” even if they do not believe in astrology. Teen magazines and social media abound with “fun quizzes.” Which holiday are you? Discover your shoe personality! What is your candy personality?! What does your coffee order say about you?! Which famous zombie are you?!

Psychological research indicates that assessing personality is actually a complicated, subjective process. As an example, evaluating patients for a personality *disorder* usually involves weighing information from a number of sources, including interviews with the client and the client’s family members, not simply multiple-choice questionnaires. One reason is that research has shown that different questionnaires can offer completely different diagnoses. Researchers at Washington University recently summed up their findings regarding questionnaires by saying that “Diagnostic impressions from one instrument [i.e., a single questionnaire] should not be regarded as the only possible option.” Anyone who has applied for a position that requires these personal questionnaires has probably been a bit baffled. Some tests ask questions such as, “Which word describes you better, ‘orderly,’ or ‘unique?’” Imagine the thought processes of the nervous test-takers. Some may answer “orderly,” reasoning that the employer wants orderly people; some may answer “orderly” because they think that “unique” sounds boastful, or vice-versa; some may answer “unique” because they reason that everyone is unique; some may answer “unique” because they think the employer will think that they are only thinking about what the employer is thinking if they answer “orderly.” Or vice-versa.



Many questions may blatantly try to discern the applicant's level of honesty. At the same time, they may ask impossible questions, such as, "Which do you prefer: jogging, or volleyball?" although obviously, most people do neither. Questions may ask applicants to agree or disagree with statements such as, "I tend to give up easily." An *honest* answer to that question depends completely and totally on a specific situation. In the abstract, the question is unanswerable.

Adding to the baffling nature of such questions, the companies that sell the tests keep interpretations secret. Exactly how choosing the word "orderly" or the word "unique," or jogging or volleyball, would relate to employment suitability is proprietary information. Thus, it is fair to suspect that the interpretations are highly unscientific.

The heart of the problem is that, as psychological research indicates, it is simply irrational to expect the questionnaires, quizzes, or tests to "work." People are not good sources when it comes to their own traits for three reasons. One is people's "social desirability bias." That is, pretty much everyone chooses the answer that is the most socially desirable; we choose answers that we think are "right." Another factor at work is the "introspection limitation," which means that our self-knowledge has limits.

Finally, there is the bias of the moment. A person's mood, age, gender, health, culture, daily concerns, and many other factors can affect how that person chooses to answer a particular question. Research has shown that people may have completely different results if they take the same tests on different days.

The clear limitations of such questionnaires make it perplexing to me that Human Resources departments are buying them; the personality-test industry rakes in more than \$500 million a year. Trying for a moment to imagine being an HR or college admissions officer who must choose one among many qualified applicants, I can see that the magnetic pull of "objective data" must be so strong that one could ignore little things like *the tests do not work*. I would argue that the tests are just as random and complicated as any other measure of human personality.

Write an essay in which you explain how Susanna Heckman builds an argument to persuade her audience that personality tests should not be used for employment or education. In your essay, analyze how the author uses one or more of the features listed in the box above (or features of your own choice) to strengthen the logic and persuasiveness of her argument. Be sure that your analysis focuses on the most relevant features of the passage.

Your essay should not explain whether you agree with the author's claims, but rather explain how the author builds an argument to persuade her audience.

# SAT® Practice Test #2

## IMPORTANT REMINDERS:

1

When you take the official SAT, you will need to use a No. 2 pencil. Do not use a pen or a mechanical pencil.

2

On the official SAT, sharing any of the question on the test violates the College Board's policies and may result in your scores being canceled.

(This cover is modeled after the cover you'll see when you take the official SAT.)

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# Reading Test 2



65 MINUTES, 52 QUESTIONS

Turn to Section 1 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each passage or pair of passages is accompanied by 10 or 11 questions. Read each passage or pair of passages, and then select the most appropriate answer to each question. Some passages may include tables or graphs that require additional analysis.

Refer to the passage below to answer questions 1–10.

This passage is adapted from Mark Twain, *Tom Sawyer*, originally published in 1884.

line Saturday morning was come, and all the summer world was bright and fresh, and brimming with life. Tom appeared on the sidewalk with a bucket of whitewash and a long-handled brush. He surveyed the fence, and all

5 gladness left him and a deep melancholy settled down upon his spirit. Thirty yards of board fence nine feet high. Life to him seemed hollow, and existence but a burden. Sighing, he dipped his

10 brush and passed it along the topmost plank; repeated the operation; did it again; compared the insignificant whitewashed streak with the far-reaching continent of unwhitewashed fence, and sat down on a tree-box discouraged.

15 He began to think of the fun he had planned for this day, and his sorrows multiplied. Soon the free boys would come tripping along on all sorts of delicious expeditions, and they would make a world of fun of him for having to work—the very thought of it burnt him like fire. ... At this

20 dark and hopeless moment an inspiration burst upon him! Nothing less than a great, magnificent inspiration.

He took up his brush and went tranquilly

25 to work. Ben Rogers hove in sight presently—the very boy, of all boys, whose ridicule he had been dreading. Ben's gait was the hop-skip-and-jump—proof enough that his heart was light and his anticipations high. He was eating an apple,

30 and giving a long, melodious whoop, at intervals, followed by a deep-toned ding-dong-dong, ding-dong-dong, for he was personating a steamboat.

Tom went on whitewashing—paid no attention to the steamboat. Ben stared a moment

35 and then said: "Hi-Yi! You're up a stump, ain't you!"

No answer. Tom surveyed his last touch with the eye of an artist, then he gave his brush another gentle sweep and surveyed the result, as before.

40 Ben ranged up alongside of him. Tom's mouth watered for the apple, but he stuck to his work. Ben said:

"Hello, old chap, you got to work, hey?"

Tom wheeled suddenly and said:

45 "Why, it's you, Ben! I warn't noticing."

"Say—I'm going in a-swimming, I am. Don't you wish you could? But of course you'd druther

work—wouldn't you? Course you would!"

Tom contemplated the boy a bit, and said:

50 "What do you call work?"

"Why, ain't *that* work?"

Tom resumed his whitewashing, and answered carelessly:

55 "Well, maybe it is, and maybe it ain't. All I know, is, it suits Tom Sawyer."

"Oh come, now, you don't mean to let on that you *like* it?"

The brush continued to move.

60 "Like it? Well, I don't see why I oughtn't to like it. Does a boy get a chance to whitewash a fence every day?"

That put the thing in a new light. Ben stopped nibbling his apple. Tom swept his brush daintily back and forth—stepped back to note the effect—added a touch here and there—criticized the effect again—Ben watching every move and getting more and more interested, more and more absorbed. Presently he said:

"Say, Tom, let *me* whitewash a little."

70 Tom considered, was about to consent; but he altered his mind:

"No—no—I reckon it wouldn't hardly do, Ben. You see, Aunt Polly's awful particular about



75 this fence—right here on the street, you know—  
but if it was the back fence I wouldn't mind and  
*she* wouldn't. Yes, *she's* awful particular about  
this fence; it's got to be done very careful; I reckon  
there ain't one boy in a thousand, maybe two  
thousand, that can do it the way it's got to be  
80 done."

"No—is that so? Oh come, now—lemme just  
try. Only just a little—I'd let *you*, if you was me,  
Tom."

85 "Ben, I'd like to, honest injun; but Aunt  
Polly—well, Jim wanted to do it, but *she* wouldn't  
let him; Sid wanted to do it, and *she* wouldn't let  
Sid. Now don't you see how I'm fixed? If you was  
to tackle this fence and anything was to happen to  
it—"

90 "Oh, shucks, I'll be just as careful. Now  
lemme try. Say—I'll give you the core of my  
apple."

"Well, here—No, Ben, now don't. I'm  
afeard—"

95 "I'll give you *all* of it!"

Tom gave up the brush with reluctance in his  
face, but alacrity in his heart. And while the late  
steamer Big Missouri worked and sweated in the  
sun, the retired artist sat on a barrel in the shade  
100 close by, dangled his legs, munched his apple,  
and planned the slaughter of more innocents.

- As used in line 11, "operation" most nearly means
  - venture.
  - maneuver.
  - performance.
  - process.
- In paragraph 1 (lines 1–14), the narrator conveys Tom's attitude toward whitewashing the fence by
  - suggesting that Tom was unknowingly tricked into whitewashing the fence.
  - using hyperbole to highlight Tom's despair at the seeming enormity of the fence.
  - contrasting the simplicity of the task with Tom's relentlessly negative outlook.
  - comparing Tom to a reluctant hero embarking on a long journey.
- Which choice provides the best evidence for the answer to the previous question?
  - Lines 1–3 ("Saturday morning...with life.")
  - Lines 3–5 ("Tom appeared...a long-handled brush.")
  - Lines 7–9 ("Thirty yards...but a burden.")
  - Lines 9–11 ("Sighing, he dipped...did it again.")
- In context of the passage, paragraph 2 serves to
  - contrast Tom's generosity with the other boys' cruelty.
  - convey Tom's transformation from despondent to hopeful.
  - explain the origins of Tom's mental acuity.
  - provide justification for Tom's sorrow.
- In context of the passage, the author's statement, "Tom surveyed... as before," (lines 37–39) is meant to convey
  - the idea that Tom's artistic inclinations bleed into all aspects of his daily life.
  - Tom's earnest desire to impress Ben with his whitewashing skills.
  - Tom's enthusiasm for undertaking tasks with diligence and care.
  - Tom's level of commitment in his attempt to deceive Ben.
- Tom Sawyer first interests Ben in whitewashing by
  - comparing whitewashing to an activity that Ben enjoys.
  - offering Ben an apple in exchange for his help.
  - appealing to the novelty of the activity.
  - claiming that the activity is more fun than swimming.
- Tom mentions Aunt Polly (lines 71–89) primarily to
  - explain to Ben why he has so little time to play.
  - contrast her laziness with his diligence and determination.
  - suggest that whitewashing the fence correctly is extremely challenging.
  - imply that she will berate Ben if he does not help whitewash the fence.
- The relationship between Tom and Ben most closely resembles that between
  - a con man and his unsuspecting victim.
  - an artist and his wealthy patron.
  - a child and his disapproving father.
  - a detective and a criminal suspect.
- As used in line 97, "late" most nearly means
  - overdue.
  - recent.
  - tardy.
  - deceased.



10. Ben's impersonation of a steamboat and Tom's impersonation of an artist differ in that
- (A) Ben's act is skillful while Tom's is unconvincing.  
 (B) Ben's act is playful while Tom's is manipulative.  
 (C) Ben's act is harmless while Tom's is hurtful.  
 (D) Ben's act is offensive while Tom's is flattering.

Refer to the passage below to answer questions 11 – 21.

This passage is adapted from Lytton Strachey, *Queen Victoria*, originally published in 1921. Queen Victoria reigned in England from 1837 until her death in 1901. In 1897, countless celebrations were held across the British Empire to mark 60 years of Victoria's reign.

*line* The final years [of Victoria's reign] were years of apotheosis. In the dazzled imagination of her subjects Victoria soared aloft towards the regions of divinity through a nimbus of purest glory. Criticism fell dumb; deficiencies which, 5 twenty years earlier, would have been universally admitted, were now as universally ignored. That the nation's idol was a very incomplete representative of the nation was a circumstance that was hardly noticed, and yet it was 10 conspicuously true. For the vast changes which, out of the England of 1837, had produced the England of 1897, seemed scarcely to have touched the Queen...

15 But if the Queen and her epoch were profoundly separated, the points of contact between them also were not few. Victoria understood very well the meaning and the attractions of power and property, and in such 20 learning the English nation, too, had grown to be more and more proficient. During the last fifteen years of the reign, imperialism was the dominant creed of the country. It was Victoria's as well. In this direction, if in no other, she had allowed 25 her mind to develop. The British Dominions over the seas had come to mean much more to her than ever before, and, in particular, she had grown enamored of the East. The thought of India fascinated her; she set to, and learnt a little 30 Hindustani; she engaged some Indian servants, who became her inseparable attendants ... The imperialist temper of the nation invested her office with a new significance exactly harmonizing with her own inmost proclivities.

35 The English polity\* was in the main a common-sense structure, but there was always

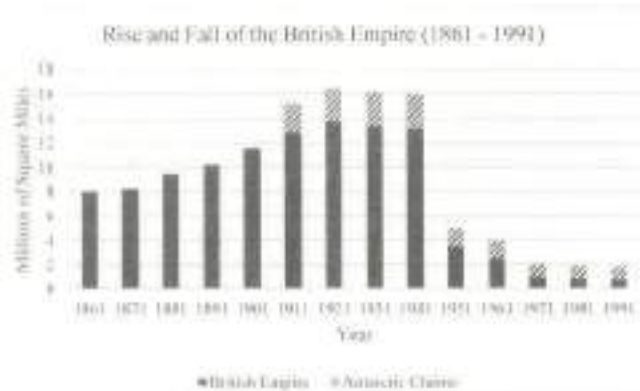
a corner in it where common-sense could not enter—where, somehow or other, the ordinary measurements were not applicable and the 40 ordinary rules did not apply. So our ancestors had laid it down, giving scope, in their wisdom, to that mystical element which, as it seems, can never quite be eradicated from the affairs of men. Naturally it was in the Crown that the mysticism 45 of the English polity was concentrated—the Crown, with its venerable antiquity, its sacred associations, its imposing spectacular array. But, for nearly two centuries, common-sense had been predominant in the great building, and 50 the little, unexplored, inexplicable corner had attracted small attention. Then, with the rise of imperialism, there was a change. For imperialism is a faith as well as a business; as it grew, the mysticism in English public life grew with it; and 55 simultaneously a new importance began to attach to the Crown. The need for a symbol—a symbol of England's might, of England's worth, of England's extraordinary and mysterious destiny—became felt more urgently than ever before. The Crown 60 was that symbol: and the Crown rested upon the head of Victoria. Thus it happened that while by the end of the reign the power of the sovereign had appreciably diminished, the prestige of the sovereign had enormously grown.

65 Yet this prestige was not merely the outcome of public changes; it was an intensely personal matter, too. Victoria was the Queen of England, the Empress of India, the quintessential pivot round which the whole magnificent machine 70 was revolving—but how much more besides! For one thing, she was of a great age—an almost indispensable qualification for popularity in England. She had given proof of one of the most admired characteristics of the race—persistent 75 vitality. She had reigned for sixty years, and she was not out. And then, she was a character. The outlines of her nature were firmly drawn, and, even through the mists which envelop royalty, clearly visible. In the popular imagination her 80 familiar figure filled, with satisfying ease, a distinct and memorable place.

In Victoria, [there was also] a peculiar sincerity. It was her sincerity which gave her at once her impressiveness, her charm, and her 85 absurdity. She moved through life with the imposing certitude of one to whom concealment was impossible—either towards her surroundings or towards herself. There she was, all of her—the Queen of England, complete and obvious; 90 the world might take her or leave her; she had nothing more to show, or to explain, or to modify; and, with her peerless carriage, she swept along her path.

\*polity: form of government





11. How does the phrase "dazzled imagination" in line 2 help establish the tone of the passage?
- (A) It explains how much the writer admires Queen Victoria.  
 (B) It suggests that the writer is critical of public opinion at the time.  
 (C) It conveys the writer's outrage at the queen.  
 (D) It alludes to the joyful public celebrations surrounding the later years of Victoria's reign.
12. The author suggests that an elderly Victoria
- (A) was pressured to live up to her role as an idol.  
 (B) overcame earlier deficiencies.  
 (C) suppressed criticism of herself or her reign.  
 (D) was widely regarded as a transcendent figure.
13. Which choice provides the best evidence for the previous question?
- (A) Lines 1 - 5 ("The final years...glory.")  
 (B) Lines 8 - 11 ("That the nation's...true.")  
 (C) Lines 17 - 21 ("Victoria understood... proficient.")  
 (D) Lines 31 - 34 ("The imperialist... proclivities.")
14. In lines 22 - 23, the statement "imperialism was the dominant creed of the country" implies that
- (A) nearly everyone in England believed that England should expand its territory.  
 (B) religious institutions included imperialistic ideas in their worship.  
 (C) most English people assumed that there was global respect for the British queen.  
 (D) British people at the time often had to swear to uphold imperialistic beliefs.
15. The author's description of Victoria's fascination with the East (lines 27 - 31) is ironic because she
- (A) showed almost no interest in the West.  
 (B) learned only Hindustani, not other languages.  
 (C) chose Indians as servants, not as friends.  
 (D) became interested once she was too old to travel.
16. As used in line 33, "office" most nearly means
- (A) workplace.  
 (B) agency.  
 (C) position.  
 (D) duty.
17. In lines 37 and 49, the author's use of a "corner" serves as a
- (A) reference to the partnership of the British parliament and prime minister.  
 (B) metaphor for the British public's occasional tendency to be irrational.  
 (C) figurative "place" for British society to express religious beliefs.  
 (D) mental image of the shift in the public's view of the monarchy during Victoria's reign.
18. As used in line 40, "scope" most nearly means
- (A) freedom.  
 (B) limits.  
 (C) vision.  
 (D) reach.
19. Which implicit point about the end of Victoria's reign in the early 20th century is explicit in the graph?
- (A) The British took control of more undeveloped nations each year.  
 (B) Great Britain conquered many lands in the East, including India and Hong Kong.  
 (C) England already occupied vast lands and was adding to them.  
 (D) The British government's expansionist policies caused the British Empire to spread.





20. The passage identifies which of the following as an important factor of Victoria's ultimate popularity?
- (A) Victoria's decades of serving the British public with great transparency  
 (B) Britain's pride that Victoria was named Empress of India as well  
 (C) belated public appreciation of Victoria's humility and confidence  
 (D) the British public's desire to justify Britain's domineering behavior abroad
21. Which choice provides the best evidence for the answer to the previous question?
- (A) Line 24 – 25 ("In this direction...develop.")  
 (B) Lines 55 – 58 ("The need...before.")  
 (C) Lines 66 – 69 ("Victoria was...besides!")  
 (D) Lines 84 – 87 ("She moved...herself.")

Refer to the passage below to answer questions 22 – 31.

This passage is adapted from Charles Darwin, *On the Origin of Species*, originally published 1859. The book laid the foundation for the study of evolutionary biology.

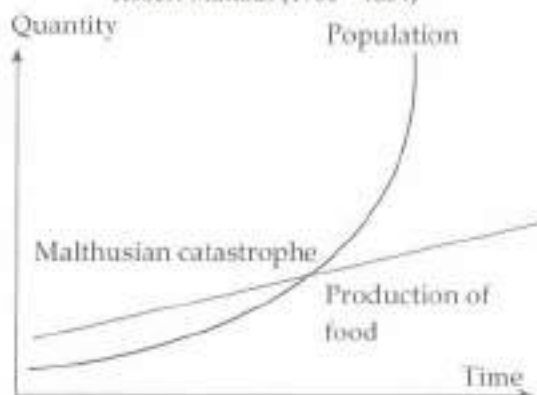
I should premise that I use the term Struggle for Existence in a large and metaphorical sense, including dependence of one being on another, and including (which is more important) not only the life of the individual, but success in leaving progeny. Two canine animals in a time of dearth, may be truly said to struggle with each other which shall get food and live. But a plant on the edge of a desert is said to struggle for life against the drought, though more properly it should be said to be dependent on the moisture. A plant which annually produces a thousand seeds, of which on an average only one comes to maturity, may be more truly said to struggle with the plants of the same and other kinds which already clothe the ground. The mistletoe is dependent on the apple and a few other trees, but can only in a far-fetched sense be said to struggle with these trees, for if too many of these parasites grow on the same tree, it will languish and die. But several seedling mistletoes, growing close together on the same branch, may more truly be said to struggle with each other. As the mistletoe is disseminated by birds, its existence depends on birds; and it may metaphorically be said to struggle with other fruit-bearing plants, in order to tempt birds to devour and thus disseminate its seeds rather than those of other plants. In these several senses, which pass into each other, I use for convenience

sake the general term of struggle for existence.

A struggle for existence inevitably follows from the high rate at which all organic beings tend to increase. Every being, which during its natural lifetime produces several eggs or seeds, must suffer destruction during some period of its life, and during some season or occasional year, otherwise, on the principle of geometrical increase, its numbers would quickly become so inordinately great that no country could support the product. Hence, as more individuals are produced than can possibly survive, there must in every case be a struggle for existence, either one individual with another of the same species, or with the individuals of distinct species, or with the physical conditions of life. It is the doctrine of Malthus applied with manifold force to the whole animal and vegetable kingdoms; for in this case there can be no artificial increase of food, and no prudential restraint from marriage. Although some species may be now increasing, more or less rapidly, in numbers, all cannot do so, for the world would not hold them.

It is good thus to try in our imagination to give any form some advantage over another. Probably in no single instance should we know what to do, so as to succeed. It will convince us of our ignorance on the mutual relations of all organic beings; a conviction as necessary, as it seems to be difficult to acquire. All that we can do, is to keep steadily in mind that each organic being is striving to increase at a geometrical ratio; that each at some period of its life, during some season of the year, during each generation or at intervals, has to struggle for life, and to suffer great destruction. When we reflect on this struggle, we may console ourselves with the full belief, that the war of nature is not incessant, that no fear is felt, that death is generally prompt, and that the vigorous, the healthy, and the happy survive and multiply.

Theory of Human Population Growth by Thomas Robert Malthus (1766 – 1834)



22. The statement in lines 6–8 (“Two canine... live”) sets up a contrast in the remainder of the paragraph between
- (A) competing for food and depending on other species.
  - (B) struggling for individual existence and struggling for success of one’s offspring.
  - (C) struggling against environmental factors and struggling against other organisms.
  - (D) actually fighting over food and a wider definition of the struggle for existence.
23. As used in line 2, the word “sense” most nearly means
- (A) feeling.
  - (B) wisdom.
  - (C) meaning.
  - (D) perception.
24. Darwin’s central claim in the passage is that
- (A) every living organism is engaged in a struggle for existence.
  - (B) understanding an organism’s struggle for existence is impossible.
  - (C) all organisms are part of a web of dependence.
  - (D) people should be careful to reproduce only in accordance with the food supply.
25. Which choice provides the best evidence for the answer to the previous question?
- (A) Lines 11–16 (“A plant which...ground.”)
  - (B) Lines 23–28 (“As the mistletoe...plants.”)
  - (C) Lines 40–45 (“Hence, as more...life.”)
  - (D) Lines 45–49 (“It is the...marriage.”)
26. Which statement about the struggle for existence is best supported by the graph?
- (A) Lines 1–6 (“I should premise...progeny.”)
  - (B) Lines 6–8 (“Two canine...live.”)
  - (C) Lines 28–30 (“In these several...existence.”)
  - (D) Lines 33–40 (“Every being...product.”)
27. Darwin mentions Malthus primarily to
- (A) argue that Malthus was wrong about animals and plants.
  - (B) adapt Malthus’s theory to non-human organisms.
  - (C) persuade the reader to accept Malthus’s conclusions.
  - (D) claim that increased food production would benefit all species.
28. As used in line 48, “artificial” most nearly means
- (A) fake.
  - (B) cultivated.
  - (C) imitation.
  - (D) dishonest.
29. In paragraph 3 (lines 52–70), Darwin’s stance could best be described as
- (A) an advocate seeking supporters for a policy.
  - (B) an expert attempting to simplify sophisticated concepts.
  - (C) a teacher advising persistence and humility.
  - (D) an environmentalist encouraging like-minded readers.
30. What is Darwin’s main point about mutual relations of organic beings?
- (A) We can comprehend them, but not fully.
  - (B) We must respect and protect them.
  - (C) We should think of ourselves as part of the system of mutual relations.
  - (D) We ought to double our efforts to study them.
31. The three-part structure of the passage most closely resembles which of the following?
- (A) Thesis-Evidence-Consequence
  - (B) Question-Answer-Discussion
  - (C) Argument-Counterargument-Synthesis
  - (D) Definition-Explanation-Commentary



Refer to the passage below to answer questions 32 – 42.

Passage 1 is adapted from Patrick Henry's speech to the Second Virginia Convention in 1775. Virginia was one of 13 British colonies in America; the colonies were debating whether to enter an armed struggle for independence from British control. Passage 2 is adapted from an 1811 speech by Tecumseh, a Shawnee Indian leader from the Northeast. After seeing his own territory overtaken by American colonists, he tried to unite all Native Americans in armed resistance. The following is from a speech he gave in Mississippi to members of the Choctaw and Chickasaw tribes.

### Passage 1

line Mr. President,

...Sir, we have done everything that could be done, to avert the storm which is now coming on. We have petitioned; we have remonstrated; we have supplicated... In vain, after these things, may we indulge the fond hope of peace and reconciliation. There is no longer any room for hope. If we wish to be free, if we mean to preserve inviolate those inestimable privileges for which we have been so long contending, if we mean not basely to abandon the noble struggle in which we have been so long engaged, and which we have pledged ourselves never to abandon until the glorious object of our contest shall be obtained, we must fight! I repeat it, sir, we must fight! An appeal to arms and to the God of Hosts is all that is left us!

They tell us, sir, that we are weak; unable to cope with so formidable an adversary. But when shall we be stronger? Will it be the next week, or the next year? Will it be when we are totally disarmed, and when a British guard shall be stationed in every house?... The battle, sir, is not to the strong alone; it is to the vigilant, the active, the brave.... There is no retreat but in submission and slavery! Our chains are forged! Their clanking may be heard on the plains of Boston! The war is inevitable and let it come! I repeat it, sir, let it come.

It is in vain, sir, to extenuate the matter. Gentlemen may cry, Peace, Peace but there is no peace. The war is actually begun! The next gale that sweeps from the north will bring to our ears the clash of resounding arms! Our brethren are already in the field! Why stand we here idle? What is it that gentlemen wish? What would they have? Is life so dear, or peace so sweet, as to be purchased at the price of chains and slavery? Forbid it, Almighty God! I know not what course others may take; but as for me, give me liberty or give me death.

### Passage 2

...The whites are already nearly a match for us all united, and too strong for any one tribe alone to resist; so that unless we support one another with our collective and united forces; unless every tribe unanimously combines to give check to the ambition and avarice of the whites, they will soon conquer us apart and disunited, and we will be driven away from our native country and scattered as autumnal leaves before the wind.

But have we not courage enough remaining to defend our country and maintain our ancient independence? Will we calmly suffer the white intruders and tyrants to enslave us?... The annihilation of our race is at hand unless we unite in one common cause against the common foe. Think not, brave Choctaws and Chickasaws, that you can remain passive and indifferent to the common danger, and thus escape the common fate. Your people, too, will soon be as falling leaves and scattering clouds before their blighting breath. You, too, will be driven away from your native land and ancient domains as leaves are driven before the wintry storms.

Sleep not longer, O Choctaws and Chickasaws, in false security and delusive hopes. Our broad domains are fast escaping from our grasp. Every year our white intruders become more greedy, exacting, oppressive and overbearing.... Before the palefaces\* came among us, we enjoyed the happiness of unbounded freedom, and were acquainted with neither riches, wants, nor oppression. How is it now? Wants and oppression are our lot; for are we not controlled in everything, and dare we move without asking, by your leave? Are we not being stripped day by day of the little that remains of our ancient liberty? Do they not even kick and strike us as they do their blackfaces? How long will it be before they will tie us to a post and whip us, and make us work for them in their cornfields as they do them? Shall we wait for that moment or shall we die fighting before submitting to such ignominy?

\* palefaces: people of European ancestry

\* by your leave: with your permission

\* blackfaces: people of African ancestry



32. Passage 1 strongly suggests that, given circumstances in the American colonies at the time,
- (A) expecting a peaceful solution would be wishful thinking.
  - (B) a standoff might be possible unless Americans are disarmed.
  - (C) the British governors are probably ready to negotiate seriously.
  - (D) Virginians should focus on the goal of building a strong Virginia.
33. Which choice provides the best evidence for the answer to the previous question?
- (A) Lines 4–5 (“We have...supplicated.”)
  - (B) Lines 5–7 (“In vain...reconciliation.”)
  - (C) Lines 8–10 (“If we wish...contending.”)
  - (D) Lines 21–23 (“Will it be...house?”)
34. As used in line 14, “object” most nearly means
- (A) recipient.
  - (B) item.
  - (C) goal.
  - (D) protest.
35. In line 26, Henry uses the phrase “Our chains are forged!” primarily to
- (A) allude to the work of making weapons to fight the British.
  - (B) argue that the colonists are already doomed.
  - (C) encourage a debate in Virginia about whether to own slaves.
  - (D) suggest that complete political oppression is imminent.
36. Tecumseh’s metaphor of autumn leaves blown by wind (lines 49–51) primarily conveys the idea that
- (A) European people will destroy vital plants and animals.
  - (B) native people will be forcibly detached from communities.
  - (C) his listeners’ dreams for a better life will be crushed.
  - (D) everyone involved will be unable to exercise self-restraint.
37. Tecumseh strongly suggests in Passage 2 that, for native tribes,
- (A) preparing to defend their own territories is paramount.
  - (B) a natural strategy would be identifying with African American slaves.
  - (C) retaining each tribe’s unique culture is a major concern.
  - (D) overcoming their differences is crucial for their survival.
38. Which choice provides the best evidence for the answer to the previous question?
- (A) Lines 55–57 (“The annihilation...foe.”)
  - (B) Lines 58–61 (“Think not...fate.”)
  - (C) Line 68–69 (“Our broad...grasp.”)
  - (D) Lines 79–80 (“Do they not...blackfaces?”)
39. As used in line 74, the word “wants” most nearly means
- (A) wishes.
  - (B) privations.
  - (C) interests.
  - (D) objectives.
40. In Passage 2, does Tecumseh base his pro-war argument on the same premise as Patrick Henry does in Passage 1?
- (A) Yes, because both refer to their frustration with ineffective written and verbal protests.
  - (B) Yes, because both predict that courage and vigilance can overcome a stronger enemy.
  - (C) No, because unlike Henry, Tecumseh claims that the war has already begun.
  - (D) No, because unlike Henry, Tecumseh warns of the complete loss of communities.
41. One difference between the two speakers’ arguments in the passages is that
- (A) Tecumseh describes his own experiences in battle.
  - (B) Henry claims he is ready to die for the cause.
  - (C) Henry supports unifying the rebels.
  - (D) Tecumseh warns about literal slavery.
42. Passages 1 and 2 both feature which component?
- (A) Evidence in terms of facts and figures
  - (B) A rhetorical question about dying
  - (C) A reference to past heroes who prevailed against all odds
  - (D) A narrative account of a person’s suffering



Refer to the passage below to answer questions 43 – 52.

This passage is adapted from Monte Basgall, "A smashing success," 2014 by the Krell Institute. The passage primarily discusses the acquisition and analysis of data from particle colliders, which guide groups of particles into near-light-speed collisions. These collisions can reveal even smaller particles, many of which can only be observed during particle collisions.

In 2012, as a worldwide collaboration of physicists labored to assemble findings that would spawn global headlines, 33 computational scientists at Brookhaven National Laboratory were working equally long and tense hours to keep many of those particle hunters supplied with constantly updated information.

"Those were probably the most exciting moments of my professional career, and this was true for many other people working in computing," recalls Michael Ernst about his group's role in the discovery of the Higgs boson. Ernst directs the RHIC and ATLAS Computing Facility (RACF) at Brookhaven, which has served as a key data hub for two massive particle accelerators making landmark findings in physics.

"It was essential for everybody directly involved in the analysis to have immediate access to the data. Everybody was committed to resolving problems, regardless of what the hour. Whenever something was not going as projected there were automatic alarms, and people got out of their beds to solve these problems immediately."

Since 2000, RHIC – for Relativistic Heavy Ion Collider – has pushed gold ions to near-light speeds around a 2.4-mile racetrack at Brookhaven, colliding them at energies of up to 500 billion electron volts (GeV). That high-energy crash is thought to free an optimal number of quarks from their normal bondage to gluons, something theoreticians say last happened 100 millionths of a second after the Big Bang.

Researchers anticipated the collisions would result in intensely hot gaseous plasmas of quarks and gluons. But RHIC experiments are instead showing these extreme conditions create a perfect liquid – a substance that flows with virtually no viscosity.

The RHIC, in essence, is a time machine. So is the Large Hadron Collider (LHC), a 17-mile track at the French-Swiss border. At intervals since 2008, the LHC has smashed together beams of protons at energy levels of up to 8 trillion electron volts (TeV). Theoretically, that can recreate other kinds of physics from just after the Big Bang.

The LHC's most notable finding to date is the apparent discovery of the last major fundamental particle needed to complete the Standard Model dictated by quantum mechanics. Theoreticians say

the Higgs boson beget the mass in most states of matter.

The Tevatron, a 4-mile, 1 TeV proton-and-antiproton smasher at the Fermi National Accelerator Laboratory (Fermilab) near Batavia, Illinois, narrowed down the Higgs search before closing in 2011. That quest then refocused at the higher-energy LHC. Meanwhile, both Fermilab and Brookhaven took on major roles in the European-based mission.

Seeking particles and states of matter that don't exist in today's world are needles-in-haystacks challenges that demand careful sifting through the many fragments from ferocious matter smashing.

The Higgs challenge has confronted about 6,000 scientists from 38 nations with byproducts from 600 million proton-proton collisions per second, reports CERN, the laboratory that hosts the LHC. Only one of each trillion such bust-ups would likely create a Higgs, Brookhaven experts say. Caught outside its time zone, each candidate Higgs would instantly decay, in as many as a dozen ways, into other detectable particles.

RHIC's gold-gold ion smashups, meanwhile, occur thousands of times a second to generate many more fragments for more than 1,000 other investigators in the U.S. and abroad to analyze.

These two divergent experiments pose another set of challenges for the information scientists at Ernst's RACF. Besides managing megadata for all RHIC collaborators, Brookhaven and Fermilab also agreed to split the more imposing information management duties for all U.S. collaborators in the LHC.

That means RACF serves about 600 Americans who analyze fragments logged by the LHC's huge ATLAS particle detector. Fermilab supplies an equal number using LHC's other detector, called CMS.

RACF is among about 140 data centers sharing the LHC's information-handling duties via a high-speed global fiber optic data grid. PanDA, a special workload management system for ATLAS that draws on disk storage, processors and enabling software, ensures that all of that detector's researchers receive whatever data they need, regardless of where they're working.

"I think it's fair to say that all these resources combined form a worldwide distributed supercomputer," Ernst says.



43. Over the course of the passage, the focus of the article shifts from
- (A) the benefits of experimentation to the costs of experimentation.
  - (B) the production of data to the analysis of data.
  - (C) developments in the United States to developments in Europe.
  - (D) historic notions of the genesis of the universe to contemporary developments.
44. As used in line 16, "landmark" most nearly means
- (A) geographic.
  - (B) visible.
  - (C) inspiring.
  - (D) seminal.
45. Based on Ernst's description in lines 18 – 25, the atmosphere at the RACF facility is best described as
- (A) pressing and collaborative.
  - (B) frantic and competitive.
  - (C) frustrated and aggressive.
  - (D) open and forgiving.
46. In paragraph 4 (lines 26 – 34), the author mentions "near-light speeds," "energies of up to 500 billion electron volts," and "100 millionths of a second" primarily to
- (A) provide the reader with the sense of the magnitude of the endeavor.
  - (B) convince the reader of the wastefulness of the experimental procedures.
  - (C) intimidate the reader with difficult concepts.
  - (D) encourage the reader to reach out to laboratories and get involved.
47. In paragraph 6 (lines 41 – 47), the author refers to the RHIC and the LHC as time machines primarily to convey the idea that
- (A) they challenge traditional concepts of time and space.
  - (B) they were first envisioned by science-fiction writers.
  - (C) they allow us to study the origins of the universe.
  - (D) they provide glimpses of processes that have not yet occurred.
48. Which choice provides the best evidence for the answer to the previous question?
- (A) Lines 30 – 34 ("That high-energy crash...Big Bang.")
  - (B) Lines 37 – 40 ("But RHIC experiments...no viscosity.")
  - (C) Lines 62 – 66 ("Seeking particles and...matter smashing.")
  - (D) Lines 67 – 71 ("The Higgs challenge...the LHC.")
49. According to the passage, the RHIC and LHC produce collisions of
- (A) ions and protons, respectively.
  - (B) gluons and quarks, respectively.
  - (C) antiprotons and protons, respectively.
  - (D) ions and neutral atoms, respectively.
50. In the context of the passage, the author's use of the phrase "needles-in-haystacks" (lines 63 – 64) is primarily meant to convey the
- (A) difficulty and laboriousness of the scientists' task.
  - (B) mathematical impossibility of the search.
  - (C) necessity of collaboration in science.
  - (D) smallness of the Higgs boson compared to an atom or ion.
51. The passage most strongly suggests which of the following about the Higgs boson?
- (A) It does not actually exist.
  - (B) It has sparked much controversy among scientists.
  - (C) Its existence has been suspected since antiquity.
  - (D) It can only be identified indirectly.
52. Which choice provides the best evidence for the answer to the previous question?
- (A) Lines 8 – 12 ("Those were probably...Higgs boson.")
  - (B) Lines 46 – 47 ("Theoretically, that can...Big Bang.")
  - (C) Lines 48 – 51 ("The LHC's most...quantum mechanics.")
  - (D) Lines 62 – 66 ("Seeking particles and...matter smashing.")



# Writing and Language Test 2



35 MINUTES, 44 QUESTIONS

Turn to Section 2 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each of the following passages is accompanied by approximately 11 questions. Some questions will require you to revise the passages in order to improve coherence and clarity. Other questions will require you to correct grammatical errors in the passages. Passages may be accompanied by graphs, charts, or tables that you must consider when making revisions. For most questions, you may select the "NO CHANGE" option if you believe that portion of the passage is clear, concise, and grammatically correct as is.

Within the passages, highlighted numbers followed by underlined text indicate which part of the text corresponds with each question. Bracketed numbers [1] indicate sentence number. These bracketed numbers are only relevant to problems that require you to add or rearrange sentences in a paragraph.

Refer to the passage below to answer questions 1 – 11.

## Audiologist

A young man experiences a sudden bout of vertigo. A girl needs to be fitted for a hearing aid. A hearing-impaired child learns to communicate using sign language. In each of these cases, an audiologist provides an assessment, a diagnosis, and a treatment plan.

Audiologists use audiometers, computers, and other devices to test **1** patient's hearing abilities and balance. They also use equipment to determine the extent of hearing damage and identify the **2** underscoring cause. Audiologists measure the volume at which a person begins to hear sounds and the person's ability to distinguish between sounds. Treatments performed by audiologists include cleaning wax out of ear canals, fitting and checking hearing aids, and **3** a patient may receive cochlear implants to improve hearing. Cochlear implants are tiny devices that are placed under the skin near **4** the ear. Additionally, these cochlear implants deliver

- (A) NO CHANGE  
(B) patients  
(C) patients'  
(D) a patients
- (A) NO CHANGE  
(B) underlying  
(C) undermining  
(D) undergoing
- (A) NO CHANGE  
(B) they might also fit cochlear implants  
(C) cochlear implants that allow people to hear more clearly  
(D) fitting patients with cochlear implants to improve hearing
- (A) NO CHANGE  
(B) the ear by delivering  
(C) the ear; they deliver  
(D) the ear, and also they can deliver



electrical impulses directly to the auditory nerve in the brain, allowing people with certain types of deafness to hear.

[1] Audiologists also help patients suffering from vertigo or dizziness. [2] Some audiologists specialize in working with the elderly or with children. [3] Others design products to help protect the hearing of workers on the job. [4] Most audiologists work in healthcare facilities, such as hospitals, physicians' offices, and audiology clinics. [5] Some work in schools or for school districts and travel between facilities. **5**

In order to become an audiologist, a person must obtain a specialized doctoral degree and be licensed.

**6** A bachelor's degree is required to enter one of these programs. Graduate coursework for aspiring audiologists **7** include anatomy, physiology, physics, genetics, normal and abnormal communication development, diagnosis and treatment, pharmacology, and ethics. Graduate programs also include supervised clinical practice.

5. For the sake of the cohesion of paragraph 3, where should the following sentence be placed?

For instance, audiologists may try to relieve feelings of disorientation by recommending exercises involving head movement or positioning to patients.

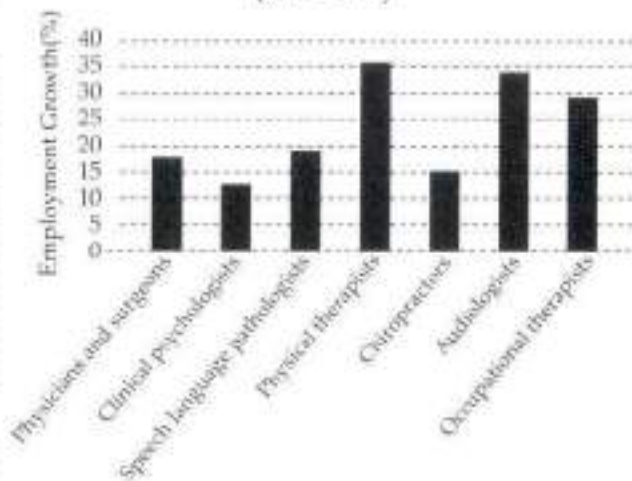
- (A) Before sentence 1  
 (B) After sentence 1  
 (C) After sentence 3  
 (D) After sentence 5
6. Which choice most logically follows the sentence that precedes **6**?
- (A) In fact, my father pursued a doctoral degree in audiology in the 1980s.  
 (B) The doctoral degree in audiology (Au.D.) is a graduate program that typically lasts four years.  
 (C) An audiologist's license may be revoked if he or she fails to adhere to a strict code of professionalism.  
 (D) However, the rising cost of tuition at many American universities makes getting a doctoral degree pricier now than ever before.
7. (A) NO CHANGE  
 (B) will include  
 (C) included  
 (D) includes





[1] Employment of audiologists is projected to grow 34 percent from 2012 to 2022, **8** as quickly as the projected growth of speech-language pathologists and chiropractors combined. [2] However, because **9** the occupational field is narrow, the rapid growth will result in only about 4,300 new jobs over the 10-year period. [3] An aging baby-boom population will continue to increase the demand for most healthcare services. [4] The increasingly early identification and diagnosis of hearing disorders in infants will also spur employment growth. [5] Hearing loss increases as **10** people age so an aging population is likely to increase demand for audiologists. **11**

Projected Employment Growth for Medical Professions  
(2012 - 2022)



Source: Bureau of Labor Statistics *Occupational Outlook Handbook*.

Passage Citation:  
Adapted from Bureau of Labor Statistics, U.S.  
Department of Labor, *Occupational Outlook Handbook*,  
2014-15 Edition, "Audiologists."

8. Which choice most effectively completes the sentence with relevant and accurate information based on the graph?
- (A) NO CHANGE  
(B) indicating that audiologists will soon earn as much as physical therapists  
(C) more quickly than other healthcare professions  
(D) with over 30 newly licensed audiologists entering the workforce each month
9. (A) NO CHANGE  
(B) of there being few audiologists  
(C) there are not a lot of audiologists  
(D) the occupation tends to be relatively small
10. (A) NO CHANGE  
(B) people age, so an aging population  
(C) people age, so, an aging population  
(D) people age so, an aging population
11. For the sake of the coherence of paragraph 5, where should sentence 4 be placed?
- (A) After sentence 1  
(B) After sentence 2  
(C) Where it is now  
(D) After sentence 5



Refer to the passage below to answer questions 12 – 22.

## Organic Chemistry

Humans practiced chemistry for centuries before **12** it has been recognized as a legitimate science. Early chemistry “experiments” included the fermentation of sugar into wine and **13** heated ashes and animal fat, which form soap. Both of these processes, as well as many others that helped support ancient civilizations, fall under a modern field of study called organic chemistry. Organic chemists study compounds (groups of elements) containing carbon and hydrogen; these compounds often contain other elements, including oxygen, nitrogen, **14** and also phosphorus.

The field is called *organic* chemistry because all living organisms are composed of various combinations of carbon compounds. And, much like the living organisms that they **15** constitute, carbon compounds are incredibly diverse. In fact, scientists have identified over 20 million carbon compounds—approximately 95 percent of all known compounds.

Carbon compounds come in so many varieties because carbon itself has several **16** puzzling properties. For one, carbon atoms can form strong bonds with other carbon atoms. In other words, a carbon atom can share some of its electrons with other carbon atoms, meaning the atoms can be “connected” to one another. Thus, carbon atoms will often bond with **17** them to form long “chains” of carbon. Moreover, carbon atoms can form four strong chemical bonds, more than most other elements. This allows organic compounds to form carbon chains with “branches,” which often incorporate the aforementioned elements hydrogen, oxygen, nitrogen, and phosphorus. Carbon’s ability to bond well with itself and with a variety of other elements **18** allows it to form the backbones of huge, complex compounds that **19** support life here on Earth.

12. (A) NO CHANGE  
(B) it was  
(C) they were  
(D) they have been
13. (A) NO CHANGE  
(B) the heating of ashes and animal fat into soap  
(C) ashes and animal fat heated into soap  
(D) soap made from heated ashes and animal fat
14. (A) NO CHANGE  
(B) and phosphorus, too  
(C) and phosphorus  
(D) and the element phosphorus
15. (A) NO CHANGE  
(B) establish  
(C) embody  
(D) initiate
16. (A) NO CHANGE  
(B) exceptional  
(C) unique  
(D) strange
17. (A) NO CHANGE  
(B) it  
(C) the others  
(D) one another
18. (A) NO CHANGE  
(B) allow  
(C) allowing  
(D) allowed
19. (A) NO CHANGE  
(B) support organisms that are alive  
(C) support living organisms, such as plants and animals  
(D) support life



**20** The simplest carbon compounds, called alkanes, are composed of relatively small groups of bonded carbon and hydrogen atoms. Because alkanes form from just carbon and hydrogen, they belong to a category of compounds called hydrocarbons. These compounds have many practical applications. Most hydrocarbons are highly combustible, so many of them are used as sources of **21** fuel, butane fuels many hand-held lighters, and propane powers some engines, stoves, and central heating systems. Nevertheless, of the 20 million known carbon compounds, only a tiny fraction serve as sources of fuel. The practical applications of carbon compounds are as **22** diverse and abundant as carbon compounds themselves.

20. Which choice provides the best transition between paragraphs 3 and 4?
- (A) However, not all carbon compounds are so complex.  
(B) Similarly, many carbon compounds are composed of thousands of individual atoms.  
(C) Scientists have discovered countless practical applications for carbon compounds.  
(D) As a result, the majority of chemists study organic chemistry.
21. (A) NO CHANGE  
(B) fuel: and butane  
(C) fuel, but butane  
(D) fuel; butane
22. (A) NO CHANGE  
(B) subtle and numerous  
(C) rare and mysterious  
(D) common and specialized



Refer to the passage below to answer questions 23 – 33.

## Borders

Modern people may hold the notion that prehistoric hunter-gatherers and semi-agricultural groups wandered freely. Actually, although humans migrated all over the world, many likely settled in certain areas for generations and came to consider these places their homes. Rivers, mountain ranges, forests, and other landmarks **23** would begin to delineate proprietary territory in the minds of humans who lived there. Researchers even suggest that many prehistoric border-crossing protocols strongly resembled those of today.

In his book *The World Until Yesterday*, Jared Diamond surveys **24** old-fashioned, small-scale societies that have remained relatively isolated since prehistoric times. These societies may provide a window into common human practices in the prehistoric world.

**25** In remote areas of Papua New Guinea, Diamond describes people who rarely travel. They may have friends and relatives among friendly neighboring tribes, so they may occasionally travel across a border for trade or feasting. However, if people do not know anyone in a particular area, they probably have no reason to go to that area except for warfare. In this context, seeing strangers trying to cross into a tribe's territory would be alarming.

[1] Traditional societies monitor borders for the same reason that modern nations set up immigration checkpoints at points of entry. [2] Immigration officers check travelers' passports to ensure that **26** they are not threats. Traditional cultural groups expect to recognize the people who enter their territories. [3] If they do not, they may instantly kill them, or they may allow the strangers to identify themselves in terms of tribe and kinship group. [4] Both passport checks and traditional peoples' screenings have the same **27** purpose: to admit only visitors who have good intentions. **28**

23. (A) NO CHANGE  
(B) would have begun  
(C) will begin  
(D) is beginning
24. (A) NO CHANGE  
(B) outdated  
(C) traditional  
(D) original
25. (A) NO CHANGE  
(B) Diamond describes many groups in his book, including tribes he visited in Papua New Guinea, who rarely travel.  
(C) Numerous groups are described by Diamond, including people in Papua New Guinea who do not travel often.  
(D) Rarely traveling is something that Diamond discusses, especially among remote groups from Papua New Guinea.
26. Which choice most effectively combines the sentences at the underlined portion?
- (A) they are not threats because traditional cultural groups  
(B) they are not threats, yet traditional cultural groups  
(C) they are not threats, if traditional cultural groups  
(D) they are not threats; similarly, traditional cultural groups
27. (A) NO CHANGE  
(B) purpose to admit  
(C) purpose; to admit  
(D) purpose. To admit
28. For the sake of the cohesion of paragraph 3, where should the following sentence be placed?  
In both cases, the objective is to learn the identity of each would-be visitor.
- (A) After sentence 1  
(B) After sentence 2  
(C) After sentence 3  
(D) After sentence 4



Among some traditional groups, even visitors who are recognized must seek special permission from a tribal chief. The visitors must explain their purposes, such as visiting relatives or gathering special medicinal plants. The modern equivalent is applying for a visa. Visas give visitors special permission to enter a territory for a specific purpose and a limited amount of time. **29** Visas can be difficult to acquire, so a person should apply for one several months before he or she intends to use it.

Free-travel regions also have equivalents **30** in both modern nations, plus traditional societies. **31** In 1995, a group of European nations established the Schengen, a zone within which citizens of all member nations can cross all borders freely. The goal is to improve the economies of all member nations by allowing people and goods to flow where needed. A comparable situation among traditional societies sometimes occurs when certain resources are **32** scarce. For example, a desert tribe may allow neighboring tribes to freely enter **33** its territory for water, knowing that at other times, the situation will be reversed. Both sides benefit from having an open-border agreement.

29. The writer is considering deleting the underlined sentence. Should the sentence be kept or deleted?
- (A) Kept, because it provides useful information on acquiring a visa.  
 (B) Kept, because it emphasizes the importance of visas in modern border-crossing practices.  
 (C) Deleted, because it undermines the importance of visas in prehistoric times.  
 (D) Deleted, because it shifts the paragraph's focus away from traditional border-crossing practices.
30. (A) NO CHANGE  
 (B) in both modern nations or traditional societies.  
 (C) in both modern nations, in addition to traditional societies.  
 (D) in both modern nations and traditional societies.
31. Which choice provides the most logical introduction to the sentence?
- (A) NO CHANGE  
 (B) For example, most nations in Europe have joined the *Schengen*,  
 (C) For this reason, many travelers praise the *Schengen*,  
 (D) DELETE the underlined portion and capitalize the first letter of the newly formed sentence
32. (A) NO CHANGE  
 (B) sporadic  
 (C) truncated  
 (D) void
33. (A) NO CHANGE  
 (B) their territory for water, knowing  
 (C) its territory for water knowing  
 (D) their territory for water knowing



Refer to the passage below to answer questions 34–44.

## Antoni Gaudí

Antoni Gaudí was a late-19th and early-20th century architect based in Barcelona, Spain whose work reveals an odd and extremely personal vision. His structures feature curves, color, and complexity. Critics have described some of his buildings as “warped” and “hideous,” but **34** they have also been praised as “vivid” and “splendid.” **35** Millions of visitors tour Gaudí structures annually, and the United Nations has declared seven of his creations to be World Heritage Sites.

[1] Gaudí was born in 1852 in a village near Barcelona, the capital of Spain’s Catalan region. [2] He spent much of his childhood observing the natural world around his home or watching his father, a coppersmith, at work. [3] As a child he was not able to play or go to school with other children because of painful rheumatism. [4] His health improved, yet he retained the passions formed in this quiet childhood—the passion for creating three-dimensional objects as his father had done—and for incorporating shapes from nature. **36**

As a young man, Gaudí moved to Barcelona and earned an architectural degree. His timing was fortunate because Barcelona **37** entered an era of affluence. **38** He designed a display cabinet for a glove factory, and the cabinet was shown at the 1878 Paris World Exhibition. Wealthy clients kept Gaudí busily employed. Soon he was designing and overseeing construction of prominent homes and apartment buildings. Given creative license by his patrons, he devised clever weight-bearing techniques, most notably the use of the parabola for ceilings. He made frequent use of ruled geometrical shapes, which are radiating straight lines that form curves, as in a hand-held fan. Employing the ruled shapes for curves and spirals in staircases, ramps, and balconies, **39** a natural look was achieved. For example, the façade of the Gaudí building La Pedrera resembles ocean waves.

34. (A) NO CHANGE  
(B) his buildings have also been praised  
(C) it is also legitimate to praise them  
(D) others have praised them
35. The writer is considering deleting the underlined sentence. Should the sentence be kept or deleted?  
(A) Kept, because it provides supporting evidence of Gaudí’s singular talent.  
(B) Kept, because it supplies information to clarify the rest of the passage.  
(C) Deleted, because it does not include explanations for the United Nations’ action.  
(D) Deleted, because it blurs the focus on Gaudí’s buildings.
36. For the sake of the cohesion of paragraph 2, sentence 3 should be placed  
(A) where it is now.  
(B) before sentence 1.  
(C) after sentence 1.  
(D) after sentence 4.
37. (A) NO CHANGE  
(B) is entering  
(C) was entering  
(D) would enter
38. The writer is considering deleting the underlined sentence. Should the sentence be kept or deleted?  
(A) Kept, because it describes an interesting contextual detail about Gaudí’s success.  
(B) Kept, because it explains the reason that Gaudí became an architect.  
(C) Deleted, because it fails to support the proposition that Gaudí quickly became a renowned architect.  
(D) Deleted, because it interferes with the paragraph’s focus on Gaudí’s opportunities in Barcelona.
39. (A) NO CHANGE  
(B) he achieved a natural look.  
(C) the structures achieved a natural look.  
(D) a natural look was achieved by Gaudí.



Gaudí's **40** principle gift was designing for practical considerations, such as light and ventilation. At the same time, he delighted in ornamentation. He added carefully crafted stained glass, ceramics, wood, stone, and wrought iron. He pioneered the creation of mosaics made from colorful shards of broken dishes. Each building is a personal statement; his style can be described as baroque or gothic, **41** but in many ways it defies classification. For example, his Casa Batlló has been nicknamed the "House of Bones" because of its bone-like window casements. The façade also features glass mosaics that reflect light. The roof curves like a dragon's back, and colorful chimneys **42** adorns it.

In 1926, while working on his masterpiece, the Sagrada Família cathedral, Gaudí died in a tram accident. The vast cultural impact of his work was not recognized at first. **43** Today, contemporary architects now make use of Gaudí-style curves and parabolas for space-age bridges and buildings. Gaudí's designs also influenced fine art. **44** He played a big role in the Art Nouveau movement, and Surrealist painter Salvador Dalí said he was influenced by Gaudí's buildings, as did Joan Miró.

40. (A) NO CHANGE  
(B) principal  
(C) princely  
(D) principled
41. (A) NO CHANGE  
(B) but remember, as mentioned above, it is always a personal statement for Gaudí.  
(C) but to be honest, no one can really say what style it is, it is just "Gaudism."  
(D) but a hallmark of Modernism is its emphasis on using symbols and representations that hold meaning for the individual artist.
42. (A) NO CHANGE  
(B) adorns them,  
(C) adorn it.  
(D) adorns it.
43. (A) NO CHANGE  
(B) Today's architecture now  
(C) Today: architects  
(D) Today, architects
44. (A) NO CHANGE  
(B) Surrealist painters Salvador Dalí and Joan Miró claimed him as an influence, and art critics consider him a major force in the Art Nouveau movement.  
(C) He helped form the Art Nouveau movement in fine art, and he helped Salvador Dalí and Joan Miró get their start as Surrealist painters.  
(D) He had a major impact on Art Nouveau fine art, and also on Surrealism, through the painter Salvador Dalí as well as Joan Miró.



# Math Test 2 – No Calculator



25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

## DIRECTIONS

For questions 1 – 15, find the solution to each problem and select the most appropriate answer from the choices provided. For questions 16 – 20, find the solution to each problem and write your answer in the space provided. You may use the blank space in your test booklet for scratch work.

## NOTES

1. The use of a calculator on any part of this section is forbidden.
2. Unless otherwise indicated, all variables and expressions used in this test represent real numbers.
3. Unless otherwise indicated, all figures used in this test are drawn to scale.
4. Unless otherwise indicated, all figures used in this test lie on a plane.
5. Unless specified otherwise, a given function,  $f$ , has the domain the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE



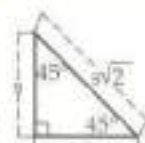
$$A = \frac{1}{2}bh$$



$$c^2 = a^2 + b^2$$



Special Right Triangles



$$A = \pi r^2$$

$$C = 2\pi r$$



$$A = lw$$



$$V = lwh$$



$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}lwh$$

The arc of a circle is 360 degrees or  $2\pi$  radians.

A triangle has angles that sum to 180 degrees.







1. James rents a car for  $x$  days. The rate is \$19.95 per day, which includes 20 miles of driving, and \$0.40 per mile for each additional mile. If James drives 30 miles per day for the duration of this period, which of the following represents the cost of the rental as a function of  $x$ ?

- (A)  $f(x) = (23.95)x$   
 (B)  $f(x) = (31.95)x$   
 (C)  $f(x) = (19.95)x + 4$   
 (D)  $f(x) = (39.95)x$

2. David and Peter are starting a lawn mowing service. They must buy a lawn mower for \$250 and plan to charge \$15 per lawn. Which of the following inequalities represents the number of lawns ( $l$ ) they need to mow to earn at least \$800 over the cost of the lawn mower?

- (A)  $l \leq 54$   
 (B)  $l \geq 54$   
 (C)  $l \leq 70$   
 (D)  $l \geq 70$

3. A car travels 125 miles at 60 miles per hour, and then a further 30 miles at 45 miles per hour. What is the total time for the trip?

- (A) 2 hours, 45 minutes  
 (B) 3 hours, 15 minutes  
 (C) 3 hours, 20 minutes  
 (D) 4 hours

4.

$$\begin{aligned} 3x + 2y &= -1 \\ 6x + 4y &= -2 \end{aligned}$$

The system of equations above represents two straight lines. What is true of these lines?

- (A) They meet at the origin.  
 (B) They never meet.  
 (C) They are perpendicular to each other.  
 (D) They are the same line.

5. A cellphone plan charges a \$2 monthly fee plus \$0.10 per minute of talk time. Which of the following functions represents the cost, in dollars, for a month in which  $m$  minutes of talk time are used?

- (A)  $C(m) = 10 + 2m$   
 (B)  $C(m) = 2 + 10m$   
 (C)  $C(m) = 0.1 + 2m$   
 (D)  $C(m) = 2 + 0.1m$

6. What is the value of  $a$  if  $(x + 2y)^2 + (x - y)^2 = 2ax + 5y^2$ ?

- (A) 1  
 (B)  $x$   
 (C)  $x + y$   
 (D)  $x - y$



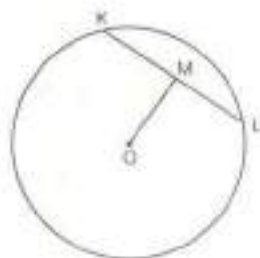
7. The sum of two numbers that differ by 3 is  $q$ . What is the smaller of the two numbers in terms of  $q$ ?

- (A)  $\frac{q}{2} - 1$   
 (B)  $\frac{q}{2}$   
 (C)  $\frac{q+3}{2}$   
 (D)  $\frac{q-3}{2}$

8. A sphere has a surface area of  $36\pi$  square centimeters. What is the volume of the sphere? (the formula for the surface area of a sphere is  $A = 4\pi r^2$ .)

- (A)  $27\pi \text{ cm}^3$   
 (B)  $36\pi \text{ cm}^3$   
 (C)  $54\pi \text{ cm}^3$   
 (D)  $72\pi \text{ cm}^3$

9.



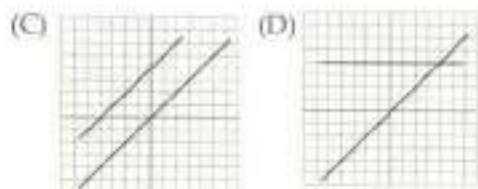
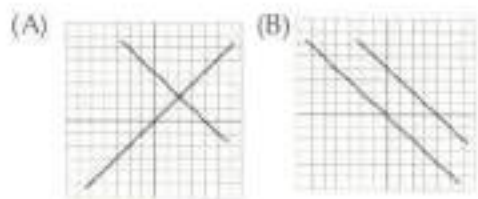
In the figure above,  $\overline{KL}$  is a chord of the circle centered at  $O$ , with  $\overline{KL} \perp \overline{MO}$ . If  $\overline{KL} = 12$  and  $\overline{MO} = 4$ , what is the area of the circle?

- (A)  $36\pi$   
 (B)  $48\pi$   
 (C)  $72\pi$   
 (D)  $96\pi$

10.

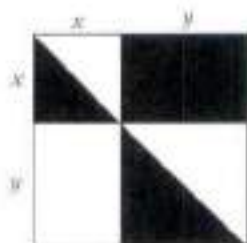
$$\begin{aligned}x + y &= 4 \\x - y &= 0\end{aligned}$$

Which of the following corresponds to the system of equations above?





11.



The large quadrilateral above is a square. What is the area of the shaded region in terms of  $x$  and  $y$ ?

- (A)  $\frac{x^2 + y^2}{2}$   
 (B)  $\frac{(x+y)^2}{2}$   
 (C)  $\frac{\sqrt{x^2 + y^2}}{2}$   
 (D)  $\frac{(x^2 + y^2)}{4}$

12. Water is poured from a full 1.5 L bottle into an empty glass until the glass and the bottle are  $\frac{3}{4}$  full. What is the volume of the glass?

- (A) 0.5 L  
 (B) 0.75 L  
 (C) 1.125 L  
 (D) 0.4 L

13. If  $\frac{a}{b} + \frac{a+2}{3b} = \frac{1}{4}$ , what is the value of  $a$  in terms

of  $b$ ?

- (A)  $\frac{b+4}{2}$   
 (B)  $\frac{3b+2}{4}$   
 (C)  $\frac{3b-2}{4}$   
 (D)  $\frac{3b-8}{16}$

14. A car travels 180 km from A to B at 60 km/h and returns from B to A along the same route at 90 km/h. What is the average speed in kilometers per hour for the round trip?

- (A) 72  
 (B) 75  
 (C) 78  
 (D) 81

15. If  $\frac{a^2 + 2ab + b^2}{a^2 - b^2} = 2(a + b)$ , what is the value of  $a - b$ ?

- (A) 1  
 (B)  $-\frac{1}{2}$   
 (C) 2  
 (D)  $\frac{1}{2}$





**DIRECTIONS**

For questions 16 – 20, find the solution to the problem and enter your answer as demonstrated below.

1. Only the answer that is bubbled in on the answer sheet will be credited. The blank spaces above the bubbles are for you to record your answers for accuracy.
2. Only fill in one bubble in any given column.
3. None of the answers on this portion of the test are negative values.
4. If a problem appears to have more than one answer, only enter one answer. If the answer you enter is one of the correct solutions, you will receive full credit for that question.
5. If the correct answer can be expressed as a mixed number, it must be entered as a decimal or an improper fraction.
6. If the correct answer is a decimal that cannot fit into the grid space, you must fill the grid with enough digits to completely fill the space. The number can be rounded or simply shortened but must fill every blank space.

Write answer → in boxes.

Answer:  $\frac{5}{36}$       Answer: 4.5

Grid in result.

← Fraction line  
← Decimal point

	5	/	3	6			4	.	5
	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Acceptable ways to grid  $\frac{1}{6}$  are:

		1	/	6			.	1	6	6			.	1	6	7
	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

Answer: 302 – either position is correct

		3	0	2			3	0	2
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
3	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

**NOTES**

Begin entering answers in any column that accommodates your answer. If you do not need a column do not enter anything in that column.





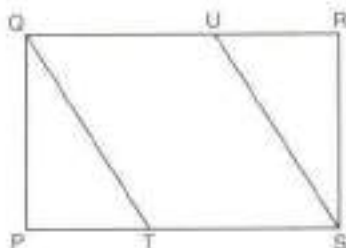
16. If  $x^2 + 7x - 33 = 11$ , and  $x > 0$ , what is the value of  $x + 11$ ?

ANSWER: \_\_\_\_\_

17. Eight men working together can build a house in 12 days. How many days would it take six men working together to build the same house?

ANSWER: \_\_\_\_\_

18.



Note: Figure not drawn to scale

$PQRS$  is a rectangle. The length of  $\overline{QR}$  is 15, the length of  $\overline{QU}$  is 10, and the length of  $\overline{SU}$  is 13. What is the area of parallelogram  $QUST$ ?

ANSWER: \_\_\_\_\_

19.  $2x^2 + 5x - 25 = 0$   
If  $p$  and  $q$  are solutions to the equation above, and  $p < q$ , what is the value of  $\frac{p^2}{q}$ ?

ANSWER: \_\_\_\_\_

20. If  $f(n-1) = 13 + 4n$  for all values of  $n$ , what is the value of  $f(3)$ ?

ANSWER: \_\_\_\_\_





# Math Test 2 – Calculator



55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

## DIRECTIONS

For questions 1 – 30, find the solution to each problem and select the most appropriate answer from the choices provided. For questions 31 – 38, find the solution to each problem and write your answer in the space provided. You may use the blank space in your test booklet for scratch work.

## NOTES

1. The use of a calculator on any part of this section is allowed.
2. Unless otherwise indicated, all variables and expressions used in this test represent real numbers.
3. Unless otherwise indicated, all figures used in this test are drawn to scale.
4. Unless otherwise indicated, all figures used in this test lie on a plane.
5. Unless specified otherwise, a given function,  $f$ , has the domain the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE



$$A = \frac{1}{2}bh$$



$$c^2 = a^2 + b^2$$



Special Right Triangles



$$A = \pi r^2$$

$$C = 2\pi r$$



$$A = lw$$



$$V = lwh$$



$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}lwh$$

The arc of a circle is 360 degrees or  $2\pi$  radians.

A triangle has angles that sum to 180 degrees.



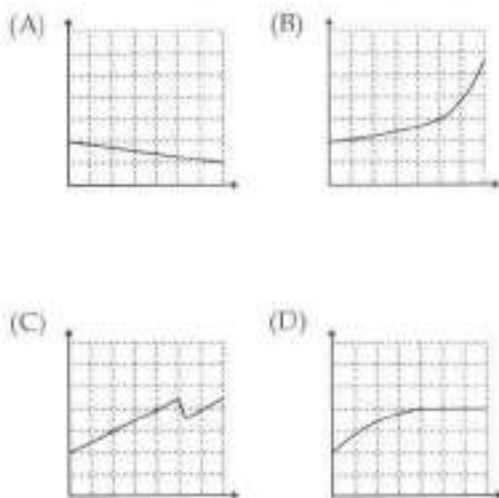


1. There are 200 pieces of cookie in a bag, 15% of which are wrapped. If 80% of the pieces of cookie are oatmeal, what is the smallest number of wrapped oatmeal pieces that could be in the bag?
- (A) 0  
(B) 15  
(C) 25  
(D) 55
3. If each of Ellen's 8 deposits was for \$200, and her withdrawal was for \$350, how much money did she have in her account after 8 months?
- (A) \$850  
(B) \$1,550  
(C) \$2,250  
(D) \$2,350

Questions 2 and 3 refer to the following information.

Ellen opened a savings account with an initial balance of \$1,000. For the next 8 months, she made one deposit per month, always for the same amount. During that time, she made just one withdrawal.

2. Which of the following graphs accurately describes those transactions over an 8-month period?



4. A clown at an amusement park makes animals from balloons. She sells each animal based on the number of balloons it requires, according to the following chart:

# of Balloons	1	2	3	4	5
Price	\$4.00	\$4.50	\$5.00	\$5.50	\$6.00

What is the price, in dollars, of an animal that takes  $x$  balloons to make?

- (A)  $x$   
(B)  $x + 4$   
(C)  $0.5x + 4$   
(D)  $0.5x + 3.5$
5. The value of a house increased from \$2.0 million to \$2.6 million. What was the percent increase in value?
- (A) 15%  
(B) 30%  
(C) 40%  
(D) 50%





6. A bag contains six marbles: two red, one yellow, and three blue. What is the probability of randomly selecting two red marbles in a row, assuming the marbles are not put back in the bag after being drawn?
- (A)  $\frac{1}{15}$   
(B)  $\frac{2}{15}$   
(C)  $\frac{1}{10}$   
(D)  $\frac{1}{10}$
7. For a set of eleven different rational numbers, which of the following CANNOT affect the value of the median?
- (A) Doubling each number  
(B) Increasing each number by 10  
(C) Increasing the smallest number only  
(D) Increasing the largest number only
8. Which of the following equations represents the line with the same  $x$ -intercept as the line with the equation  $y = 2x - 5$ ?
- (A)  $y = \frac{1}{2}x + 10$   
(B)  $y = \frac{1}{3}x + \frac{10}{3}$   
(C)  $y = -\frac{2}{3}x + 5$   
(D)  $y = -\frac{2}{3}x + \frac{5}{3}$
9. Rhodopsinol is a new drug designed to treat sleepwalking, and has a half-life of two hours. It is produced in 500mg tablets. If 40% of the orally ingested drug is absorbed into the bloodstream, which of the following functions gives the amount of Rhodopsinol in the bloodstream, in milligrams,  $t$  hours after the ingestion of a single tablet?
- (A)  $f(t) = (400)(0.5)^{2t}$   
(B)  $f(t) = (0.4)(500)(0.5)^{\frac{t}{2}}$   
(C)  $f(t) = (0.4)(500)(0.5)^t$   
(D)  $f(t) = (400)(0.5)^{2t}$
10. Paris and Genevieve are waiting in line to buy tacos. It's Tuesday, and the taqueria has a Taco Tuesday special: all tacos are 50% off. Fish tacos normally sell for \$2.50 each, and beef and chicken tacos are normally \$1.50. They need exactly 16 tacos, and cannot spend more than \$15. What is the most they can spend on fish tacos?
- (A) \$6  
(B) \$7.50  
(C) \$10  
(D) \$15



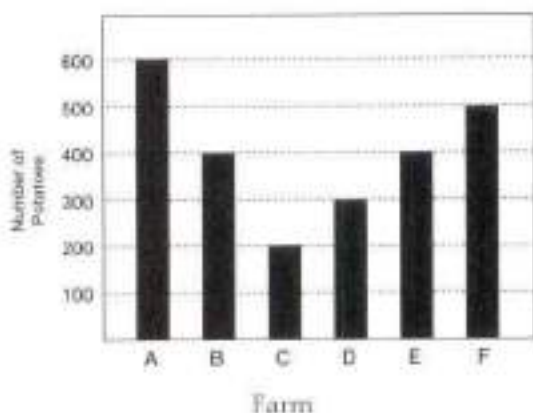




11. A chemistry student has a 25% solution of acetic acid and a 55% solution of sodium bicarbonate, a base. How much of each solution does the student need to make a 120 milliliters (mL) solution with equal parts acid and base?

- (A) 82.5mL of the 25% solution, 37.5mL of the 55% solution
- (B) 85mL of the 25% solution, 35mL of the 55% solution
- (C) 40.5mL of the 25% solution, 79.5mL of the 55% solution
- (D) 60mL of the 25% solution, 60mL of the 55% solution

12. According to the chart below, what is the average number of potatoes harvested by the six farms?



- (A) 200
- (B) 400
- (C) 500
- (D) 600

13. A basketball team had a ratio of wins to losses of 3 to 1. After winning six games in a row, the team's ratio of wins to losses was 5 to 1. How many games had the team won before it won the six games?

- (A) 3
- (B) 6
- (C) 9
- (D) 24

Questions 14 and 15 refer to the information below.

An engineer performed strength-tests to measure the durability of a certain plastic. Fifty samples of the plastic were subjected to increasing pressures, and the results are presented below:

Pressure (psi)	# Broken	# Cracked
25	0	1
50	0	1
100	3	6
125	14	30
150	32	18

14. If 10,000 samples were subjected to 100 pounds per square inch (psi) of pressure, based on the results above, how many are expected to break?

- (A) 60
- (B) 300
- (C) 600
- (D) 1200





15. At 125 pounds per square inch (psi), the break rate for sample sizes of fifty has a standard error (SE) of 0.06, and a critical value (CV) for a 95% confidence level of 1.96. Using the equation  $ME = CV \times SE$ , find the margin of error (ME) for the break rate of the entire population of samples at 125 psi.

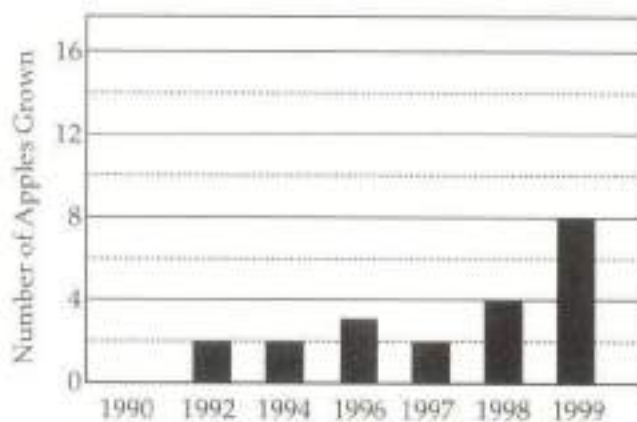
- (A) 0.06  
(B) 0.12  
(C) 0.68  
(D) 0.95

16. Which of the following functions, when graphed, crosses the  $x$ -axis three times?

- (A)  $f(x) = x^3 + 4x^2$   
(B)  $f(x) = x^3 + 4x^2 - 5x$   
(C)  $f(x) = 7x^2 - 5x + 75$   
(D)  $f(x) = x^{\frac{1}{2}}$

17.

Apples Grown by Bob



The figure above shows the number of apples grown in Bob's backyard every year. One year, Bob read about a new kind of fertilizer guaranteed to double the number of apples grown the year before. Assuming that the fertilizer works, in which year did Bob first try the fertilizer?

- (A) 1995  
(B) 1996  
(C) 1998  
(D) 1999

18. An isosceles triangle has three angles that measure  $40^\circ$ ,  $x^\circ$ , and  $y^\circ$ . Which of the following CANNOT be true?

- (A)  $x = y$   
(B)  $x = 50^\circ$   
(C)  $x - y = 60^\circ$   
(D)  $x = 70^\circ$

19. A dessert recipe requires  $p$  tablespoons of sugar and  $q$  cups of flour. If Peter wants to make a larger batch using  $p + 2$  tablespoons of sugar, how many cups of flour does he need to keep the ingredients in the original proportion?

- (A)  $\frac{p}{(p+2)q}$   
(B)  $\frac{p}{q}$   
(C)  $\frac{(p+2)}{q}$   
(D)  $\frac{(p+2)q}{p}$

20. If  $f(x) = |x + 3| - 7$ , which of the following must be true?

- (A)  $f(x) \leq -7$   
(B)  $f(x) \leq 0$   
(C)  $f(x) \geq -4$   
(D)  $f(x) \geq -7$





21. A bungee jumper leaps off a cliff 122 meters from the ground. Her cord, when fully stretched, is 72 meters long, and it takes 6 seconds after the jump for it to extend fully. The distance between the jumper and the ground as a function of time can be modeled as a quadratic function. Which equation represents her distance from the ground as a function of time?

- (A)  $f(t) = t^2 - 12t + 122$   
 (B)  $f(t) = 2t^2 - 24t + 122$   
 (C)  $f(t) = 2t^2 - 28t + 122$   
 (D)  $f(t) = t^2 - 12t + 122$

22.

$$x = \frac{2k}{x} + 2$$

Which of the following is a possible solution for  $x$  in terms of  $k$  for the equation shown above?

- (A)  $\sqrt{2}$   
 (B)  $\sqrt{-2k}$   
 (C)  $\sqrt{1+2k} + 1$   
 (D)  $\sqrt{1+2k} - 1$

23. For which real number  $x$  will

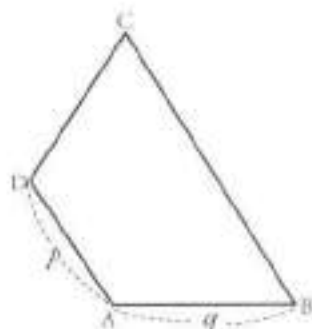
$$\frac{2}{x} + \frac{x+2}{x(x-2)} = \frac{4}{x(x-2)}$$

- (A) -1  
 (B) 1  
 (C) 2  
 (D) No real number

24. If  $f(x) = \frac{x^2 + 2x + 1}{x+1}$ , what is  $f(i)$ ?

- (A) 2  
 (B)  $\frac{2}{i+1}$   
 (C)  $i-1$   
 (D)  $i+1$

25. In  $ABCD$ ,  $\overline{AD}$  and  $\overline{BC}$  are parallel. What is the length of  $\overline{BC}$ ?

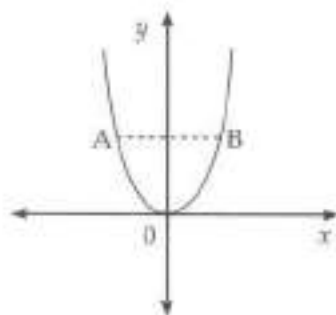


- (A)  $2p$   
 (B)  $p+q$   
 (C)  $p+2q$   
 (D)  $2p+q$

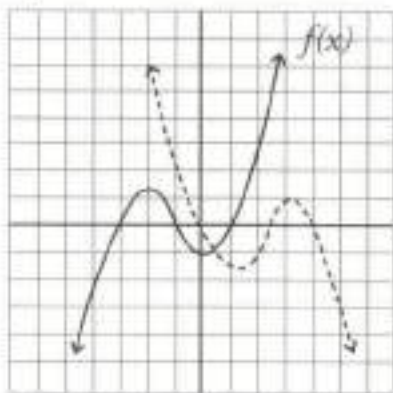




26. The equation of the parabola below is  $y = x^2$ . If the  $y$ -coordinate of  $A$  and the  $y$ -coordinate of  $B$  are both 8, what is the length of  $\overline{AB}$ ?



- (A) 16  
(B) 8  
(C)  $2\sqrt{2}$   
(D)  $4\sqrt{2}$
27. If the function  $f(x)$  is translated three units to the right, then reflected across the  $x$ -axis, a new function is produced. Which of the following is equivalent to the new function?



- (A)  $f(-x) + 3$   
(B)  $f(-x) - 3$   
(C)  $-f(x + 3)$   
(D)  $-f(x - 3)$

28. Sixty cookies were equally distributed to  $x$  campers. Eight campers did not want cookies, so their share was redistributed to the other campers, who each received two more. What is the total number of campers?

- (A) 12  
(B) 20  
(C) 32  
(D) 40

29. Recent polls indicate that only 15% of those registered to vote in an upcoming election is in the age group 18 to 25. A voter registration drive wants to raise this figure to 20% before the day of the election, so it begins to target this demographic exclusively. If there are currently 51,000 registered voters in the district, and assuming all new registrations are in the target demographic, approximately how many new voters does the drive need to register to meet its goal?

- (A) 2,600  
(B) 3,200  
(C) 6,800  
(D) 10,200

30. If  $x$  is an acute angle and  $\cos\left(\frac{\pi}{2} - 2x\right) = \frac{1}{2}$ , what is the possible value of  $x$ ?

- (A)  $\frac{\pi}{12}$   
(B)  $\frac{\pi}{3}$   
(C)  $\frac{5\pi}{12}$   
(D)  $\frac{\pi}{6}$





## DIRECTIONS

For questions 31 – 38, find the solution to the problem and enter your answer as demonstrated below.

1. Only the answer that is bubbled in on the answer sheet will be credited. The blank spaces above the bubbles are for you to record your answers for accuracy.
2. Only fill in one bubble in any given column.
3. None of the answers on this portion of the test are negative values.
4. If a problem appears to have more than one answer, only enter one answer. If the answer you enter is one of the correct solutions, you will receive full credit for that question.
5. If the correct answer can be expressed as a mixed number, it must be entered as a decimal or an improper fraction.
6. If the correct answer is a decimal that cannot fit into the grid space, you must fill the grid with enough digits to completely fill the space. The number can be rounded or simply shortened but must fill every blank space.

## NOTES

Begin entering answers in any column that accommodates your answer. If you do not need a column do not enter anything in that column.

Write answer in boxes.

Answer:  $\frac{5}{36}$

5	/	3	6
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1	0	0	0
2	1	1	1
3	2	2	2
4	3	3	3
5	4	4	4
6	5	5	5
7	6	6	6
8	7	7	7
9	8	8	8
0	9	9	9

Grid in result.

Answer: 4.5

	4	.	5
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<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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2	1	1	1
3	2	2	2
4	3	3	3
5	4	4	4
6	5	5	5
7	6	6	6
8	7	7	7
9	8	8	8
0	9	9	9

← Fraction line  
← Decimal point

Acceptable ways to grid  $\frac{1}{6}$  are:

	1	/	6
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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2	1	1	1
3	2	2	2
4	3	3	3
5	4	4	4
6	5	5	5
7	6	6	6
8	7	7	7
9	8	8	8
0	9	9	9

.	1	6	6
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1	0	0	0
2	1	1	1
3	2	2	2
4	3	3	3
5	4	4	4
6	5	5	5
7	6	6	6
8	7	7	7
9	8	8	8
0	9	9	9

.	1	6	7
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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2	1	1	1
3	2	2	2
4	3	3	3
5	4	4	4
6	5	5	5
7	6	6	6
8	7	7	7
9	8	8	8
0	9	9	9

Answer: 302 – either position is correct

	3	0	2
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1	0	0	0
2	1	1	1
3	2	2	2
4	3	3	3
5	4	4	4
6	5	5	5
7	6	6	6
8	7	7	7
9	8	8	8
0	9	9	9

3	0	2	
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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2	1	1	1
3	2	2	2
4	3	3	3
5	4	4	4
6	5	5	5
7	6	6	6
8	7	7	7
9	8	8	8
0	9	9	9





31. Tickets to a play cost \$15 for adults and \$2 for children. If 750 tickets were sold for a total of \$4,100, how many children's tickets were sold?

ANSWER: \_\_\_\_\_

32. The force,  $f$ , needed to break a board varies inversely with the length,  $l$ , of the board. If it takes 5 pounds of force to break a board 2 feet long, how many pounds of force will it take to break a board that is 6 feet long?

ANSWER: \_\_\_\_\_

33. Two students started walking from the same point in opposite directions. They each walked 12 feet and then one student made a 90 degree turn to the left and walked 5 feet. The other student made a 90 degree turn to the right and walked 5 feet. How many feet apart are two students?

ANSWER: \_\_\_\_\_

34. If the population of bacteria in a culture flask doubles every 20 minutes, by what factor has the population increased after 3 hours 20 minutes?

ANSWER: \_\_\_\_\_

35. A bookstore has 18,000 books in stock, of which 70% are paperback and 30% are hardcover. The books are either fiction or nonfiction. If 6,800 books are nonfiction, and 4,800 of the nonfiction books are paperback, how many books are both fiction and hardcover?

ANSWER: \_\_\_\_\_

36. The function  $f$  is defined as  $f(x) = x^2 - 6$ , and the function  $p$  is defined as  $p(x) = f\left(-\frac{x}{2}\right) + 5$ . What is the value of  $p(-4)$ ?

ANSWER: \_\_\_\_\_





Questions 37 and 38 refer to the information below.

Price Summary  
U.S Energy Information

	2012	2013	2014	2015 (projected)
WTI Crude Oil	94.12	97.91	93.82	62.75
Brent Crude Oil	111.65	108.64	99.54	68.08
Gasoline	3.63	3.51	3.37	2.60
Diesel	3.97	3.92	3.82	3.07
Natural Gas	10.69	10.30	10.97	10.96
Electricity	11.88	12.12	12.47	12.69

\*Crude oil in \$ per barrel; 42 gallons per barrel

\*Gasoline, and diesel in \$ per gallon

\*Natural gas in \$ per 1,000ft<sup>3</sup>

\*Electricity in cents per kilowatt-hour

37. Part 1

What was the average price of natural gas, in dollars per cubic meter (m<sup>3</sup>), from 2012 to 2014 (1 foot = 0.305 meters)?

ANSWER: \_\_\_\_\_

38. Part 2

Recent analysis by the U.S. Energy Information Administration indicates that Brent crude oil, an international benchmark, is a better indicator of domestic gasoline prices than WTI Crude Oil. Assuming that there is a direct relationship between the price of crude oil and the price of gasoline, by how much would the price of gasoline rise, in dollars, from its 2014 levels if the price of Brent crude oil goes up from its 2014 levels by \$12.76 per barrel?

ANSWER: \_\_\_\_\_



## Essay Test 2



50 MINUTES, Prompt-based essay

Turn to Section 5 of your answer sheet to answer the question in this section.

### DIRECTIONS

As you read the passage below, consider how Evan Gerdisch uses

- evidence, such as facts or examples, to support claims.
- reasoning to develop ideas and to connect claims and evidence.
- stylistic or persuasive elements, such as word choice or appeals to emotion, to add power to the ideas expressed.

Adapted from “Earthbound Imagination” by Evan Gerdisch. ©2015 by KALLIS EDU.

Billions upon billions of planets inhabit the observable universe. Although most of them are almost certainly inhospitable, some may harbor life. This is an exciting prospect. What might these exotic beings, intelligent or not, look like? How might they behave? What biological processes might sustain them? If most works of science fiction are to be believed, the answers are simple: human-like, human-like, and the same ones as humans. And that’s a shame.

After all, Earth itself is brimming with incredible biodiversity. Hundred-legged millipedes navigate forest floors while sleek, bioluminescent fish lurk in the ocean’s depths. Undoubtedly, humans share more genetic information with these strange Earthly beings than *any* extraterrestrial. Yet time and time again, in science fiction films and literature, humans travel trillions of miles through space only to meet human-like aliens.

Don’t get me wrong: sometimes an anthropomorphic extraterrestrial (human-like alien) is useful. A skilled science-fiction writer might create an alien society only slightly different from our own in order to explore social, political, or religious issues in or among Earth-bound cultures. But too often, science-fiction writers fall back on the tired trope of the anthropomorphic extraterrestrial for no clear reason. Probably the most egregious offender of this trend just happens to be the most famous science fiction series of all time: *Star Wars*. These films depict aliens from countless planets with wildly varying environments, yet the majority of these aliens have two arms, two legs, and humanoid facial features. What’s more, they all seem to share common—and very human-like—cultural practices.

Of course, many will argue that popular culture favors anthropomorphic extraterrestrials because they are relatable. Fair enough. I doubt that Chewbacca, Han Solo’s stalwart companion, would have enjoyed much popularity if he had looked even stranger than Earth’s own assortment of bizarre creatures, such as the star-nosed mole, the blobfish, and the aye-aye. But I maintain that this desire to make our extraterrestrials relatable is a major part of the problem: science fiction is meant to challenge, not reassure. Science fiction should cause people to question their preconceptions, not reinforce them.





By depicting aliens as slightly-different-humans, science fiction writers miss opportunities to ask big, important questions about where we came from and where we are going. Life on Earth evolved under unique conditions. For instance, humans' distant ancestors would never have descended from their arboreal habitats had it not been for the extinction event that wiped out many species of dinosaur. A single—albeit very large—meteor impact 65 million years ago drastically altered the trajectory of life on Earth. So even if extraterrestrial life were composed of cells like our own (and that's a big “if”), their appearances and behaviors would have been shaped by their own unique environmental conditions. This is an exciting and humbling concept. So why sacrifice the idea that humans are unique for the reassurance and familiarity of an anthropomorphic extraterrestrial?

Ultimately, I understand that one of science fiction's primary functions is to entertain, but entertainment can still challenge viewers. Stanley Kubrick's 1968 film, *2001: A Space Odyssey*, is an excellent example. The film centers on a crew of astronauts searching for extraterrestrials who leave enigmatic clues throughout the solar system, yet the aliens themselves never appear on screen. Kubrick invites us to consider the possibilities that advanced extraterrestrials take forms incomprehensibly different from our own, or that they have evolved beyond the point of requiring a corporeal form, much as some humans hope to accomplish by downloading their consciousness into computers.

One of science fiction's greatest strengths is its ability to inspire real-world change by stoking the public's imagination. Many of the then-futuristic gadgets depicted in the original *Star Trek* series have inspired real-world innovations. Similarly, the public's interest in space exploration is fueled by imagination. Depicting extraterrestrials as robotic muscle cars (as in the *Transformers* franchise) or small green men with large heads does not challenge the public to stretch its imagination, and it will do no favors for the future of space travel.

\**Cheebacca and Han Solo are two protagonists from the Star Wars series.*

Write an essay in which you explain how Evan Gerdisch builds an argument to persuade his audience that extraterrestrials have been poorly depicted in science fiction. In your essay, analyze how the author uses one or more of the features listed in the box above (or features of your own choice) to strengthen the logic and persuasiveness of his argument. Be sure that your analysis focuses on the most relevant features of the passage.

Your essay should not explain whether you agree with the author's claims, but rather explain how the author builds an argument to persuade his audience.

# SAT® Practice Test #3

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1

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2

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## Reading Test 3



65 MINUTES, 52 QUESTIONS

Turn to Section 1 of your answer sheet to answer the questions in this section.

**DIRECTIONS** Each passage or pair of passages is accompanied by 10 or 11 questions. Read each passage or pair of passages, and then select the most appropriate answer to each question. Some passages may include tables or graphs that require additional analysis.

Refer to the passage below to answer questions 1–10.

This passage is adapted from W.E.B. Dubois, *The Souls of Black Folk*, originally published in 1903. Dubois was an African-American sociologist, historian, author, and activist who devoted his life to securing equal rights for African Americans.

line Between me and the other world there  
is ever an unasked question: unasked by  
some through feelings of delicacy; by others  
through the difficulty of rightly framing it. All,  
5 nevertheless, flutter round it. They approach me  
in a half-hesitant sort of way, eye me curiously  
or compassionately, and then, instead of saying  
directly, "How does it feel to be a problem?"  
they say, "I know an excellent colored man in my  
10 town;" or, "I fought at Mechanicsville;"\* or, "Do  
not these Southern outrages make your blood  
boil?" At these I smile, or am interested, or reduce  
the boiling to a simmer, as the occasion may  
require. To the real question, How does it feel to  
15 be a problem? I answer seldom a word.

And yet, being a problem is a strange  
experience, peculiar even for one who has never  
been anything else, save perhaps in babyhood  
and in Europe. It is in the early days of rollicking  
20 boyhood that the revelation first bursts upon one,  
all in a day, as it were. I remember well when  
the shadow swept across me. I was a little thing,  
away up in the hills of New England, where  
the dark Housatonic winds between Hoosac  
25 and Taghkanic to the sea. In a wee wooden  
schoolhouse, something put it into the boys' and  
girls' heads to buy gorgeous visiting-cards—ten  
cents a package—and exchange. The exchange  
was merry, till one girl, a tall newcomer, refused  
30 my card,—refused it peremptorily, with a glance.

Then it dawned upon me with a certain  
suddenness that I was different from the others;  
or like, mayhap, in heart and life and longing,  
but shut out from their world by a vast veil. I  
35 had thereafter no desire to tear down that veil,  
to creep through; I held all beyond it in common  
contempt, and lived above it in a region of  
blue sky and great wandering shadows. That  
sky was bluest when I could beat my mates at

40 examination-time, or beat them at a foot-race, or  
even beat their stringy heads.

Alas, with the years all this fine contempt  
began to fade; for the words I longed for, and  
all their dazzling opportunities, were theirs, not  
45 mine. But they should not keep these prizes, I  
said; some, all, I would wrest from them. Just  
how I would do it I could never decide: by  
reading law, by healing the sick, by telling the  
wonderful tales that swam in my head,—some  
50 way. With other black boys the strife was not so  
fiercely sunny: their youth shrunk into tasteless  
sycophancy, or into silent hatred of the pale world  
about them and mocking distrust of everything  
white; or wasted itself in a bitter cry, Why did  
55 God make me an outcast and a stranger in mine  
own house? The shades of the prison-house closed  
round about us all: walls straight and stubborn  
to the whitest, but relentlessly narrow, tall, and  
unscalable to sons of night who must plod darkly  
60 on in resignation, or beat unavailing palms  
against the stone, or steadily, half hopelessly,  
watch the streak of blue above.

After the Egyptian and Indian, the Greek  
and Roman, the Teuton and Mongolian, the  
65 Negro is a sort of seventh son, born with a veil,  
and gifted with second-sight in this American  
world,—a world which yields him no true self-  
consciousness, but only lets him see himself  
through the revelation of the other world. It is a  
70 peculiar sensation, this double-consciousness, this  
sense of always looking at one's self through the  
eyes of others, of measuring one's soul by the tape  
of a world that looks on in amused contempt and  
pity. One ever feels his twoness,—an American, a  
75 Negro; two souls, two thoughts, two unreconciled  
strivings; two warring ideals in one dark body,  
whose dogged strength alone keeps it from being  
torn asunder.

\* *Mechanicsville*: a city in Virginia near which several important Civil War battles were fought.



- In the context of the passage, the "other world" referred to in line 1 most likely refers to
  - those who do not view the narrator as a "problem."
  - those who hope to gain a better understanding of American culture.
  - those who enjoy social privileges that are denied to black Americans.
  - those who refuse to recognize the cultural differences among individuals.
- The "unasked question" discussed throughout paragraph 1 (lines 1 – 15) is best described as
  - the subtext of a conversation between a white and a black American.
  - the rhetorical device that the narrator often uses in conversation.
  - a puzzling social imbalance that exclusively affects the narrator.
  - a serious concern among American writers and orators.
- As used in line 4, "framing" most nearly means
  - presenting.
  - establishing.
  - drafting.
  - placing.
- Which of the following best describes the way that paragraph 2 (lines 16 – 30) functions in the passage as a whole?
  - It sets the nostalgic tone that dominates the passage.
  - It provides a window into the initial shock of being excluded.
  - It emphasizes the importance of the "unasked question" introduced in paragraph 1.
  - It establishes the contrast between the author's determination and the laziness of others.
- The statement "or like, mayhap, in heart and life and longing, but shut out from their world by a vast veil," (lines 33 – 34) primarily serves to
  - distinguish the narrator from other black Americans.
  - point out specific similarities between different cultures.
  - state that black Americans are not inherently different from others.
  - suggest that black Americans do not realize that they are different from others.
- By paragraph 4 (lines 42 – 62), the "region of blue sky" introduced by the narrator in paragraph 3 (lines 31 – 41) becomes
  - something to be celebrated rather than avoided.
  - a useful tool rather than an unattainable goal.
  - a manageable nuisance rather than a constant distraction.
  - a metaphor for unattainable dreams rather than a viable means of escape.
- From paragraph 3 (lines 31 – 41) to paragraph 4 (lines 42 – 62), the narrator's attitude toward the opportunities denied to black Americans changes from
  - burning jealousy to resignation.
  - disdain to defiant desire.
  - ambivalence to concern.
  - contentment to rebellion.
- As used in line 54, "bitter" most nearly means
  - sharp
  - churlish
  - petulant
  - aggrieved
- What does the narrator suggest about the "veil" that separates black Americans from the opportunities available to others?
  - It contributes to the formation of a "double-consciousness" in black Americans.
  - It creates a rift between the narrator's generation and the preceding one.
  - It causes many black Americans to emulate the actions of white Americans.
  - It drives many black Americans to work harder than their white counterparts.
- Which choice provides the best evidence for the answer to the previous question?
  - Lines 42 – 45 ("Alas, with...not mine.")
  - Lines 56 – 58 ("The shades...the whitest.")
  - Lines 63 – 65 ("After the Egyptian...seventh son.")
  - Lines 69 – 72 ("It is a peculiar sensation...of others.")



Refer to the passage below to answer questions 11 – 21.

Susanna Heckman, "Income Inequality," © 2015 KALLIS.EDU.

line My middle school son, under the spell of  
pop stars and professional athletes, described a  
baseball player's signing bonus the other day.  
After I expressed the appropriate admiration, I  
5 added that no one needs that much money.

This was dismissed. "Are you really gonna  
say that a great player, who has worked really  
hard all his life, and can do what no one else can  
do, shouldn't get what he *deserves*?"

10 I had just read a newspaper account of a  
celebrity selling her home, which includes a  
hall that sounds like a royal ballroom. It made  
me wonder who *deserves* to earn millions upon  
millions of dollars. Why isn't one million enough?  
15 Maybe even less? Who *needs* a palace? Didn't  
we once fight a war against the British over this  
question? We are not supposed to be living in  
a monarchy. We are not supposed to believe in  
supporting an entitled class that possesses more  
20 money than it could ever spend.

Tax rates that took effect in 2013 have made  
a small improvement in income inequality. But  
in truth, there is still an enormous polarization of  
wealth in the United States. Rappers, athletes, and  
25 other celebrities are not even the most affluent,  
though they are the most visible. American wealth  
is concentrated in the hands of a relatively  
tiny group that dwells on fluffy pink clouds of  
privilege, sometimes with personal jets.

30 On these fluffy clouds, there are no past-  
due rent notices, no struggle over new shoes  
for growing kids, no waiting for payday to buy  
groceries. I don't have to look far for a contrast. In  
my family's neighborhood of 1950s homes, many  
35 people get by on fixed incomes or slim profits  
from their own tiny businesses. Single teachers  
and nurses support their children. Work trucks  
line the street. Multigenerational households are  
common. Next door to us, three hardworking  
40 families with young children squeeze into one  
small house.

Theirs is not an unusual situation. U.S.  
Census data indicate that nearly half of all people  
in the United States qualify as low-income or  
45 poor; the figure is a shocking 57 percent for  
children. Meanwhile, research shows that the top  
1 percent of the population possesses 40 percent  
of the nation's wealth and takes home nearly a  
quarter of the nation's income each year. These  
50 wealthy are not likely to socialize with people  
like my neighbors—a dozen people who share  
one bathroom. Instead, the super-wealthy are  
swaddled by their quiet, green neighborhoods  
and well-kept schools. Their "normal" is different,  
55 and they see no reason why it should change.  
From childhood on, they meet people like

themselves, and visit friends who live in mansions  
like theirs.

60 Economist Robert Reich estimates that if the  
economic gains of the last three decades had been  
divided equally among Americans, the typical  
American would be 60 percent better-off now.  
Instead, a large portion of the money has  
gone to the already wealthy. As a group,  
65 middle-income earners have actually seen their  
incomes fall. Admittedly, this dynamic is not  
simple; its causes certainly include the decline  
of manufacturing jobs in the U.S., increased  
automation in the service industry, and the  
70 decline of organized labor.

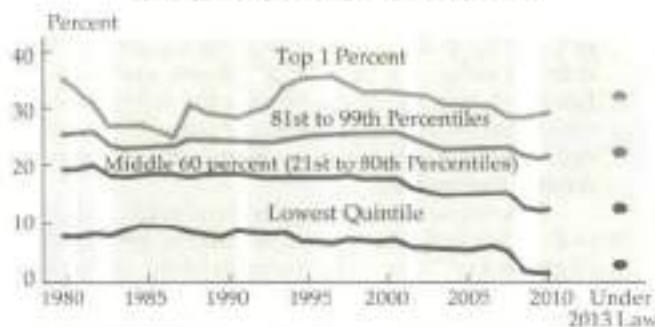
However, one of the causes of the lopsided  
distribution is clear. In the U.S., according to  
the non-profit, nonpartisan National Bureau  
of Economic Research (NBER), companies' top  
managers regularly help each other take greater  
75 proportions of company profits. NBER cites a  
study showing that top management received 5  
percent of their firms' profits in 1995, ballooning  
to 13 percent by 2002. No matter how chief  
80 executive officers (CEOs) perform, NBER says,  
cronyism results in their getting a bigger piece  
of the pie. Boards of directors made up of their  
peers approve salary packages that the CEOs  
supposedly "deserve," and then shower them  
85 with stock options and other benefits that enrich  
them further.

Many of the super wealthy give to charity,  
and many people admire them greatly. Bill  
Gates has famously given away an astounding  
amount—nearly \$40 billion by some accounts—  
90 saving millions of lives through vaccine  
programs. Of course, Gates acquires billions *more*  
dollars every year through investments; he is still  
the richest man on Earth, worth nearly \$80 billion  
95 in 2015. Moreover, Gates' grants and donations  
give him undue influence in fields such as public  
education and medical research. He gets to set  
the priorities. By handing out money, the wealthy  
claim power that is not theirs by right.

100 But my son was not much convinced by  
differences in lifestyle or societal influence.  
Ultimately, what shocked him was that money  
buys more life. My son and his friends are all  
familiar with the 2011 science fiction thriller  
105 *In Time*. In the film, minutes of life are a form  
of currency, making the super-rich virtually  
immortal. In today's United States, life expectancy  
is increasing much more for the rich than for  
the poor, according to the Brookings Institute.  
110 The average life span of poor women is actually  
declining. The data show that whatever the  
specific causes of the longevity gap, the link to  
income is clear. Rich Americans live to an older  
age than poor Americans. This blunt, dystopian  
115 fact should prod all of us to question the status  
quo.



Average Federal Tax Rates, by Income Group,  
1979 to 2010 and Under 2013 Law



CONGRESSIONAL BUDGET OFFICE DECEMBER 2013

11. Within the passage, the main purpose of paragraphs 1 and 2 (lines 1 – 9) is to
- provide personal details about the author.
  - introduce opposing viewpoints on the topic.
  - produce an image of disproportionate wealth.
  - criticize the effect of media on the attitudes of young people.
12. In paragraph 3 (lines 10 – 20), the author most strongly implies which of the following?
- Having a house that includes a royal ballroom is unethical.
  - America's Revolutionary War against the English king was ultimately meaningless.
  - Celebrities in the United States receive too much money and become arrogant.
  - Assuming that certain people deserve wealth is a characteristic of monarchies.
13. Which of the author's claims about society is best supported by the graph?
- Lines 12 – 14 ("It made me...of dollars.")
  - Line 21 – 22 ("Tax rates...income inequality.")
  - Line 22 – 24 ("But in truth...United States.")
  - Lines 26 – 29 ("American wealth...personal jets.")
14. According to the graph, which statement is true about average tax rates for people with incomes in the top 1 percent?
- In 2013, they returned to about what they were in 1979.
  - From 2000 to 2010, they were roughly the same as the other income groups.
  - Since 1979, they have varied between 25 and 40 percent of income.
  - The top 1 percent receives almost 40 percent of the nation's wealth.
15. In paragraph 5 (lines 30 – 41), the author describes her own neighborhood primarily to
- prove how hard most people work to survive.
  - inform readers about an unfamiliar lifestyles.
  - explain how her background informs her opinion.
  - illustrate in human terms the statistics that follow.
16. The passage strongly suggests that the author shares which assumption?
- Rich people in America actively thwart upward mobility of the less well-off.
  - Most affluent Americans do not form emotional bonds with poorer people.
  - The very wealthy in the U.S. rarely leave their own neighborhoods.
  - The American middle class will disappear within a short time frame.
17. Which choice provides the best evidence for the answer to the previous question?
- Lines 42 – 46 ("U.S. Census...for children.")
  - Lines 54 – 55 ("Their 'normal' is...change.")
  - Lines 56 – 58 ("From childhood...like theirs.")
  - Lines 64 – 66 ("As a group, middle-income...seen their incomes fall.")
18. As used in line 66, "dynamic" most nearly means
- motility.
  - interaction.
  - change.
  - upsurge.
19. The author recognizes a counter argument to the position she takes in the passage by
- acknowledging large charitable donations by the affluent.
  - admitting a false assumption about charitable funds associated with Bill Gates.
  - introducing data about fighting disease, medical research, and public education.
  - conceding that the wealthy are usually right about effective aid programs.
20. As used in line 96, "undue" most nearly means
- needless.
  - exorbitant.
  - unwanted.
  - unwarranted.



21. According to the passage, the relationship between the film *In Time* and today's United States is most like
- (A) a stumble compared to a fall.  
 (B) hyperbole challenging a flaw.  
 (C) a warning regarding a possible outcome.  
 (D) an aggregate of multiple concerns.

Refer to the passage below to answer questions 22 – 31.

This passage is adapted from Albert Einstein, *Relativity: The Special and General Theory*, originally published in 1920. In this passage, the German-born physicist discusses the “truth” of fundamental geometric ideas as well as their correspondence to that which is observed in the real world.

line In your schooldays most of you who read this book made acquaintance with the noble building of Euclid's geometry, and you remember—perhaps with more respect than love—the magnificent structure, on the lofty staircase of which you were chased about for uncounted hours by conscientious teachers. By reason of your past experience, you would certainly regard every one with disdain who should pronounce even the most out-of-the-way proposition of this science to be untrue. But perhaps this feeling of proud certainty would leave you immediately if some one were to ask you: “What, then, do you mean by the assertion that these propositions are true?” Let us proceed to give this question a little consideration.

Geometry sets out from certain conceptions such as “plane,” “point,” and “straight line,” with which we are able to associate more or less definite ideas, and from certain simple propositions (axioms) which, in virtue of these ideas, we are inclined to accept as “true.” Then, on the basis of a logical process, the justification of which we feel ourselves compelled to admit, all remaining propositions are shown to follow from those axioms, i.e. they are proven. A proposition is then correct (“true”) when it has been derived in the recognized manner from the axioms. The question of the “truth” of the individual geometrical propositions is thus reduced to one of the “truth” of the axioms. Now it has long been known that the last question is not only unanswerable by the methods of geometry, but that it is in itself entirely without meaning. We cannot ask whether it is true that only one straight line goes through two points. We can only say that Euclidean geometry deals with things called “straight lines,” to each of which is ascribed the property of being uniquely determined by

40 two points situated on it. The concept “true” does not tally with the assertions of pure geometry, because by the word “true” we are eventually in the habit of designating always the correspondence with a “real” object; geometry, however, is not concerned with the relation of the ideas involved in it to objects of experience, but only with the logical connection of these ideas among themselves.

It is not difficult to understand why, in spite of this, we feel constrained to call the propositions of geometry “true.” Geometrical ideas correspond to more or less exact objects in nature, and these last are undoubtedly the exclusive cause of the genesis of those ideas. Geometry ought to refrain from such a course, in order to give to its structure the largest possible logical unity. The practice, for example, of seeing in a “distance” two marked positions on a practically rigid body is something which is lodged deeply in our habit of thought. We are accustomed further to regard three points as being situated on a straight line, if their apparent positions can be made to coincide for observation with one eye, under suitable choice of our place of observation.

If, in pursuance of our habit of thought, we now supplement the propositions of Euclidean geometry by the single proposition that two points on a practically rigid body always correspond to the same distance (line-interval), independently of any changes in position to which we may subject the body, the propositions of Euclidean geometry then resolve themselves into propositions on the possible relative position of practically rigid bodies. Geometry which has been supplemented in this way is then to be treated as a branch of physics. We can now legitimately ask as to the “truth” of geometrical propositions interpreted in this way, since we are justified in asking whether these propositions are satisfied for those real things we have associated with the geometrical ideas. In less exact terms we can express this by saying that by the “truth” of a geometrical proposition in this sense we understand its validity for a construction with ruler and compasses.

Of course the conviction of the “truth” of geometrical propositions in this sense is founded exclusively on rather incomplete experience. For the present we shall assume the “truth” of the geometrical propositions, then at a later stage (in the general theory of relativity) we shall see that this “truth” is limited, and we shall consider the extent of its limitation.



22. In lines 1–7, the author mentions “Euclid’s geometry” and a “lofty staircase” primarily to
- describe a context to which he will later refer as part of his argument.
  - highlight the relationship between architecture and geometry.
  - emphasize the importance of diligence in the study of geometry.
  - relate his topic to a situation with which he believes most of his readers are familiar.
23. The author’s use of the phrase “perhaps with more respect than love” (line 4) is primarily meant to convey the sense of
- reverence that most students feel for figures of authority.
  - ambivalence that students feel when studying a challenging subject.
  - nostalgia about first encountering the principles of geometry.
  - formality that marked the relationship between teacher and pupil.
24. According to paragraph 3 (lines 49–64), the geometric concepts plane, point, and straight line probably stem from their
- indisputable truth.
  - simplicity and clarity.
  - similarity to actual entities.
  - cross-cultural acceptance.
25. As used in lines 19–20, the phrase “more or less” most nearly means
- concretely.
  - quantitatively.
  - unreliably.
  - approximately.
26. According to the author, the Euclidean definition of a “straight line” is problematic primarily because
- it does not correspond to lived experience.
  - it involves two points when it should actually include three.
  - it does not sufficiently support the axioms that come from it.
  - it is logically connected to other geometric ideas.
27. As used in line 55, “course” most nearly means
- class.
  - practice.
  - itinerary.
  - direction.
28. Based on the passage, which choice best describes the relationship between geometry and physics?
- Geometry overlaps with physics when its concepts are applied to real-world situations.
  - Geometry and physics are both important in an educational curriculum.
  - Geometry is based in fiction and physics is based in truth.
  - Geometry is measured using generalizations whereas physics is studied through experiments.
29. In the final paragraph (lines 86–93), the author suggests that the “‘truth’ of geometric propositions” is challenged by
- the artificiality of geometry as a system of knowledge.
  - humans’ limited understanding of physical phenomena.
  - humans’ inability to confirm geometric truths by measurement.
  - the fact that truth actually resides in physics, not geometry.
30. Based on the passage as a whole, the author would most likely agree with the definition of “truth” as
- a concept that corresponds with lived experience.
  - a concept that can be experimentally verified.
  - a concept that can be applied in a practical setting.
  - a notion about which the vast majority would agree.
31. Which choice provides the best evidence to the previous question?
- Lines 7–11 (“By reason of...be untrue.”)
  - Lines 40–44 (“The concept ‘true’...‘real’ object.”)
  - Lines 51–54 (“Geometrical ideas correspond...those ideas.”)
  - Lines 86–88 (“Of course the...incomplete experience.”)





Refer to the passage below to answer questions 32–42.

Passage 1 is adapted from Emma Goldman, "Marriage and Love," Mother Earth Publishing Association, 1911. Emma Goldman was a well-known anarchist and feminist writer. Passage 2 is adapted from Susanna Heckman, "Modern Love: Marriage in the 21st Century," originally published in 2015, by KALLIS EDU.

### Passage 1

line Marriage and love have nothing in common; they are as far apart as the poles; are, in fact, antagonistic to each other. No doubt some marriages have been the result of love. Not  
5 however, because love could assert itself only in marriage; much rather is it because few people can completely outgrow a convention. There are today large numbers of men and women to whom marriage is naught but a farce, but who submit to  
10 it for the sake of public opinion. At any rate, while it is true that some marriages are based on love, and while it is equally true that in some cases love continues in married life, I maintain that it does so regardless of marriage, and not because of it.

15 On the other hand, it is utterly false that love results from marriage. On rare occasions one does hear of a miraculous case of a married couple falling in love after marriage, but on close examination it will be found that it is a mere adjustment to the inevitable. Certainly the growing-used to each other is far away from the spontaneity, the intensity, and beauty of love...

20 Marriage is primarily an economic arrangement, an insurance pact. It differs from the ordinary life insurance agreement only in that it is more binding, more exacting. Its returns are insignificantly small compared with the investments. In taking out an insurance policy one pays for it in dollars and cents, always at liberty  
25 to discontinue payments. If, however, woman's premium is a husband, she pays for it with her name, her privacy, her self-respect, her very life, "until death doth part." Moreover, the marriage insurance condemns her to life-long dependency,  
30 to parasitism, to complete uselessness, individual as well as social. Man, too, pays his toll, but as his sphere is wider, marriage does not limit him as much as woman. He feels his chains more in an economic sense.

35 Behind every marriage stands the life-long environment of the two sexes; an environment so different from each other that man and woman must remain strangers. Separated by an insurmountable wall of superstition, custom,  
40 and habit, marriage has not the potentiality of developing knowledge of, and respect for, each other, without which every union is doomed to failure.

### Passage 2

In today's United States, getting married is  
50 like tossing a coin. More than half of all marriages end in divorce. The failure rate is even higher for second and third marriages. The number of U.S. homes maintained by married couples is shrinking, dipping below 50 percent in the 2010.

55 Presumably most people are aware of the statistics. Yet, optimism seems to persist. Millions of couples get married each year, vowing to stay together forever. Why do couples believe they will live "happily ever after?" Is the chance of  
60 wedded bliss worth the risk of painful divorce?

It turns out that there may be some solid facts underpinning the popular notion that marriage is blissful. Studies have found that on average, married people claim to be happy more often than  
65 their single peers do.

Claims are all well and good, but there is medical evidence, as well. Since the mid-1800s, researchers have noticed and puzzled over the fact that married people live longer, on average,  
70 than never-married, divorced, or widowed people. Research has continually confirmed that married people tend to have lower blood pressure, suffer less from depression, and have more efficient immune systems. Stressful  
75 relationships are the exception; people who report conflict-ridden marriages are no healthier than singles. Thus, the evidence points to the conclusion that a loving, supportive relationship reduces stress levels, resulting in the noted health  
80 benefits.

Researchers have collected massive amounts of data on what makes a relationship last. Not surprisingly, among the conclusions is that couples who stay together tend to talk. They talk  
85 about more than just household chores; they share hopes, fears, and dreams. They celebrate successes and make each other feel special and cared-for. They maintain a certain level of kindness and consideration, even during arguments.  
90 Also, married couples who report high levels of happiness together early in the relationship are more likely to still be married years later.



32. The author of Passage 1 most strongly implies which of the following about marriage?
- (A) Keeping love alive in marriage requires work.  
 (B) Only unconventional people really fall in love.  
 (C) Some people have to get married so that they can get health insurance.  
 (D) People frequently get married just to fit into society.
33. Which choice provides the best evidence for the answer to the previous question?
- (A) Lines 3–7 (“No doubt...convention.”)  
 (B) Lines 7–10 (“There are...opinion.”)  
 (C) Lines 15–16 (“On the other...marriage.”)  
 (D) Lines 23–24 (“Marriage is primarily...pact.”)
34. In lines 33–36, the author of Passage 1 mentions parasitism primarily to
- (A) characterize the predicament women found themselves in at the time.  
 (B) criticize the way health insurance takes advantage of the healthy.  
 (C) demand equal opportunities for jobs for women.  
 (D) illustrate the way that unhappy marriages use up the energy of both parties.
35. As used in line 44, “superstition” most nearly means
- (A) magic.  
 (B) belief.  
 (C) charm.  
 (D) fear.
36. In Passage 2, the author focuses on which quandary?
- (A) Some people get married and divorced multiple times.  
 (B) Fewer U.S. homes include two adults.  
 (C) People continue to risk getting married.  
 (D) Medical researchers still have not been able to explain marriage’s effects on health.
37. The author of Passage 2 implies which hypothesis?
- (A) People should get married.  
 (B) Any marriage can become happy.  
 (C) Marriage can be calming.  
 (D) Wedded bliss is a fairy tale.
38. Which choice provides the best evidence for the answer to the previous question?
- (A) Lines 63–65 (“Studies have...peers do.”)  
 (B) Lines 67–71 (“Since the mid-1800s...people.”)  
 (C) Lines 74–77 (“Stressful relationships...singles.”)  
 (D) Lines 77–80 (“Thus, the evidence...benefits.”)
39. As used in line 89, the word “consideration” most nearly means
- (A) sensitivity.  
 (B) factor.  
 (C) contemplation.  
 (D) deliberation.
40. The author of Passage 2 would most likely respond to the life insurance metaphor for marriage in lines 23–36 by
- (A) criticizing Passage 1 for ignoring medical research on the health benefits of marriage.  
 (B) pointing out that over the last century, divorce laws and women’s status have changed.  
 (C) agreeing that the “returns” of marriage are much smaller than the “investments.”  
 (D) arguing that the author of Passage 1 was too extreme in her cynical analysis.
41. In Passage 1, is the principle of the “insurmountable wall” (line 44) consistent with conclusions in Passage 2?
- (A) Yes, because Passage 2 concludes that communicating (breaking down walls metaphorically) sustains marriages.  
 (B) Yes, because Passage 1 cites research regarding arguments.  
 (C) No, because the wall described in Passage 1 has no current equivalent.  
 (D) No, because Passage 2 focuses more on statistics than relationships.
42. It is reasonable to conclude that the authors of Passage 1 and Passage 2 would both advise that
- (A) young couples should avoid marriage due to the stress it causes.  
 (B) young couples should get married if they really love each other.  
 (C) getting married will not make a couple love each other more.  
 (D) the only way to be healthy and happy is to get married.



Refer to the passage below to answer questions 43 – 52.

Nick Stockton, "Heat, Pollution, and Skyscrapers Make Cities Have More Thunderstorms," © 2015 by Conde Nast.

line Ah, city life: The culture! The food! The music! The thunderstorms! Wait, what? Thunderstorms? Yes, that's right: You can add weather to the list of things that are more exciting

5 in the city than in the sticks.

Ok, not all cities. But in regions like the American south, normal urban attributes like heat, pollution, and tall buildings could stir up more storms. New research examined nearly two

10 decades of meteorological data from Georgia and found thunderstorms were slightly more likely to form over Atlanta than the surrounding rural areas. Through modeling and other research,

15 meteorologists have known about the connection between cities and storms for decades, but this is the first time data has shown the phenomena in action.

During the summer, cumulonimbus clouds ripen like peaches over Georgia and Alabama.

20 These moisture-heavy storms appear on radars as dark, pixelated patterns. Alex Haberlie, a geography doctoral student at Northern Illinois University, used a computer program to find these patterns, then crunched 17 years' worth of

25 data. In all, the geographers found that Atlanta is 5 percent more likely to initiate a thunderstorm than the surrounding rural area.

"By our count, that's a couple to three or more storms a year," Haberlie, the study's lead author,

30 says. This doesn't seem like much, but a city's built infrastructure compounds the effects of any storm. For instance, Atlanta's catastrophic 2009 floods probably were worsened because all the asphalt and concrete kept the water from seeping

35 into the soil.

"The discovery that urban environments can create their own storms and rainfall: Not new at all," says J. Marshall Shepherd, a researcher at the University of Georgia who is an expert

40 in urban meteorology. Researchers have long known that cities generally get more rainfall than their surrounding areas. Shepherd says that he and other researchers teased out the relationship between cities and thunderstorms by running

45 models. "Set up studies where you don't include Atlanta, and some where you do, and lo and behold you can see that taking away the city reduces the rainfall," he says. Based on research he's seen, Shepherd says he isn't surprised by

50 the 5 percent difference between Atlanta and its realm. He expected the number to be upward of 20 percent. But despite his misgivings about the degree of difference shown in the current study's results, he says what's really important is that

55 their methods show that these effects are actually happening.

According to Shepherd and Haberlie, these storms are brewed by several factors. First,

60 cities are hotter than surrounding areas. This warm, rising city air creates circulation that mixes with other atmospheric conditions to create thunderheads. Second, tall buildings

65 form a barrier that pushes wind up and around the city. "Upward motion is always good for thunderstorms," says Haberlie. Finally, pollution particles act like nuclei that water glom onto,

70 creating droplets. In essence, cities get more thunder and rain because they are hot, stale, and dirty.

75 But you can't generalize this type of research to every city. Places like New York, Chicago, and Washington D.C. are probably also contributing to their own thunderstorms, but because these cities are so close to large bodies of water, it

80 would be hard to tease this out of radar data the way Haberlie and his co-authors did with Atlanta. Research like this could help city managers plan for bigger influxes of water, either by opening up more reservoirs, or coming up with better

strategies for flooding. But perhaps most important, there is no telling if this research will result in a long-awaited new verse to the AC/DC\*

classic, "Thunderstruck."

\*An Australian rock band popular in the 1970s and 1980s.

"Thunderstruck" was one of their later hits.

43. The author begins the passage by mentioning aspects of city life primarily to
- (A) introduce a specific characteristic of city life about which readers may not be familiar.
  - (B) imply that he grew up in an urban setting.
  - (C) demonstrate how these aspects are affected by weather patterns.
  - (D) point out differences between city and rural life that are just as important as differences in weather.
44. As used in line 13, "modeling" most nearly means
- (A) sculpture.
  - (B) acting.
  - (C) simulations.
  - (D) imitations.



45. According to the passage, approximately how many more storms per year can be expected in Atlanta compared to surrounding rural areas?
- (A) Two or more  
(B) Less than three  
(C) Twice as many  
(D) Half as many
46. Based on the passage, it can be reasonably inferred that the author shares which of the following assumptions about the experimental technique of modeling weather patterns?
- (A) It is as important as data-based methods.  
(B) It is ultimately more effective than data-based methods.  
(C) It provides insight but is not definitive.  
(D) It generates conflicting results.
47. Which choice provides the best evidence for the answer to the previous question?
- (A) Lines 9 – 13 (“New research examined... rural areas.”)  
(B) Lines 13 – 17 (“Through modeling...in action.”)  
(C) Lines 25 – 27 (“In all, the...rural area.”)  
(D) Lines 48 – 51 (“Based on research...its realm.”)
48. Based on the passage, the relationship between Shepherd’s and Haberlie’s research can best be described as
- (A) different approaches to a problem that produce different results.  
(B) different approaches to a problem that produce similar results.  
(C) similar approaches to a problem that produce similar results.  
(D) similar approaches to a problem that produce different results.
49. The author states that cities are “hot, stale, and dirty” (lines 68 – 69) primarily to
- (A) summarize the preceding information.  
(B) point out similarities between two diverging viewpoints.  
(C) express a common opinion.  
(D) clarify his purpose in writing the article.
50. The passage strongly suggests that storm effects have a larger impact on cities than on surrounding areas because
- (A) the same factors that make storms more likely also make them harder to deal with.  
(B) population density in cities makes storm evacuation practices an issue of public safety.  
(C) it is more difficult to predict when they will occur due to the challenges of obtaining data.  
(D) cities represent greater economic investments and are subject to greater losses.
51. The passage strongly suggests that the difference in weather research between Atlanta and New York is due to
- (A) the fundamental ineffectiveness of radar as a research tool.  
(B) the unpredictability of the Atlantic Ocean.  
(C) geographical factors that obscure results.  
(D) a greater concern about flooding effects in cities in the American South.
52. The value of both modeling and interpreting data in verifying weather phenomena is best supported by which choice?
- (A) Lines 9 – 13 (“New research examined... rural areas.”)  
(B) Lines 13 – 17 (“Through modeling...in action.”)  
(C) Lines 40 – 42 (“Researchers have... surrounding areas.”)  
(D) Lines 71 – 76 (“Places like New York...with Atlanta.”)



# Writing and Language Test 3



35 MINUTES, 44 QUESTIONS

Turn to Section 2 of your answer sheet to answer the questions in this section.

**DIRECTIONS** Each of the following passages is accompanied by approximately 11 questions. Some questions will require you to revise the passages in order to improve coherence and clarity. Other questions will require you to correct grammatical errors in the passages. Passages may be accompanied by graphs, charts, or tables that you must consider when making revisions. For most questions, you may select the “NO CHANGE” option if you believe that portion of the passage is clear, concise, and grammatically correct as is.

Within the passages, highlighted numbers followed by underlined text indicate which part of the text corresponds with each question. Bracketed numbers [1] indicate sentence number. These bracketed numbers are only relevant to problems that require you to add or rearrange sentences in a paragraph.

Refer to the passage below to answer questions 1–11.

## Interpreters/Translators

In today’s world, globalization has increased the need to overcome language barriers. While computer applications can translate some information from one language to another, computers cannot yet surpass the human brain in terms of processing language meaningfully. Businesses, governments, and many other organizations still rely on multilingual professionals **1** which can interpret or translate languages.

The two skills—interpreting and translating—are actually separate specialties. Interpreting refers to spoken language or sign language. An interpreter listens to someone **2** speaks, and an interpreter repeats the message in the language of the listeners. In some cases, interpreters may listen in one language and speak in another simultaneously. However, in most interpretive situations, the interpreter can wait for the speaker to pause before relaying the message.

Translators work with written material; they rewrite text **3** as precise as possible in the target language. The task may involve creative challenges, **4** such as how to express an idiomatic phrase that does not translate literally. Some translators also specialize in business-related “localization,” which means

- (A) NO CHANGE  
(B) they  
(C) whom  
(D) who
- (A) NO CHANGE  
(B) speak and repeats  
(C) who speaks and also repeats  
(D) speak, and he or she repeats
- (A) NO CHANGE  
(B) as precise as it is possible  
(C) as precisely as possible  
(D) as precisely as it is possible
- The writer is considering deleting the underlined phrase. Should it be kept or deleted?

(A) Kept, because it provides a relevant example.  
(B) Kept, because it provides a transition to idiomatic phrases.  
(C) Deleted, because it ignores similar creative challenges faced by interpreters.  
(D) Deleted, because it distracts the reader from the paragraph’s focus on written material.



they help companies **5** adapt products or services to consumers in a particular locale. Localization translators serve as experts on **6** local consumers' language and preferences. They help companies avoid embarrassing cultural missteps and successfully design, package, and advertise products or services.

**7** Interpreters and translators may be needed in settings that range from the very humble to the highly prestigious. They may work in local county courtrooms or at meetings of **8** the United Nations. They may work for small rural hospitals or for multinational corporations. Their employers include professional sports teams, publishers, military services, and international aid organizations. Some translators and interpreters work from home via computer, and some travel frequently. Some set up their own freelance businesses.

Becoming a professional interpreter or translator requires earning at least a bachelor's degree, but clearly, the most important skill is complete fluency in at least two languages. **9** Eventual interpreters and translators may also benefit by earning certificates from independent professional organizations in the field. Some employers provide a training period or training materials regarding particular terminology related to a job, such as legal terms used in courtrooms.

Economic forecasters believe that society will experience an increasing need for qualified interpreters and translators in the foreseeable future. The U.S. Bureau of Labor Statistics predicts a 42 percent rise in job opportunities in language interpretation and translation fields between 2012 and 2022. **10** Paradoxically, the biggest need will be for the most commonly spoken languages. **11** Their will also be an increasing need for sign-language interpreters for people with impaired hearing.

5. (A) NO CHANGE  
(B) restore  
(C) transform  
(D) recalibrate
6. (A) NO CHANGE  
(B) local consumer's language and preferences  
(C) local consumers' language, and preferences  
(D) local consumer's language, and preferences
7. Which choice most effectively establishes the main topic of paragraph 4?  
(A) Being a translator or an interpreter is always exciting.  
(B) Fluent bilingualism opens up many opportunities.  
(C) Just think of all the places where people speak different languages.  
(D) Language-related professionals work in extremely diverse fields.
8. Which choice most effectively combines the two sentences at the underlined portion?  
(A) the United Nations, they may work  
(B) the United Nations, also they may work  
(C) the United Nations—they may work  
(D) the United Nations; they may work.
9. (A) NO CHANGE  
(B) Prospective  
(C) Attainable  
(D) Feasible
10. (A) NO CHANGE  
(B) Naturally  
(C) As a result  
(D) On the other hand
11. (A) NO CHANGE  
(B) These  
(C) There  
(D) It



Refer to the passage below to answer questions 12 – 22.

## Floodplains

Most people consider overflowing rivers to be natural disasters. But incongruously, floods support **12** life, including human life through the creation of floodplains. Floodplains are areas of flat and fertile land stretching out on either side of rivers that have flooded countless times over eons. **13** Governments often build dams and levees to prevent flooding in densely populated floodplains. The dilemma is that **14** from the standpoint of geomorphology, in which “geo” stands for “earth,” and “morph” stands for “form,” periodic flooding contributes to the health of the soil as well as the availability of clean water.

Floodplains develop because rivers carry rock and soil downward from mountains. When there is excessive snow or rainfall at the higher elevations, rivers rise above their usual banks and spill over, taking gravel and soil along.

The floodwater spreads out over the land. It sinks into the surface, leaving behind **15** all the stuff that it was carrying. Over the course of time, river floods leave behind so many layers of sediment on either side that wide, flat plains form. The sediment **16** creates rich soil, and supports lush vegetation. Because rivers gradually erode the surfaces over which they flow, **17** floodplains are sometimes located above step-like formations called “terraces.”

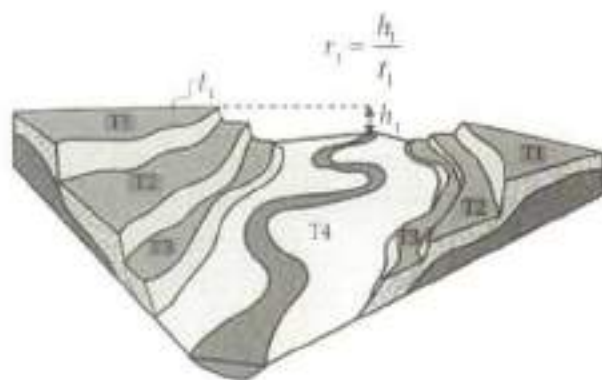
12. (A) NO CHANGE  
(B) life, including human life,  
(C) life: including human life,  
(D) life including human life
13. The author wants to add a sentence at this point to explain the connection between ideas. Which choice best maintains the paragraph’s focus?
- (A) In spite of the danger of flooding, people tend to settle in the floodplains because they can grow healthy crops in the soil.  
(B) People frequently settle in floodplains such as California’s Central Valley, Vietnam’s Mekong River delta, and Bangladesh’s Ganges delta.  
(C) Sometimes ancient cultures adjusted their lives to seasonal, mild flooding, such as in Egypt’s Nile River delta.  
(D) Some geologists predict that flooding will threaten more communities due to the effects of global warming and global population growth.
14. (A) NO CHANGE  
(B) with an eye toward the dynamics of change,  
(C) from a very long-term perspective,  
(D) when experts study the situation,
15. (A) NO CHANGE  
(B) the sediment  
(C) gravel and soil  
(D) the foreign matter
16. (A) NO CHANGE  
(B) creates rich soil, supports  
(C) creates rich soil and  
(D) creates rich soil and supports
17. Which choice accurately and effectively represents the information presented in the diagram?
- (A) NO CHANGE  
(B) floodplains may be surrounded by step-like inclines called “terraces.”  
(C) recently formed flood plains may actually form below the surface of a river.  
(D) large floodplains often form at the bases of steep mountains called “terraces.”



**18** They slow down floods, accommodating water and preventing it from building up even more force downstream. Instead of the excess water tearing up obstacles and charging into the sea, it diffuses calmly over the plains. Gravity slowly pulls the water down, where it replenishes underground aquifers.

An underground aquifer consists of deep layers of permeable rock, sand, and soil that **19** is saturated with drops of water. The water inches through the aquifer, pushed or pulled by natural forces. It is this water that people draw upon when they drill wells. The same mechanisms that cause the water to seep into wells cause it to seep into springs, lake bottoms, and river beds. **20** Geologists estimate that up to 40 percent of the water typically found in rivers and streams comes from underground aquifers.

Therefore, water periodically transfers from rivers to floodplains, from floodplains to underground aquifers, and then back to lakes and rivers. In this cycle, floodplains can improve water quality in two ways. As mentioned, floodplains filter sediment out of the water as it sinks in. Secondly, floodplains can reduce nitrates, which might otherwise contribute to excessive nutrients in aquatic ecosystems. **21** As a result, waterlogged soils harbor types of anaerobic bacteria that break down nitrates. The floodplain's trees and other plants also take up some of the nitrates. The overall result is clear, clean water in the underground aquifer. **22**



T1 – T3: terrace surfaces     $t_1$ : age of T1 surface  
 T4: floodplain surface     $h_1$ : height of T1 terrace  
     $r_1$ : average rate of incision

SOURCE: Terranova 274, "A series of paired river terraces"

18. Which choice most effectively establishes the main topic of paragraph 3?
- (A) There are many reasons that floodplains are important.  
 (B) Excess water is crucial to maintaining floodplains.  
 (C) Floodplains are essentially catch-basins.  
 (D) Flooding does not cause damage in the floodplains.
19. (A) NO CHANGE  
 (B) might be  
 (C) would become  
 (D) are
20. The writer is considering deleting the underlined sentence. Should the sentence be kept or deleted?
- (A) Kept, because it successfully summarizes the essay's main point.  
 (B) Kept, because it adds supportive and relevant information.  
 (C) Deleted, because it adds confusing and unimportant details.  
 (D) Deleted, because it strays from the paragraph's main focus and organization.
21. (A) NO CHANGE  
 (B) In consequence,  
 (C) The reason is that  
 (D) For this reason,
22. The writer wants to conclude the passage with a sentence that emphasizes the importance of floodplains. Which choice would best accomplish this goal?
- (A) From this, it is clear to see the importance of floodplains.  
 (B) Therefore, floodplains support various habitats that are rich in biodiversity.  
 (C) Thus, communities should value floodplains as critical natural resources.  
 (D) It is imperative that communities begin to dismantle their dams and levees.





Refer to the passage below to answer questions 23 – 33.

## Bedu Culture

[1] Before the 20th century ushered in motorized vehicles, the vast deserts of the Middle East—including those in Egypt, the Arabian Peninsula, and Jordan—were nearly impassable, let alone habitable. [2] The only people who did manage to live there were the Bedu, also known as the Bedouin. [3] Records of their traditional culture, however, provide an intriguing example of humans' ability to adapt to even the most extreme landscapes. [4] For centuries, Bedu people herded camels and served as desert guides. [5] Today, the estimated five million Bedu people have mostly settled in modern towns in the Arab region. **23**

Middle Eastern people typically viewed Bedu people with both fear and admiration. The tough desert **24** dweller's had a reputation for engaging in violent feuds and stealing camels. **25** Nonetheless, they were also known for offering extravagant hospitality to anyone who visited them, and they were held in awe for their poetic way of speaking. Europeans who spent time with Bedu in the desert wrote **26** how you could always hear their lively, loud conversation and recitations from their oral literature. Wilfred Thesiger, a British **27** photographer and author, who traveled with Bedu companions between 1945 and 1950, later wrote that all the Bedu individuals whom he knew were "unflagging talkers." Thesiger said that in his experience they found it "an almost unendurable hardship to keep silent."

23. For the sake of the cohesion of paragraph 1, sentence 3 should go
- (A) where it is now  
(B) before sentence 1  
(C) after sentence 1  
(D) after sentence 5
24. (A) NO CHANGE  
(B) dweller  
(C) dwellers  
(D) dwellers'
25. (A) NO CHANGE  
(B) So far,  
(C) In addition,  
(D) Consequently,
26. (A) NO CHANGE  
(B) some on  
(C) a lot about their  
(D) descriptions of
27. (A) NO CHANGE  
(B) photographer and author  
(C) photographer, and author,  
(D) photographer-author,



Constant communication served a practical purpose **28** in a habitat where resources are thinly spread. Meager water sources could support only small groups of people and camels at a time. Therefore, families often had to camp alone or with just a few other families. Thesiger writes that when visitors **29** were arriving, they would signal from far away their friendly intentions by throwing sand in the air. As soon as visitors arrived, they would be offered a seat and a meal. They were often **30** investigated at length, sometimes overnight. The "news" might include where there was currently grass and water for the camels, where friends and foes were camped, and any current anecdotes or personal news from other camps the guest had visited. **31**

[1] Talking also helped pass the time in barren terrain. [2] These oral traditions were repeated so often that virtually everyone memorized them. [3] Since all the listeners shared knowledge of the same literature and lifestyle, they were able to easily understand metaphors, allusions, and unusual vocabulary. [4] Thus, **32** their elusive poetic speaking gave them a way to creatively engage with a small social circle over a long period of time. **33**

28. (A) NO CHANGE  
(B) in a place like that, with thin resources.  
(C) with thinly spreading resources.  
(D) among the thinly spread resources of the habitat.
29. (A) NO CHANGE  
(B) signaled, they could be seen and known for  
(C) came into sight, they would signal  
(D) were seen, signaling
30. (A) NO CHANGE  
(B) impugned  
(C) queried  
(D) diverted
31. Which choice would most effectively conclude paragraph 3?
- (A) Through such encounters, Bedu people gained up-to-date information about their vast surroundings and far-flung community.  
(B) For example, they might learn about someone acquiring new camels, someone getting married, and so on.  
(C) It was especially important for survival to gain knowledge of places that they could take their goats and camels to graze.  
(D) By talking at length with visitors, Bedu people learned everything they needed to know about their desert home.
32. (A) NO CHANGE  
(B) their spoken literary tradition  
(C) tradition  
(D) a highly developed tradition
33. The writer wants to add the following sentence to the paragraphs.
- From childhood, the Bedu heard thousands of stories, songs, and poems.
- The best placement for this sentence is
- (A) after sentence 1  
(B) after sentence 2  
(C) after sentence 3  
(D) after sentence 4



Refer to the passage below to answer questions 34–44.

## Art in the Civil War

— 1 —

**34** The American Civil War was fought from 1861 to 1865 because the United States' northern and southern regions found it impossible to compromise on a fundamental question: whether the federal government could overrule states. In particular, representatives of the southern states feared that the federal government would overrule them by outlawing **35** slavery. The economy of the South was based on slavery. The resulting war caused the death of at least 600,000 soldiers, and wreaked havoc on civilians through disease and destruction.

— 2 —

Ironically, some of the best-known American writers were alive at the time—Ralph Waldo Emerson, Frederick Douglass, Herman Melville, Walt Whitman, Mark Twain, Emily Dickinson, and Henry Wadsworth Longfellow. While some produced elegiac poems, **36** none of them were able to produce a novel or body of poetry that conveyed the turmoil that soldiers and families endured. It was not until 39 years after the war that a young Stephen Crane was able to write such a novel, *The Red Badge of Courage*, based on first-hand **37** accounts that he read, or heard, from veterans.

— 3 —

Historians have noted that during the Civil War, **38** American writing was in a transition period away from Victorian romanticism, but not yet free of it. Perhaps it was too difficult to glean insights from the morally ambiguous situation: people on both sides held **39** equivocal views on the issues, yet they also felt disillusioned by the terrifying reality of war.

34. (A) NO CHANGE  
 (B) People in the north of America and people in the south went to civil war against each other from 1861 to 1865 for the simple reason that they  
 (C) From 1861 to 1865, the United States northern and southern regions fought against each other in the American Civil War. They  
 (D) The American Civil War, from 1861 to 1865, pitched the South against the North, expressly because, as it turned out, they
35. Which choice most effectively combines the sentences at the underlined portion?  
 (A) slavery, which sustained the South's economy.  
 (B) slavery, the main support of the southern economy.  
 (C) slavery since the southern economy could not do without slavery.  
 (D) slavery; yet slavery supported the southern economy.
36. (A) NO CHANGE  
 (B) none of them was  
 (C) none of the writers were  
 (D) none of the poems were
37. (A) NO CHANGE  
 (B) accounts—that he read, or heard,  
 (C) accounts that he read or heard,  
 (D) accounts that he read or heard
38. (A) NO CHANGE  
 (B) American authors published very little that illustrated the war experience.  
 (C) American authors tended to publish material about travels in Europe or other comforting distractions.  
 (D) American authors remained largely silent.
39. (A) NO CHANGE  
 (B) unequal  
 (C) indefinite  
 (D) unequivocal



— 4 —

Visual artists found it easier to focus on the war even while in its midst. Photography was a recent invention. Cameras still had slow shutter speeds and could not yet capture activity, but photographers documented the gruesome aftermath of battles. **40** Photographers Mathew Brady and Alexander Gardner held photo exhibits in northern cities, providing alarming views of corpse-strewn landscapes. Meanwhile, newspapers and magazines could not yet print photographs, so many hired sketch artists and sent them to the front lines. The artists lived with the troops and risked getting close to battle so they could report accurate images. Probably the most skilled and daring of these artists was Alfred Waud, who excelled at depicting movement. In his images, men and horses run, cannons blast, trains run off bridges, **41** and everywhere there is fire and smoke. War looks anything but glorious.

— 5 —

A young Winslow Homer, **42** one of Americas most gifted painters, worked as a sketch artist near the front during the war and also produced a number of paintings. His 1864 painting *Skirmish in the Wilderness* depicts a small group of soldiers engaged in combat in a forest. One of the men is down. The opposing forces cannot be seen through the thickets and shadows. It is impossible to perceive why one soldier is shooting and another **43** runs up with a drawn sword. Consequently, the image conveys panic, disorder, and dread. Homer seems to offer the scene as a metaphor for the larger war. **44**

40. The writer is considering cutting the underlined sentence. Should it be kept or deleted?
- (A) Kept, because it supports the previous point about documenting the consequences of battles.  
 (B) Kept, because it supports the writer's point about the importance of photography as an art.  
 (C) Deleted, because it is confined to only two examples of photographers.  
 (D) Deleted, because it blurs the paragraph's focus on the visual arts in general.
41. (A) NO CHANGE  
 (B) and also fire and smoke are there.  
 (C) fires blaze, and smoke billows.  
 (D) fires are threatening, and smoke is everywhere.
42. (A) NO CHANGE  
 (B) one of Americans  
 (C) one of America's  
 (D) one of Americas'
43. (A) NO CHANGE  
 (B) is running up  
 (C) ran up  
 (D) was running up

Think about the previous passage as a whole as you answer question 44.

44. To make the passage most logical, paragraph 3 should be placed
- (A) after paragraph 1  
 (B) where it is now  
 (C) after paragraph 4  
 (D) after paragraph 5





# Math Test 3 – No Calculator



25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

## DIRECTIONS

For questions 1 – 15, find the solution to each problem and select the most appropriate answer from the choices provided. For questions 16 – 20, find the solution to each problem and write your answer in the space provided. You may use the blank space in your test booklet for scratch work.

## NOTES

1. The use of a calculator on any part of this section is forbidden.
2. Unless otherwise indicated, all variables and expressions used in this test represent real numbers.
3. Unless otherwise indicated, all figures used in this test are drawn to scale.
4. Unless otherwise indicated, all figures used in this test lie on a plane.
5. Unless specified otherwise, a given function,  $f$ , has the domain the set of all real numbers  $x$  for which  $f(x)$  is a real number.

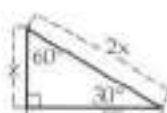
## REFERENCE



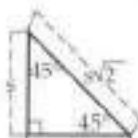
$$A = \frac{1}{2}bh$$



$$c^2 = a^2 + b^2$$



Special Right Triangles



$$A = \pi r^2$$

$$C = 2\pi r$$



$$A = lw$$



$$V = lwh$$



$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}lwh$$

The arc of a circle is 360 degrees or  $2\pi$  radians.

A triangle has angles that sum to 180 degrees.



1.  $x^2(y + 3) = 12$

If  $(x, y)$  is a solution to the equation above, and  $x$  and  $y$  are both integers, which of the following could NOT be a value of  $x$ ?

- (A) -1  
(B) 0  
(C) 2  
(D) 3

2. A sociologist determines that the population of a city will grow at 3% per year for the next 20 years. If the current population is 850,000, which of the following expressions represents the population  $x$  years in the future?

- (A)  $(850,000)(1.03)^x$   
(B)  $(850,000) + (1.03)^x$   
(C)  $\frac{850,000}{1.03^x}$   
(D)  $(850,000)(1.03)x^2$

3. What is the equation of the line that passes through the point  $(1, 2)$  and is perpendicular to the line  $x + y = 2$ ?

- (A)  $y = 1 - x$   
(B)  $y = 3 - x$   
(C)  $y = 1 + x$   
(D)  $y = 2 + x$

4. Mary wants to print flyers for her fundraising event. Printing costs \$0.25 per copy for the first 100 copies, \$0.20 per copy for the next 200 copies, and \$0.10 per copy for every copy after that. The entire purchase is subject to an 11% sales tax. Which of the following represents the cost of printing, in dollars, as a function of the number of flyers,  $x$ , assuming Mary prints at least 500 flyers?

- (A)  $[(100)(0.25) + (200)(0.2) + (x - 300)(0.1)](1.11)$   
(B)  $[(100)(0.25) + (100)(0.2) + (x - 200)(0.1)](1.11)$   
(C)  $(100)(0.25) + (200)(0.2) + (x - 300)(0.1)$   
(D)  $[(x - 100)(0.25) + (x - 200)(0.2) + (x - 300)(0.1)](1.11)$

5. Three boys can paint a fence in 5 hours. How many hours would it take four boys to paint the same fence?

- (A)  $\frac{3}{4}$   
(B) 3  
(C)  $3\frac{3}{4}$   
(D) 4





6. Angelo makes  $x$  dollars for  $y$  hours of work. Sarah makes the same amount of money for one less hour of work. Which of the following expressions represents the positive difference between their hourly wages?

(A)  $\frac{x}{y-1} + \frac{x}{y}$

(B)  $\frac{x}{y} - \frac{x}{y-1}$

(C)  $\frac{x}{y-1} - \frac{x}{y}$

(D)  $\frac{y-1}{x} - \frac{y}{x}$

7.

$$\begin{aligned} \frac{1}{2}x - \frac{1}{4}y &= 5 \\ ax - 3y &= 20 \end{aligned}$$

If the system of linear equations above has no solution, what is the value of the constant  $a$ ?

(A)  $\frac{1}{2}$

(B) 2

(C) 6

(D) 12

8. Barbara is planning a lunch for her Sailing Club. It costs \$250 to rent the venue, and \$15 per guest for food. If the total cost of the lunch is graphed as a function of the number of guests, which of the following represents the slope?

(A) 1

(B) 15

(C) 25

(D) 250

9. If  $(x+1)^2 = 4$  and  $(x-1)^2 = 16$ , what is the value of  $x$ ?

(A) -3

(B) -1

(C) 1

(D) 3

10. If the rational expression  $\frac{9x^2 + 4}{x+1}$  is rewritten in the equivalent form  $\frac{5}{x+1} + A$ , what is  $A$  in terms of  $x$ ?

(A)  $x-1$

(B)  $x+1$

(C)  $9x-9$

(D)  $12x-3$

11. Julie, the manager of a tea shop decides to experiment with a new blend. She mixes some Earl Grey tea at \$5 per pound with Orange Pekoe tea at \$3 per pound to make 100 pounds of the new blend. The selling price for the new blend is \$4.50 per pound, reflecting the prices and proportions of the component teas. How many pounds of the Earl Grey are in the blend?

(A) 70

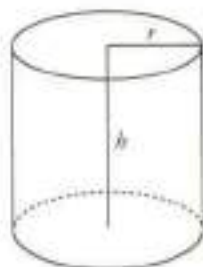
(B) 75

(C) 80

(D) 85



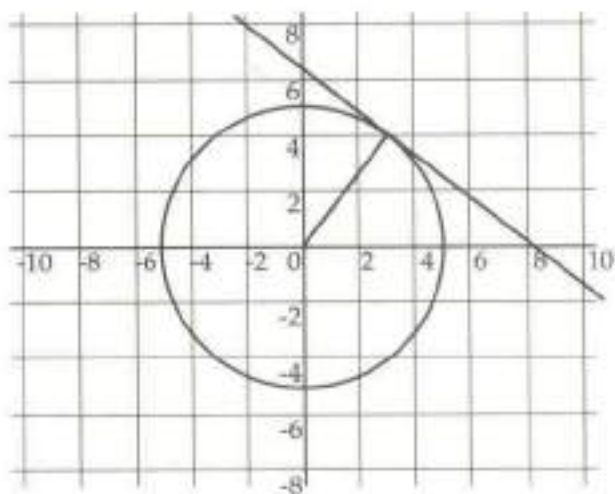
12. If the radius of a circular cylinder is decreased by 50%, and its height is simultaneously increased by 60%, what is the change in volume?



- (A) An increase of 40%  
 (B) A decrease of 40%  
 (C) An increase of 60%  
 (D) A decrease of 60%
13. If  $A$ ,  $B$ , and  $C$  are constants such that for all values of  $x$ ,  $x^2 - x - 2 = (Ax + B)(x - 2) + C(x + 3)$ , what is the value of  $A$ ?

- (A) 1  
 (B) 2  
 (C) 3  
 (D) 4

14.



Which of the following equations represents the line tangent to the circle  $x^2 + y^2 = 25$  at the point  $(3, 4)$ ?

- (A)  $3x + 4y - 25 = 0$   
 (B)  $3x - 4y - 25 = 0$   
 (C)  $4x + 3y + 3 = 0$   
 (D)  $4x - 3y = 0$
15. An equilateral triangle is inscribed in a circle with a radius of 2 meters. What is the area of this triangle?
- (A)  $\sqrt{3}$   
 (B)  $2\sqrt{3}$   
 (C)  $3\sqrt{3}$   
 (D)  $\pi\sqrt{3}$







## DIRECTIONS

For questions 16 – 20, find the solution to the problem and enter your answer as demonstrated below.

1. Only the answer that is bubbled in on the answer sheet will be credited. The blank spaces above the bubbles are for you to record your answers for accuracy.
2. Only fill in one bubble in any given column.
3. There are no negative answers in this portion of the test.
4. If a problem appears to have more than one answer, only enter one answer. If the answer you enter is one of the correct solutions, you will receive full credit for that question.
5. If the correct answer can be expressed as a mixed number, it must be entered as a decimal or an improper fraction.
6. If the correct answer is a decimal that cannot fit into the grid space, you must fill the grid with enough digits to completely fill the space. The number can be rounded or simply shortened but must.

Write answer in boxes.

Answer:  $\frac{5}{36}$       Answer: 4.5

	5	/	3	6			4	.	5
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← Fraction line  
← Decimal point

Acceptable ways to grid  $\frac{1}{6}$  are:

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Grid in result.	0	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
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	2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
	3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
	4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
	5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
	6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>			
	7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
	8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				

Answer: 302 - either position is correct

	3	0	2				3	0	2
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Grid in result.	0	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	3	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

## NOTES

Begin entering answers in any column that accommodates your answer. If you do not need a column do not enter anything in that column.





16. Daisha bought a car for \$15,000, and its value depreciated linearly. After 3 years, the value of the car was \$11,250. What is the amount, in dollars, of yearly depreciation?

ANSWER: \_\_\_\_\_

17. If  $a$  and  $b$  are numbers such that  $(a-4)(b+6) = 0$ , then what is the smallest possible value of  $a^2 + b^2$ ?

ANSWER: \_\_\_\_\_

18. If the graph of  $y = x^2 + mx + n$  passes through the points  $(1, 12)$  and  $(3, 28)$ , what is the value of the product  $mn$ ?

ANSWER: \_\_\_\_\_

19. If  $x - 2$  is a factor of  $x^3 - kx^2 + kx + 2$ , where  $k$  is a constant, what is the value of  $k$ ?

ANSWER: \_\_\_\_\_

20. The table below shows some values for the function  $N$ .

$t$	0	1	2
$N(t)$	128	16	2

If  $N(t) = k \cdot 2^{-at}$  for positive constants  $k$  and  $a$ , what is the value of  $a$ ?

ANSWER: \_\_\_\_\_





# Math Test 3 – Calculator



55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

## DIRECTIONS

For questions 1 – 30, find the solution to each problem and select the most appropriate answer from the choices provided. For questions 31 – 38, find the solution to each problem and write your answer in the space provided. You may use the blank space in your test booklet for scratch work.

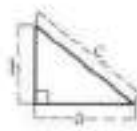
## NOTES

1. The use of a calculator on any part of this section is allowed.
2. Unless otherwise indicated, all variables and expressions used in this test represent real numbers.
3. Unless otherwise indicated, all figures used in this test are drawn to scale.
4. Unless otherwise indicated, all figures used in this test lie on a plane.
5. Unless specified otherwise, a given function,  $f$ , has the domain the set of all real numbers  $x$  for which  $f(x)$  is a real number.

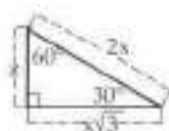
## REFERENCE



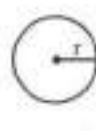
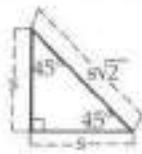
$$A = \frac{1}{2}bh$$



$$c^2 = a^2 + b^2$$



Special Right Triangles



$$A = \pi r^2$$

$$C = 2\pi r$$



$$A = lw$$



$$V = lwh$$



$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



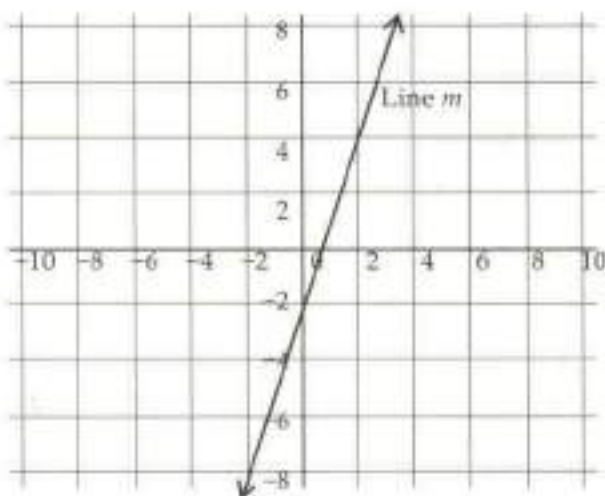
$$V = \frac{1}{3}lwh$$

The arc of a circle is 360 degrees or  $2\pi$  radians.  
A triangle has angles that sum to 180 degrees.





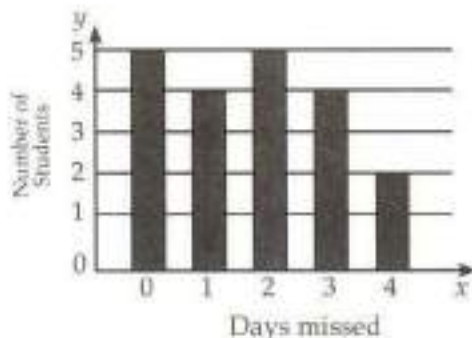
1.



Line  $m$  has a positive slope and a negative  $y$ -intercept. What happens to the  $x$ -intercept if the slope and the  $y$ -intercept are doubled?

- (A) The  $x$ -intercept becomes four times larger.  
 (B) The  $x$ -intercept becomes twice as large.  
 (C) The  $x$ -intercept becomes one-fourth as large.  
 (D) The  $x$ -intercept remains the same.

2.



According to the bar graph above, what is the average number of days missed by students in the class?

- (A) 1.5  
 (B) 1.7  
 (C) 3.4  
 (D) 4

3. If  $f(x)$  is a linear function,  $f(3) = 1$  and  $f(2) = 5$ , what is the  $y$ -intercept?

- (A)  $-4$   
 (B)  $1$   
 (C)  $11$   
 (D)  $13$

Questions 4 and 5 refer to the following information.

The following table shows the results of a survey distributed to thousands of households. Households were asked to select which, if any, forms of public transportation they use regularly. Some households used more than one form of public transportation.

*Households Using Public Transport, 2010*  
*(numbers in thousands);*  
*U.S. Census Bureau*

	Northeast	Midwest	South	West
Local Public Bus	4595	2365	2853	4501
Subway, Lightrail, Trolley	3487	816	1337	2067
Commuter or Inner-city Train	1296	457	187	457
Total Number of Households Using Public Transportation	6862	3265	4116	5925

4. Which region had the highest proportion of households using public transportation that used the public bus in 2010?
- (A) Northeast  
 (B) Midwest  
 (C) South  
 (D) West

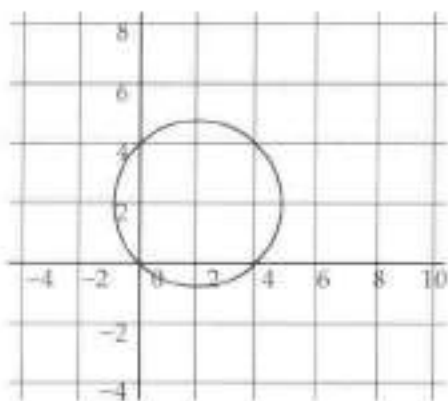




5. What percentage of households that used public transport in the Midwest made use of a commuter or inner-city train?

(A) 7.7  
 (B) 12.6  
 (C) 14.0  
 (D) 18.9

6.



What is the area of the circle that passes through the points  $(0, 0)$ ,  $(0, 4)$ , and  $(4, 0)$ ?

(A)  $3\pi$   
 (B)  $2\sqrt{2}\pi$   
 (C)  $8\pi$   
 (D)  $16\pi$

7. Larry is driving from Charlotte to Charleston—a distance of 380 miles—with his friend, Omar. Larry and Omar have agreed to split the cost of gas in half. If Omar's car gets 28 miles per gallon, and gas costs  $x$  dollars per gallon, which of the following represents the total cost of the trip for Larry?

(A)  $\frac{380x}{28} + \frac{1}{2}$   
 (B)  $\frac{380x}{28}$   
 (C)  $\frac{380x}{28} + \frac{1}{28} + \frac{1}{2}$   
 (D)  $\frac{190x}{28} + \frac{1}{2}$

8. During a 3-year boom, a government experienced a budget surplus of \$15 million per year. An economist predicts that annual revenue will drop to \$40 million below current levels and remain at that level for the next 5 years. By how much must the government reduce expenditures yearly to maintain a balanced budget over this period?

(A) \$8 million  
 (B) \$16 million  
 (C) \$25 million  
 (D) \$40 million

9. A region is defined by the system:

$$\begin{aligned} y &> 2x + 1 \\ y &\leq -x + 2 \end{aligned}$$

In which quadrants of the coordinate plane is the region located?

(A) I, II, III only  
 (B) II, III only  
 (C) III, IV only  
 (D) I, II, III, IV





10. If 10 boys averaged 88% on a test on which 15 girls averaged 75%, what was the test average for all 25 students?
- (A) 76.4%  
(B) 80.2%  
(C) 84.6%  
(D) 86.2%
11. The difference of two numbers is 2. If the difference of their squares is 18, what is their sum?
- (A) 20  
(B) a number between 10 and 16  
(C) a number between 5 and 8  
(D) a number between 7 and 10
12. The function  $h$  given by  $h(t) = -16t^2 + 48t + 5$  represents the height of a ball, in feet,  $t$  seconds after it is thrown. To the nearest foot, what is the maximum height reached by the ball?
- (A) 5  
(B) 23  
(C) 31  
(D) 41
13. Brad and Tom are comparing their classes' scores on a math test. Both of their classes had mean scores of 80 on the test, but Brad's class had a range of 6 while Tom's class had a range of 30. If the highest possible score was 100, which class had the LOWEST score in it?
- (A) Brad's class had the lowest score in it.  
(B) Tom's class had the lowest score in it.  
(C) The lowest score occurred in both classes.  
(D) It cannot be determined from the information.
14. A 2-cup mixture consists of  $\frac{1}{3}$  flour and  $\frac{2}{3}$  cornmeal. If 1 cup of flour is added to make a 3-cup mixture, approximately what percent of the 3-cup mixture is flour?
- (A) 65%  
(B) 56%  
(C) 50%  
(D) 45%
15. Brian has taken five exams in his biochemistry class and scored 56, 55, 41, 29, and 86 (out of a possible 100). The only exam remaining is the class final, which is worth twice as many points as each of the previous exams. If he must average 65 to pass the course, what is the minimum grade he must receive on the final exam to pass?
- (A) 62  
(B) 94  
(C) 100  
(D) He cannot pass the course.





16. A taxi charges \$0.30 for the first mile and \$0.15 for each additional mile a passenger travels. If a passenger rides in the taxi for  $x$  miles, which of the following expressions describes the cost of this ride in dollars as a function  $f(x)$ ?
- (A)  $f(x) = 0.30 + 0.15x$   
(B)  $f(x) = 0.30 + 0.15(1 - x)$   
(C)  $f(x) = 0.30 + 0.15(x - 1)$   
(D)  $f(x) = 0.30 + 0.15x - 1$
17. A store received \$823.00 for the sale of 5 tape recorders and 7 radios. If the receipts from the tape recorders exceeded the receipts from the radios by \$137.00, what is the price of a tape recorder?
- (A) \$49  
(B) \$96  
(C) \$68  
(D) \$84
18. Car A takes 15 seconds to go once around a circular racetrack, and car B takes 25 seconds to go once around the same track. If the two cars begin racing from the same position at the same time, how many seconds will it take for car A to pass car B?
- (A) 1.67 seconds  
(B) 10.5 seconds  
(C) 31.4 seconds  
(D) 37.5 seconds
19. The distance in meters that has been covered by a car at a given time,  $t$  (in seconds), after its departure is equal to  $35t + 5t^2$ . During what time period will the car travel between 75 and 130 meters?
- (A)  $1.7 \leq t \leq 2.7$   
(B)  $1.5 \leq t \leq 2.5$   
(C)  $1.6 \leq t \leq 2.8$   
(D)  $1.8 \leq t \leq 2.8$
20. Peter has invested \$8,000 in stocks and bonds. The stocks pay 4% interest, and the bonds pay 7% interest. If his annual income from both is \$500, how much is invested in bonds?
- (A) \$2,000  
(B) \$3,500  
(C) \$4,000  
(D) \$6,000
21. The cost of a piece of lumber is directly proportionally to its length. A piece of lumber 16 feet long costs \$12.00. What is the cost, in dollars, of a piece of lumber  $x$  yards long?  
(1 yard = 3 feet)
- (A)  $x - 2$   
(B)  $3x - 2$   
(C)  $\frac{3}{4}x$   
(D)  $\frac{9}{4}x$





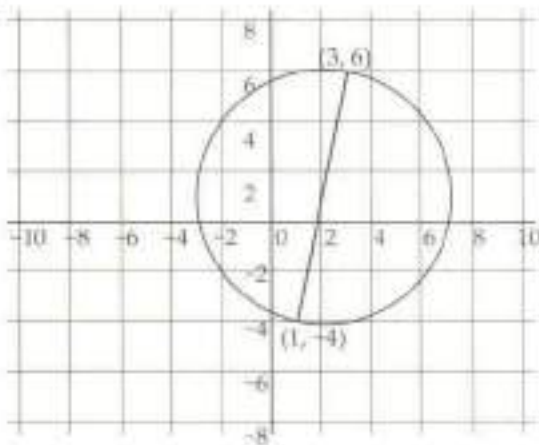
22. Let  $a$  and  $b$  be numbers such that  $a^3 = b^2$ . Which of the following is equivalent to  $b\sqrt[3]{a}$ ?

- (A)  $b^{\frac{1}{3}}$   
(B)  $b^{\frac{1}{6}}$   
(C)  $b^{\frac{2}{3}}$   
(D)  $b^{\frac{4}{3}}$

23. A website makes \$0.002 for every page view, an additional \$0.01 if a visitor clicks through, and additional \$0.10 if a visitor that clicks through clicks more than once. If 30% of visitors clicks through, and 10% of visitors that click-through clicks more than once, how many total visitors are needed to reach an advertising revenue of \$100,000?

- (A) 6.3 million  
(B) 12.5 million  
(C) 20 million  
(D) 125 million

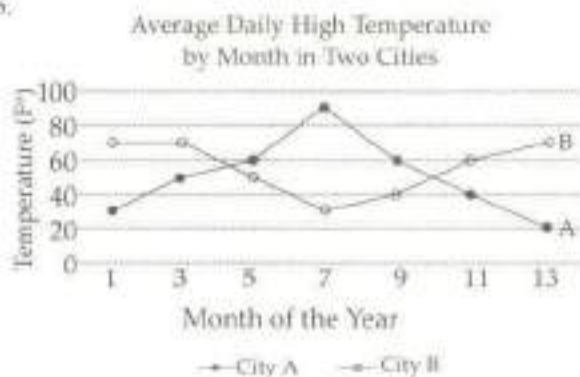
24.



Which of the following is the equation of the circle whose diameter is the line segment connecting points  $(3, 6)$  and  $(1, -4)$ ?

- (A)  $(x - 2)^2 + (y - 1)^2 = 26$   
(B)  $(x - 1)^2 + (y + 4)^2 = 104$   
(C)  $(x + 2)^2 + (y + 1)^2 = 26$   
(D)  $(x + 2)^2 + (y + 1)^2 = 25$

25.



According to the graph, what was City B's average daily high, in Fahrenheit, during the two month period over which City A's average daily temperature increased by the greatest percentage?

- (A) 38  
(B) 40  
(C) 52  
(D) 66

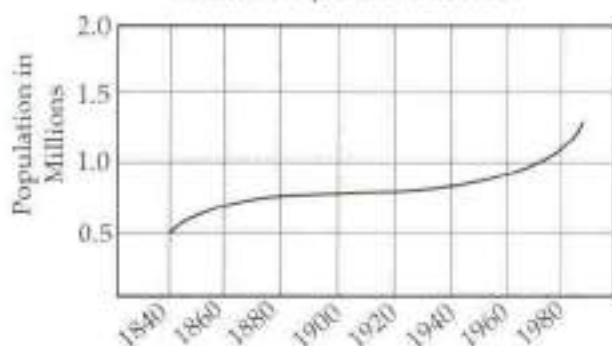






26.

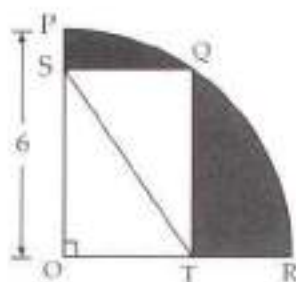
Maine's Population Growth



According to the graph, approximately how many years did it take for Maine's population to double from what it was in 1840?

- (A) 25  
 (B) 40  
 (C) 70  
 (D) 130

27.



In the figure, arc PQR is one quarter of a circle with center O and radius 6. If the quadrilateral OSQT is a rectangle, what is the perimeter of shaded region?

- (A)  $8 + 3\pi$   
 (B)  $12 + 3\pi$   
 (C)  $14 + 3\pi$   
 (D)  $1 + 6\pi$

28. If  $(3 + 2i) - (a + 3i) = 10 - i$ , what is the real number  $a$ ?

- (A)  $2^{\frac{1}{2}}$   
 (B)  $-7 - 2i$   
 (C)  $-7$   
 (D) 6

29.

$$2\cos x - \sqrt{2} = 0$$

Find the value of an acute angle  $x$  that satisfies the equation above.

- (A)  $30^\circ$   
 (B)  $60^\circ$   
 (C)  $40^\circ$   
 (D)  $45^\circ$

30. Let  $f(x)$  be a function such that  $f(x) = 2f(x - 1) + 4$  and  $f(0) = 16$ . What is the value of  $f(-2) + f(2)$ ?

- (A) 0  
 (B) 16  
 (C) 32  
 (D) 77





**DIRECTIONS**

For questions 31 – 38, find the solution to the problem and enter your answer as demonstrated below.

1. Only the answer that is bubbled in on the answer sheet will be credited. The blank spaces above the bubbles are for you to record your answers for accuracy.
2. Only fill in one bubble in any given column.
3. None of the answers on this portion of the test are negative values.
4. If a problem appears to have more than one answer, only enter one answer. If the answer you enter is one of the correct solutions, you will receive full credit for that question.
5. If the correct answer can be expressed as a mixed number, it must be entered as a decimal or an improper fraction.
6. If the correct answer is a decimal that cannot fit into the grid space, you must fill the grid with enough digits to completely fill the space. The number can be rounded or simply shortened but must fill every blank space.

Answer:  $\frac{3}{36}$       Answer: 4.5

Write answer in boxes. →

Grid in result. →

← Fraction line  
← Decimal point

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1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Acceptable ways to grid  $\frac{1}{6}$  are:

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3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	6	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	6	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Answer: 302 - either position is correct

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1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	2	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**NOTES**

Begin entering answers in any column that accommodates your answer. If you do not need a column do not enter anything in that column.





31. On a map, a quarter inch represents 20 actual miles. How many inches on the map separate two towns that are 325 miles apart?

ANSWER: \_\_\_\_\_

32. A chemistry student has 45 milliliters of a 20% salt solution. How many milliliters of salt are in the solution?

ANSWER: \_\_\_\_\_

33.

$$\begin{aligned} y &= 4 \\ -3x^2 + y^2 &= 52 \end{aligned}$$

If  $(x, y)$  is a solution to the system of equations above and  $x > 0$ , what is the value of  $x$ ?

ANSWER: \_\_\_\_\_

34. A ball is dropped from a height of 30 feet. Each time it strikes the ground, it bounces up to  $\frac{4}{5}$  of the previous height. How many times does the ball hit the ground before it bounces up less than 6 feet?

ANSWER: \_\_\_\_\_

35. Linda receives 3% in royalties for every paper copy of her book that is sold. In addition, she receives 20% in royalties for every electronic copy. In the month of February, her book sold 1,200 paper copies at \$29.95, and 800 electronic copies at \$16.95. How much did she receive from royalties in February? (Round your answer to the nearest dollar.)

ANSWER: \_\_\_\_\_





36. To measure the height of Lincoln's head on Mt. Rushmore, two sightings 800 feet from the base of the mountain are taken. If the angle of elevation to the bottom of Lincoln's face is  $32^\circ$ , and the angle of elevation to the top is  $35^\circ$ , what is the height, in feet, of Lincoln's face? (Round your answer to the nearest foot.)

ANSWER: \_\_\_\_\_

**Questions 37 and 38 are based on the following information:**

A new online music streaming service reached peak volume the previous year with 8-billion songs streamed.

37. **Part 1**  
If volume increased 50% during the second half of the year, what was the average number streams per month, in millions, during this period?

ANSWER: \_\_\_\_\_

38. **Part 2**

The most-streamed single of the year represented 0.3% of all plays during the fifth, sixth, and seventh months of the year. If the song was streamed 7.1 million times during this period, what was the total number of all streams, in billions, during the same three-month period?

ANSWER: \_\_\_\_\_



## Essay Test 3



50 MINUTES, Prompt-based essay

Turn to Section 5 of your answer sheet to answer the question in this section.

### DIRECTIONS

As you read the passage below, consider how Susanna Heckman uses

- evidence, such as facts or examples, to support claims.
- reasoning to develop ideas and to connect claims and evidence.
- stylistic or persuasive elements, such as word choice or appeals to emotion, to add power to the ideas expressed.

Adapted from "The Graphic Novel: A Historical Perspective," ©2015 by KALLIS EDU.

Speech balloons have a long and fascinating history. In modern times, they characterize the modes of expression referred to as the comic-book, the cartoon, and the graphic novel. This little device is extremely effective at communicating ideas without taking up much space. As a result, speech balloons imbue their messages with urgency, an important characteristic that has inspired a wide variety of uses. For example, they are often the vehicle of potent political messages, as well as the spring that propels action-packed sequences in superhero comics.

One of the earliest versions of the speech balloon, which dates to 13th century medieval France, is the "banderole" (literally, "small banner"). This term describes flags or banners in general, but also refers to speech scrolls that appear in painting or sculpture. Banderoles denote speech action in the picture, and are often depicted emanating from a person's mouth. An early example is found in the *Postilles de Nic. de Lire sur la Bible*, a 15th century French manuscript. It includes an illustration of clergymen in conference before a crucifix and makes use of banderoles to represent their prayers.

*The Yellow Kid*, an early newspaper comic by Richard Outcault (considered by some to be the first modern comic), brought the medium unprecedented exposure at the start of the 20th century. Comics and comic-books rose in popularity during The Great Depression as a form of cheap entertainment, and peaked in the 1940s with the advent of the enormously successful superhero comic. As the industry grew, publishers and artists established conventions intended to standardize production and facilitate reading. They capitalized general text and reserved lower-case letters for particular effect. They used detached circles in place of a solid tail for "thought" balloons, and spiky balloons for shouting. Captions also found their place, most often for depicting narration.

Artists and writers began experimenting with the speech balloon as a means of creative expression. Soon there would be "monster" balloons for depicting fear, icicle balloons to indicate a frosty exchange, and colored balloons to express mood. Even *The Yellow Kid* often placed the Yellow Kid's



speech on his oversized smocks instead of in standard bubbles.

Occasionally, speech balloons themselves became a focal point of action. One of the longest-running newspaper comics, Walt Kelly's *Pogo*, often shows characters physically manipulating speech balloons in humorous ways. The novel *Who Censored Roger Rabbit?*, while not a comic book or graphic novel, provided a bridge between comics and animated cartoons when it described a murdered cartoon character whose final words are found in a speech balloon stuffed under its lifeless body.

Many people now consider comic books and graphic novels serious art forms. They have been studied and written about from the perspectives of art history, art theory, and literary criticism. They have even been explored in the context of neurobiology, concerning the effect they have on the visual and language centers of our brains. Even outside of comics, the speech balloon continues to enjoy a life of its own. It is seen in novel forms such as the "speech balloon" interface of text-messaging, and the modern-day rebuses known as "emojis."

Write an essay in which you explain how the author builds an argument to persuade her audience that the addition of visual elements adds complexity to literature. In your essay, analyze how the author uses one or more of the features listed in the box above (or features of your own choice) to strengthen the logic and persuasiveness of her argument. Be sure that your analysis focuses on the most relevant features of the passage.

Your essay should not explain whether you agree with the author's claims, but rather explain how the author builds an argument to persuade her audience.



# SAT® Practice Test #4

## IMPORTANT REMINDERS:

1

When you take the official SAT, you will need to use a No. 2 pencil. Do not use a pen or a mechanical pencil.

2

On the official SAT, sharing any of the question on the test violates the College Board's policies and may result in your scores being canceled.

(This cover is modeled after the cover you'll see when you take the official SAT.)

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# Reading Test 4



65 MINUTES, 52 QUESTIONS

Turn to Section 1 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each passage or pair of passages is accompanied by 10 or 11 questions. Read each passage or pair of passages, and then select the most appropriate answer to each question. Some passages may include tables or graphs that require additional analysis.

Refer to the passage below to answer questions 1 – 10.

This passage is adapted from Mary Shelley, *Frankenstein*, originally published in 1818.

line It was on a dreary night of November that  
I beheld the accomplishment of my toils. With  
an anxiety that almost amounted to agony, I  
collected the instruments of life around me, that  
5 I might infuse a spark of being into the lifeless  
thing that lay at my feet. It was already one in the  
morning; the rain pattered dismally against the  
panes, and my candle was nearly burnt out, when,  
by the glimmer of the half-extinguished light, I  
10 saw the dull yellow eye of the creature open; it  
breathed hard, and a convulsive motion agitated  
its limbs.

How can I describe my emotions at this  
catastrophe, or how delineate the wretch  
15 whom with such infinite pains and care I  
had endeavored to form? His limbs were in  
proportion, and I had selected his features as  
beautiful. Beautiful! Great God! His yellow skin  
scarcely covered the work of muscles and arteries  
20 beneath; his hair was of a lustrous black, and  
flowing; his teeth of a pearly whiteness; but these  
luxuriances only formed a more horrid contrast  
with his watery eyes, that seemed almost of the  
same color as the dun-white sockets in which they  
25 were set, his shriveled complexion and straight  
black lips.

The different accidents of life are not so  
changeable as the feelings of human nature. I had  
worked hard for nearly two years, for the sole  
30 purpose of infusing life into an inanimate body.  
For this I had deprived myself of rest and health.  
I had desired it with an ardor that far exceeded  
moderation; but now that I had finished, the  
beauty of the dream vanished, and breathless

35 horror and disgust filled my heart.

Unable to endure the aspect of the being I had  
created, I rushed out of the room and continued a  
long time traversing my bed-chamber, unable to  
compose my mind to sleep.

40 At length lassitude succeeded to the tumult  
I had before endured, and I threw myself on the  
bed in my clothes, endeavoring to seek a few  
moments of forgetfulness. But it was in vain; I  
slept, indeed, but I was disturbed by the wildest  
45 dreams. I thought I saw Elizabeth, in the bloom  
of health, walking in the streets of Ingolstadt.  
Delighted and surprised, I embraced her, but as  
I imprinted the first kiss on her lips, they became  
livid with the hue of death; her features appeared  
50 to change, and I thought that I held the corpse of  
my dead mother in my arms; a shroud enveloped  
her form, and I saw the grave-worms crawling in  
the folds of the flannel.

I started from my sleep with horror; a cold  
55 dew covered my forehead, my teeth chattered,  
and every limb became convulsed; when, by the  
dim and yellow light of the moon, as it forced  
its way through the window shutters, I beheld  
the wretch—the miserable monster whom I had  
60 created. He held up the curtain of the bed; and  
his eyes, if eyes they may be called, were fixed  
on me. His jaws opened, and he muttered some  
inarticulate sounds, while a grin wrinkled his  
cheeks. He might have spoken, but I did not hear;  
65 one hand was stretched out, seemingly to detain  
me, but I escaped and rushed downstairs. I took  
refuge in the courtyard belonging to the house  
which I inhabited, where I remained during the  
rest of the night, walking up and down in the  
70 greatest agitation, listening attentively, catching  
and fearing each sound as if it were to announce  
the approach of the demoniacal corpse to which I  
had so miserably given life.



- As used in line 5, "infuse" most nearly means
  - saturate.
  - bathe.
  - imbue.
  - inspire.
- The descriptions in paragraph 2 (lines 13 – 26) indicate that what the narrator despises most about his creation is its
  - yellow skin.
  - muscular build.
  - pale eyes.
  - black hair.
- The statement "The different accidents of life are not so changeable as the feelings of human nature" (line 27 – 28) primarily comments on the
  - variability of human emotions and attitudes.
  - methods that people use to cope with misfortune.
  - narrator's negative outlook toward the concept of fate.
  - process by which accidental encounters cause people to feel differently.
- The narrator leaves his creation alone after giving it life because he
  - believes that his creation is violent and dangerous.
  - feels revolted and repulsed by his creation.
  - wants his creation to become self-sufficient.
  - is exhausted and leaves to get some rest.
- The narrator's actions in lines 36 – 39 ("Unable to endure...compose my mind to sleep") most closely resemble those of
  - an unwilling father rejecting his child.
  - a dissatisfied customer returning a product.
  - an editor revising a manuscript.
  - a soldier pursuing an enemy.
- The narrator recounts his dream (lines 43 – 53) primarily to
  - emphasize that he can find no relief from the specter of death.
  - convey his sorrow regarding the death of his mother.
  - explain why he decided to create life from nonliving matter.
  - reveal his growing acceptance of his creation.
- As used in line 61 – 62, "fixed on" most nearly means
  - connected to.
  - focused on.
  - mended by.
  - linked to.
- Over the course of the passage, the narrator's attitude shifts from
  - Fear that his experiment will fail to unmitigated joy at its success.
  - amazement at the beauty of his creation to disappointment in its inability to communicate.
  - exhaustion due to his physical and mental exertions to exhilaration because of the success of his experiment.
  - nervous excitement at the prospect of bringing his creation to life to abject horror at his creation's existence.
- Which choice provides the best evidence for the answer to the previous question?
  - Lines 2 – 6 ("With an anxiety...at my feet.")
  - Lines 16 – 18 ("His limbs...Great God!")
  - Lines 32 – 35 ("I had...filled my heart.")
  - Lines 40 – 43 ("At length...moments of forgetfulness.")
- The main rhetorical effect of the narrator calling his creation a "thing" and a "creature" is to
  - dehumanize his creation.
  - confuse and disorient his creation.
  - hide his true feelings toward his creation.
  - emphasize his creation's unusual appearance.



Refer to the passage below to answer questions 11 – 20.

This passage is excerpted from U.S. President Bill Clinton's speech, "Remarks to the People of Ghana," which he delivered in Accra, the capital of Ghana, on March 23, 1998.

line Africa has changed so much in just 10 years. Dictatorship has been replaced in so many places. Half of the 48 nations in sub-Saharan Africa choose their own governments, leading a new  
5 generation willing to learn from the past and imagine a future. Though democracy has not yet gained a permanent foothold even in most successful nations, there is everywhere a growing respect for tolerance, diversity, and elemental  
10 human rights. A decade ago, business was stifled. Now, Africans are embracing economic reform. Today from Ghana to Mozambique, from Cote d'Ivoire to Uganda, growing economies are fueling a transformation in Africa.

15 For all this promise, you and I know Africa is not free from peril: the genocide in Rwanda; civil wars in Sierra Leone, Liberia, both Congos; pariah states that export violence and terror; military dictatorship in Nigeria; and high levels  
20 of poverty, malnutrition, disease, illiteracy, and unemployment. To fulfill the vast promise of a new era, Africa must face these challenges. We must build classrooms and companies, increase the food supply and save the environment, and  
25 prevent disease before deadly epidemics break out.

The United States is ready to help you. First, my fellow Americans must leave behind the stereotypes that have warped our view and  
30 weakened our understanding of Africa. We need to come to know Africa as a place of new beginning and ancient wisdom from which, as my wife, our First Lady, said in her book, we have so much to learn. It is time for Americans to put a  
35 new Africa on our map.

Here in Independence Square, Ghana blazed the path of that new Africa. More than four decades ago, Kwame Nkrumah proposed what he called a "motion of destiny" as Ghana stepped  
40 forward as a free and independent nation. Today, Ghana again lights the way for Africa. Democracy is spreading. Business is growing. Trade and investment are rising. Ghana has the only African-owned company today on our New York Stock  
45 Exchange.

You have worked hard to preserve the peace in Africa and around the world—from Liberia to Lebanon, from Croatia to Cambodia. And you  
50 have given the world a statesman and peacemaker in Kofi Annan to lead the United Nations. The world admires your success. The United States admires your success. We see it taking root throughout the new Africa. And we stand ready

to support it.

55 First, we want to work with Africa to nurture democracy, knowing it is never perfect or complete. We have learned in over 200 years that every day democracy must be defended and a more perfect union can always lie ahead. Democracy requires more than the insults and  
60 injustice and inequality that so many societies have known and America has known. Democracy requires human rights for everyone, everywhere, for men and women, for children and the elderly, for people of different cultures and tribes and  
65 backgrounds. A good society honors its entire family.

Second, democracy must have prosperity. Americans of both political parties want to  
70 increase trade and investment in Africa. We have an "African Growth and Opportunity Act" now before Congress. Both parties' leadership are supporting it. By opening markets and building businesses and creating jobs, we can  
75 help and strengthen each other. By supporting the education of your people, we can strengthen your future and help each other. For centuries, other nations exploited Africa's gold, Africa's diamonds, Africa's minerals. Now is the time for  
80 Africans to cultivate something more precious, the mind and heart of the people of Africa, through education.

Third, we must allow democracy and prosperity to take root without violence. We must  
85 work to resolve the war and genocide that still tear at the heart of Africa. We must help Africans to prevent future conflicts. Here in Ghana, you have shown the world that different peoples can live together in harmony. You have proved that  
90 Africans of different countries can unite to help solve disputes in neighboring countries. Peace everywhere in Africa will give more free time and more money to the pressing needs of our children's future. The killing must stop if a new  
95 future is to begin.

Fourth and finally, for peace and prosperity and democracy to prevail, you must protect your magnificent natural domain. Africa is mankind's  
100 first home. We all came out of Africa. We must preserve the magnificent natural environment that is left. We must manage the water and forest. We must learn to live in harmony with other species. You must learn how to fight drought and famine and global warming. And we must share with you  
105 the technology that will enable you to preserve your environment and provide more economic opportunity to your people.



Percentages of African Population by Income Category

	Wealthy	Middle Class	Poor
1980	4.8	26.2	69.0
1990	4.3	27.0	68.7
2000	6.5	27.2	66.3
2010	4.8	34.3	60.8

SOURCE: African Development Bank

11. The most prevalent contrast throughout the speech is that between
- America's flawed perceptions of Africa and reality.
  - Africa's troubled past and Africa's hopeful future.
  - Ghana's peaceful democracy and the violent dictatorships of other African nations.
  - Ghana's struggling economy and America's thriving economy.
12. Which choice best summarizes paragraphs 1 and 2 (lines 1 – 26)?
- African nations now tend to have elected governments, and improved human rights.
  - Political and economic improvements in Africa have not yet lifted Africans out of danger.
  - Ghana must help other African nations meet challenges in education, business, food, and so on.
  - America needs to embrace both the change and the challenge in Africa.
13. As used in line 9, "elemental" most nearly means
- fundamental.
  - rudimentary.
  - instrumental.
  - environmental.
14. Throughout the speech, Clinton refers to Ghana as
- a social utopia that America should attempt to replicate.
  - a troubled nation on the brink of social revolution.
  - a mirror image of America when it was establishing a democracy.
  - a model that other African nations should aspire to.
15. Which choice provides the best evidence for the answer to the previous question?
- Lines 30 – 34 ("We need to...much to learn.")
  - Lines 40 – 43 ("Today, Ghana...are rising.")
  - Lines 55 – 57 ("First, we want...perfect or complete.")
  - Lines 79 – 82 ("Now is the time...through education.")
16. The table suggests that in 1998, when Clinton delivered his speech, African nations were experiencing
- widespread prosperity.
  - slightly increasing average incomes.
  - affluence in a few regions.
  - a revolution in social mobility.
17. Which trend mentioned in the passage is best supported by the table?
- Lines 11 – 14 ("Now, Africans...Africa.")
  - Lines 41 – 42 ("Democracy is spreading.")
  - Lines 77 – 79 ("For centuries...minerals.")
  - Lines 87 – 89 ("Here in Ghana...harmony.")
18. As used in line 66, "honors" most nearly means
- obeys.
  - praises.
  - worships.
  - respects.
19. The main rhetorical effect of Clinton's use of "we" throughout the passage is to
- distinguish Ghana as a fellow democratic nation.
  - imply a promise of military aid in case of a threat to Ghana.
  - emphasize the U.S. pledge to help develop a "new Africa."
  - focus more on the U.S. than on Africa.
20. In the context of the speech, Clinton regards the social, political, and economic future of Africa
- with vitriolic pessimism.
  - with a combination of optimism and pragmatism.
  - with admiration that borders on jealousy.
  - with a mixture of resignation and reverence.



Refer to the passage below to answer questions 21 – 30.

This passage is adapted from naturalist John Burroughs, *The Breath of Life*, originally published in 1915.

line We read our astronomy and geology in the  
light of our enormous egotism, and appropriate  
all to ourselves; but science sees in our appearance  
here a no more significant event than in the foam  
5 and bubbles that whirl and dance for a moment  
upon the river's current. The bubbles have their  
reason for being; all the mysteries of molecular  
attraction and repulsion may be involved in their  
production; without the solar energy, and the  
10 revolution of the earth upon its axis, they would  
not appear; and yet they are only bubbles upon  
the river's current, as we are bubbles upon the  
stream of energy that flows through the universe.  
Apparently the cosmic game is played for us no  
15 more than for the parasites that infest our bodies,  
or for the frost ferns that form upon our window-  
panes in winter. The making of suns and systems  
goes on in the depths of space, and doubtless will  
go on to all eternity, without any more reference  
20 to the vital order than to the chemical compounds.

The amount of living matter in the universe,  
so far as we can penetrate it, compared with the  
non-living, is, in amount, like a flurry of snow that  
whitens the fields and hills of a spring morning  
25 compared to the miles of rock and soil beneath it;  
and with reference to geologic time it is about as  
fleeting. In the vast welter\* of suns and systems  
in the heavens above us, we see only dead matter,  
and most of it is in a condition of glowing metallic  
30 vapor. There are doubtless living organisms upon  
some of the invisible planetary bodies, but they  
are probably as fugitive and temporary as upon  
our own world. Much of the surface of the earth  
is clothed in a light vestment\* of life, which, back  
35 in geologic time, seems to have more completely  
enveloped it than at present, as both the Arctic  
and the Antarctic regions bear evidence in their  
coal-beds and other fossil remains of luxuriant  
vegetable growths.

40 Strip the earth of its thin pellicle\* of soil,  
thinner with reference to the mass than is the  
peel to the apple, and you have stripped it of its  
life. Or, rob it of its watery vapor and the carbon  
dioxide in the air, both stages in its evolution, and  
45 you have a dead world. The huge globe swings  
through space only as a mass of insensate\* rock.  
So limited and evanescent\* is the world of living  
matter, so vast and enduring is the world of the  
non-living. Looked at in this way, in the light of  
50 physical science, life, I repeat, seems like a mere  
passing phase of the cosmic evolution, a flitting  
and temporary stage of matter which it passes  
through in the procession of changes on the  
surface of a cooling planet. Between the fiery mist

55 of the nebula, and the frigid and consolidated  
globe, there is a brief span, ranging over about  
one hundred and twenty degrees of temperature,  
where life appears and organic evolution  
takes place. Compared with the whole scale of  
60 temperature, from absolute zero to the white heat  
of the hottest stars, it is about a hand's-breadth  
compared to a mile.

Life processes cease, but chemical and  
mechanical processes go on forever. Life is as  
fugitive and uncertain as the bow in the clouds,  
and, like the bow in the clouds, is confined to a  
65 limited range of conditions. Like the bow, also,  
it is a perpetual creation, a constant becoming,  
and its source is not in the matter through which  
it is manifested, though inseparable from it. The  
material substance of life, like the rain-drops, is  
70 in perpetual flux and change; it hangs always  
on the verge of dissolution and vanishes when  
the material conditions fail, to be renewed again  
when they return. We know—do we not?—that  
life is as literally dependent upon the sun as is  
75 the rainbow, and equally dependent upon the  
material elements; but whether the physical  
conditions sum up the whole truth about it, as  
they do with the bow, is the insoluble question.  
80 Science says "Yes," but our philosophy and our  
religion say "No." The poets and the prophets say  
"No," and our hopes and aspirations say "No."

\*welter — a state of disorder or chaos

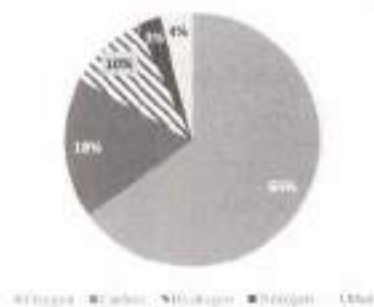
\*vestment — a garment or piece of clothing

\*pellicle — a thin membrane or film

\*insensate — unable to perceive or experience physical sensations

\*evanescent — quickly fading or disappearing

Elemental Composition of the Human Body



21. Over the course of the passage, the author presents his argument primarily by
- (A) analogy and reasoning.
  - (B) argument and counterargument.
  - (C) metaphor and hyperbole.
  - (D) appealing to physical laws.
22. As used in line 2, "light" most nearly means
- (A) illumination.
  - (B) context.
  - (C) ambiance.
  - (D) opinion.
23. The author likens living matter to light snow on a "spring morning" (lines 21 – 27) primarily to
- (A) suggest that life is both rare and fleeting on a cosmic scale.
  - (B) indicate that spring will always bring new life.
  - (C) allude to the conditions that may have created life.
  - (D) provide a metaphor for our shallow understanding of life.
24. The author suggests that the amount of life on Earth at present is
- (A) lower than in past geologic periods.
  - (B) higher than in past geologic periods.
  - (C) comparable to past geologic periods.
  - (D) comparable to that on similar planets throughout the universe.
25. As used in line 72, "hangs" most nearly means
- (A) sticks.
  - (B) exists.
  - (C) prevails.
  - (D) depends.
26. According to the chart, the human body is
- (A) comprised of materials not fully understood by scientists.
  - (B) composed entirely from only five elements.
  - (C) mostly oxygen at the atomic level.
  - (D) not unique in terms of elements.
27. Which statement from the passage is best supported by the chart?
- (A) Lines 17 – 20 ("The making...compounds.")
  - (B) Lines 47 – 49 ("So limited...non-living.")
  - (C) Lines 54 – 59 ("Between the...place.")
  - (D) Lines 67 – 70 ("Like the bow...from it.")
28. The author would most likely agree that science
- (A) is unable to resolve certain important questions about life.
  - (B) has failed the public by not providing answers about life.
  - (C) is actually a type of poetic expression.
  - (D) consists of an entirely arbitrary set of principles.
29. Which choice provides the best evidence for the answer to the previous question?
- (A) Lines 1 – 6 ("We read our...river's current.")
  - (B) Lines 33 – 39 ("Much of the...vegetable growths.")
  - (C) Line 63 – 64 ("Life processes cease...on forever.")
  - (D) Line 75 – 80 ("We know...question.")
30. Based on the passage as a whole, the author's argument is best described as
- (A) an interrogation of traditionally accepted ideals.
  - (B) a scientific question approached from a philosophical perspective.
  - (C) a poetic treatment of a technical subject.
  - (D) a skeptical dismissal based on evidence from the natural world.



Refer to the passage below to answer questions 31 – 41.

This passage is excerpted from the Bill of Rights, which went into effect in 1791. The Bill of Rights is a list of the first ten changes (amendments) to the Constitution of the United States.

*line*     **THE** Conventions of a number of the States, having at the time of their adopting the Constitution, expressed a desire, in order to prevent misconstruction or abuse of its powers, that further declaratory and restrictive clauses should be added: And as extending the ground of public confidence in the Government, will best ensure the beneficent ends of its institution....

**Amendment 1** Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the Government for a redress of grievances.

**Amendment 2** A well regulated Militia, being necessary to the security of a free State, the right of the people to keep and bear Arms, shall not be infringed.

**Amendment 3** No Soldier shall, in time of peace be quartered in any house, without the consent of the Owner, nor in time of war, but in a manner to be prescribed by law.

**Amendment 4** The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

**Amendment 5** No person shall be held to answer for a capital, or otherwise infamous crime, unless on a presentment or indictment of a Grand Jury, except in cases arising in the land or naval forces, or in the Militia, when in actual service in time of War or public danger; nor shall any person be subject for the same offence to be twice put in jeopardy of life or limb; nor shall be compelled in any criminal case to be a witness against himself, nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation.

**Amendment 6** In all criminal prosecutions, the accused shall enjoy the right to a speedy and public trial, by an impartial jury of the

State and district wherein the crime shall have been committed, which district shall have been previously ascertained by law, and to be informed of the nature and cause of the accusation; to be confronted with the witnesses against him; to have compulsory process for obtaining witnesses in his favor, and to have the Assistance of Counsel for his defense.

**Amendment 7** In Suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury, shall be otherwise re-examined in any Court of the United States, than according to the rules of the common law.

**Amendment 8** Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted.

**Amendment 9** The enumeration in the Constitution, of certain rights, shall not be construed to deny or disparage others retained by the people.

**Amendment 10** The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.



31. According to paragraph 1 (lines 1–8), Congress included the Bill of Rights primarily to
- (A) ensure freedom of speech.
  - (B) restrict the new government's powers.
  - (C) ensure that people approve of the government.
  - (D) halt cases of abuse.
32. Based on Amendment 1, the authors wanted to prevent Congress from passing laws that
- (A) require people to respect established religions.
  - (B) ban people from grieving publicly.
  - (C) ban individuals from owning guns.
  - (D) ban or establish some religions or religious practices.
33. As used in line 15, "grievances" most nearly means
- (A) injustices.
  - (B) sorrows.
  - (C) rights.
  - (D) indignities.
34. In line 27, the authors refer to "Warrants" primarily to
- (A) propose a new method for police to keep track of particular searches and seizures.
  - (B) specify the conditions under which a local judge can authorize a search.
  - (C) state that official documents must justify and limit searches and seizures beforehand.
  - (D) emphasize the privacy of homes and belongings, and that authorities should enter respectfully.
35. Amendment 5 strongly suggests that the authors wanted to prevent
- (A) civil courts from judging military cases.
  - (B) arbitrary imprisonment, execution, and confiscation of goods.
  - (C) government malfunctioning, including mistrials in court cases.
  - (D) attorneys and bureaucrats from having too much political power.
36. Which choice provides the best evidence for the answer to the previous question?
- (A) Lines 35–37 ("except in...actual service")
  - (B) Line 39–41 ("nor shall...against himself.")
  - (C) Lines 41–42 ("nor be...due process of law.")
  - (D) Line 43–45 ("nor shall private property... just compensation.")
37. Between Amendment 6 and Amendment 6, the authors' focus shifts from
- (A) limits on bringing charges to rights of the accused.
  - (B) how to form grand juries to the right to have a defense attorney.
  - (C) exceptions regarding land or naval forces to the importance of juries.
  - (D) seizing the property of individuals to criminal prosecutions.
38. In Amendment 8, the authors use the words "excessive," "cruel," and "unusual" primarily to
- (A) emphasize their strong humanitarian values.
  - (B) indicate their intent without creating specific rules.
  - (C) give courts the authority to set bail as well as to fine and punish people.
  - (D) imply that the new government would be more beneficent than the old.
39. As used in line 68, "construed" most nearly means
- (A) deciphered.
  - (B) interpreted.
  - (C) simplified.
  - (D) translated.
40. The passage strongly suggests that the founding document of the new government should
- (A) explicitly resolve future grievances.
  - (B) suggest that an elected government can be trusted.
  - (C) primarily describe limitations.
  - (D) serve as a rough draft to be rewritten frequently.
41. Which choice provides the best evidence for the answer to the previous question?
- (A) Lines 9–15 (Amendment 1)
  - (B) Lines 20–23 (Amendment 3)
  - (C) Lines 63–65 (Amendment 8)
  - (D) Lines 70–73 (Amendment 10)





Refer to the passage below to answer questions 42 – 52.

Passage 1 is adapted from H. W. Conn, *The Story of Germ Life*, originally published in 1915. Passage 2 is adapted from “Guideline for Hand Hygiene in Health-Care Settings,” published in 2002.

### Passage 1

line In the study of medicine in the past centuries  
the only aim has been to discover methods of  
curing disease; at the present time a large and  
increasing amount of study is devoted to the  
5 methods of preventing disease. Preventive  
medicine is a development of the last few years,  
and is based almost wholly upon our knowledge  
of bacteria. This subject is yearly becoming of  
more importance. Forewarned is forearmed,  
10 and it has been found that to know the cause of  
a disease is a long step toward avoiding it. As  
some of our contagious and epidemic diseases  
have been studied in the light of bacteriological  
knowledge, it has been found possible to  
15 determine not only their cause, but also how  
infection is brought about, and consequently  
how contagion may be avoided. Some of the  
results which have grown up so slowly as to be  
hardly appreciated are really great triumphs. For  
20 instance, bacteriological study has shown that  
the source of cholera infection in cases of raging  
epidemics is, in large part at least, our drinking  
water; and since this has been known, although  
cholera has twice invaded Europe, and has been  
25 widely distributed, it has not obtained any strong  
foothold or given rise to any serious epidemic  
except in a few cases where its ravages can be  
traced to recognized carelessness.

The study of preventive medicine is yet in its  
30 infancy, but it has already accomplished much.  
It has developed modern systems of sanitation,  
has guided us in the building of hospitals, given  
rules for the management of the sick-room which  
largely prevent contagion from patient to nurse;  
35 it has told us what diseases are contagious,  
and in what way; it has told us what sources  
of contagion should be suspected and guarded  
against, and has thus done very much to prevent  
the spread of disease. Its value is seen in the fact  
40 that there has been a constant decrease in the  
death rate since modern ideas of sanitation began  
to have any influence, and in the fact that our  
general epidemics are less severe than in former  
years, as well as in the fact that more people  
45 escape the diseases which were in former times  
almost universal.

### Passage 2

For generations, handwashing with soap and  
water has been considered a measure of personal  
hygiene. The concept of cleansing hands with an  
antiseptic agent probably emerged in the early  
50 19<sup>th</sup> century. As early as 1822, a French  
pharmacist demonstrated that solutions  
containing chlorides of lime or soda could  
eradicate the foul odors associated with human  
corpses and that such solutions could be used as  
55 disinfectants and antiseptics.

In 1961, the U. S. Public Health Service  
produced a training film that demonstrated  
handwashing techniques recommended for use  
60 by health-care workers (HCWs). At the time,  
recommendations directed that personnel wash  
their hands with soap and water for 1–2 minutes  
before and after patient contact.

In 1975 and 1985, formal written guidelines on  
65 handwashing practices in hospitals were  
published by CDC (Centers for Disease Control  
and Prevention). These guidelines recommended  
handwashing with non-antimicrobial soap  
between the majority of patient contacts and  
70 washing with antimicrobial soap before and after  
performing invasive procedures or caring for  
patients at high risk. Use of waterless antiseptic  
agents (e.g., alcohol-based solutions) was  
recommended only in situations where sinks were  
75 not available.

In 1988 and 1995, guidelines for handwashing  
and hand antisepsis were published by the  
Association for Professionals in Infection  
Control (APIC). Recommended indications for  
80 handwashing were similar to those listed in  
the CDC guidelines. The 1995 APIC guideline  
included more detailed discussion of alcohol-  
based hand rubs and supported their use in more  
clinical settings than had been recommended  
85 in earlier guidelines. In 1995 and 1996, the  
Healthcare Infection Control Practices Advisory  
Committee (HICPAC) recommended that either  
antimicrobial soap or a waterless antiseptic  
agent be used for cleaning hands upon leaving  
90 the rooms of patients with multidrug-resistant  
pathogens (e.g., vancomycin-resistant enterococci  
[VRE] and methicillin-resistant *Staphylococcus*  
*aureus* [MRSA]). These guidelines also provided  
recommendations for handwashing and hand  
95 antisepsis in other clinical settings, including  
routine patient care. Although the APIC and  
HICPAC guidelines have been adopted by  
the majority of hospitals, adherence of HCWs  
to recommended handwashing practices has  
100 remained low.



42. As used in line 30, "infancy" most nearly means:
- (A) childhood.
  - (B) beginnings.
  - (C) immaturity.
  - (D) fantasy.
43. Which choice best describes the term "preventive medicine" as it appears in Passage 1?
- (A) Lines 1 – 5 ("In the study...preventing disease.")
  - (B) Lines 5 – 8 ("Preventive medicine is...of bacteria.")
  - (C) Lines 9 – 11 ("Forewarned is forearmed...avoiding it.")
  - (D) Lines 11 – 17 ("As some of...be avoided.")
44. The reference to the cholera epidemics in lines 19 – 28 primarily serves to
- (A) downplay the importance of scientific research to medicine.
  - (B) warn against the consequences of personal negligence.
  - (C) demonstrate a major achievement of preventive medicine.
  - (D) suggest a future free of epidemics.
45. As used in line 54, "foul" most nearly means
- (A) avian.
  - (B) putrid.
  - (C) illegal.
  - (D) frightening.
46. The author of Passage 2 mentions "chlorides of lime and soda" (line 53) primarily to
- (A) criticize 19th century medicine's crudeness.
  - (B) describe early forms of disinfectants used by doctors.
  - (C) update the reader on recent advances in antiseptic technology.
  - (D) provide an example of a household remedy that was adopted by the scientific community.
47. The progression of hand-washing procedures as outlined in paragraphs 2 and 3 of Passage 2 (lines 57 – 75) is best described as
- (A) optional to required.
  - (B) guidelines to regulations.
  - (C) disinfectant to antiseptic.
  - (D) general to specific.
48. The author of Passage 2 strongly suggests that the biggest challenge to improving hand-washing procedures in health-care settings is
- (A) providing adequate education.
  - (B) compelling workers to follow recommendations.
  - (C) availability of necessary cleaning agents.
  - (D) opposition from hospital bureaucracies.
49. Which choice provides the best evidence for the answer to the previous question?
- (A) Lines 51 – 56 ("As early as...antiseptics.")
  - (B) Lines 72 – 75 ("Use of waterless...not available.")
  - (C) Lines 85 – 91 ("In 1995...pathogens.")
  - (D) Lines 96 – 100 ("Although...remained low.")
50. How would the author of Passage 1 most likely respond to the description of the French pharmacist in Passage 2 (lines 51 – 56)?
- (A) With surprise, because it refutes the author's assertion that preventive medicine is a 20th century development.
  - (B) With approval, because he represents an early pioneer in an important movement in public health.
  - (C) With disdain, because of the crude methods he used to treat disease.
  - (D) With ambivalence, because it is unrelated to his area of concern.
51. Which choice best states the relationship between the two passages?
- (A) Passage 2 provides a public health perspective on a scientific breakthrough described in Passage 1.
  - (B) Passage 2 describes the failings of a project introduced in Passage 1.
  - (C) Passage 2 discusses international implications of concerns raised in Passage 1.
  - (D) Passage 2 criticizes the practicality of the proposals outlined in Passage 1.
52. What information discussed in Passage 1 is represented by Passage 2?
- (A) Line 29 – 30 ("The study of...accomplished much.")
  - (B) Lines 32 – 34 ("given rules for...to nurse")
  - (C) Lines 35 – 39 ("it has told...of disease.")
  - (D) Lines 39 – 44 ("Its value is...former years")



# Writing and Language Test 4



35 MINUTES, 44 QUESTIONS

Turn to Section 2 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each of the following passages is accompanied by approximately 11 questions. Some questions will require you to revise the passages in order to improve coherence and clarity. Other questions will require you to correct grammatical errors in the passages. Passages may be accompanied by graphs, charts, or tables that you must consider when making revisions. For most questions, you may select the "NO CHANGE" option if you believe that portion of the passage is clear, concise, and grammatically correct as is.

Within the passages, highlighted numbers followed by underlined text indicate which part of the text corresponds with each question. Bracketed numbers [1] indicate sentence number. These bracketed numbers are only relevant to problems that require you to add or rearrange sentences in a paragraph.

Refer to the passage below to answer questions 1 – 11.

### Nurse Anesthetist

Most surgeries performed today would not be possible without anesthetic medicine. The medicine blocks **1** pain, and renders patients unconscious, preventing them from going into shock or moving. Although anesthesia has clear benefits, it also carries risks and must be carefully monitored during any instance of use. Thus, the administration of anesthetics has become a specialized field. Medical doctors **2** oversee most anesthetic use in the United States, but increasingly, nurses are taking a share of the responsibility. Doctors in the field are known as "anesthesiologists," while nurses are known as "nurse anesthetists."

- (A) NO CHANGE  
(B) pain: rendering  
(C) pain, renders  
(D) pain and renders
- (A) NO CHANGE  
(B) overlook  
(C) watch over  
(D) view



3 Nurse anesthetists can choose to work in diverse settings, from operating rooms or obstetrical wards to 4 emergency rooms. Although they may work under the supervision of a medical doctor, they usually have a high degree of autonomy. Another benefit is that they work with only one patient at a time.

Some nurse anesthetists find personal satisfaction in providing trustworthy care when a patient is most vulnerable. They talk with patients before surgery to 5 ally any anxieties and to determine the best combinations of anesthetics to use. They administer the anesthetic medications and attach patients to necessary machines such as 6 the ventilator, intravenous pumps, and monitoring instruments. They adjust medications and oxygen as needed, and they constantly communicate with the surgeons and surgical nurses. After the procedure, 7 nurse anesthetists must be adept at returning patients to consciousness.

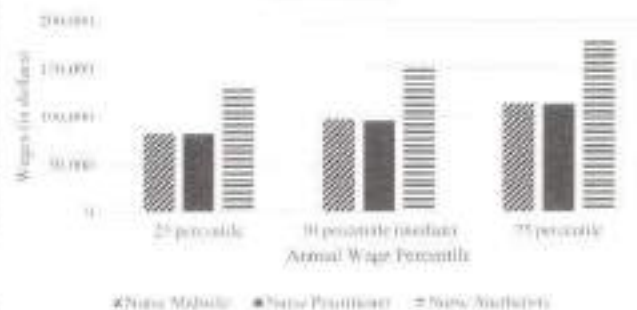
Preparing to take on the responsibilities of a nurse anesthetist takes at least seven years. A candidate must earn a bachelor's degree in nursing and pass a licensing exam to become a registered 8 nurse (RN). Next, he or she must spend at least one year working in an acute care setting. The next step is to return to school and earn a master's degree in nursing anesthetics, and finally 9 passing a national certification exam.

- Which choice most effectively establishes the main topic of the paragraph?
  - The work of administering anesthetics can be stressful.
  - Nurses who choose to specialize in anesthetics gain certain advantages.
  - Many nurse anesthetists admit that their jobs are occasionally boring.
  - Some anesthesiologists object to nurses administering anesthetics.
- The writer wants to include a setting that provides a strong contrast with the first two examples. Which choice would best accomplish this goal?
  - NO CHANGE
  - surgery centers
  - pediatric hospitals
  - specialized dental practices
- NO CHANGE
  - allow
  - alloy
  - purge
- NO CHANGE
  - the ventilator, the intravenous pumps, and the monitoring instruments
  - ventilators, intravenous pumps, and monitoring instruments
  - a ventilator, an intravenous pump, and a monitoring instrument
- Which choice maintains the sentence pattern already established in the paragraph?
  - NO CHANGE
  - they help patients return to consciousness.
  - they have been trained to monitor recovery.
  - nurse anesthetists are called upon to monitor patients.
- Which choice most effectively combines the sentences at the underlined portion?
  - nurse (RN)—next, he or she must
  - nurse (RN), and then he or she
  - nurse, known as an "RN," and after that
  - nurse (RN), because he or she must
- NO CHANGE
  - passed
  - to pass
  - to have passed



In the nursing field, anesthesiology is the highest-paid specialty. In fact, nurse anesthetists who earn the median wage for their profession will earn **10** as much as the highest-paid midwives. **11** Already, nurses provide the majority of anesthesia care in rural areas of the U.S. and in U.S. military facilities. The U.S. Bureau of Labor Statistics predicts that the current strong demand for qualified nurse anesthetists will continue to increase. The increase will be driven by the rising median age of the U.S. population, as older people tend to have a greater need for health care services.

Annual Wages of Nursing Professionals at the 25th, 50th, and 75th Percentiles



SOURCE: adapted from the Bureau of Labor Statistics, *Occupational Employment Statistics*, "Occupational Employment and Wages, May 2014."

10. Which choice accurately finishes the sentence by interpreting the data in the graph?
- NO CHANGE
  - over 50 percent more than midwives earning the median wage for their profession.
  - more than the median wages for a midwife and a practitioner combined.
  - more than double the 25th percentile wages of other nursing professions.
11. The writer is considering deleting the underlined sentence. Should the sentence be kept or deleted?
- Kept, because it supports the paragraph's focus on the high demand for nurse anesthetists.
  - Kept, because it supports the paragraph's focus on places that nurse anesthetists can work.
  - Deleted, because it does not add information about the job market, the paragraph's focus.
  - Deleted, because it repeats information previously provided in the passage.



Refer to the passage below to answer questions 12 – 22.

## Bat-luring Plants

Flowers have a distinct purpose: to attract wandering organisms that will transfer the flower's pollen for reproduction. Flowering plants need to have pollen carried from anther to stigma, the male and female parts of the flower, **12** in perspective. In some plants, the pollen can be transferred within the flower, but with many it must be carried to another plant's flower. Either way, the plant must attract a mobile assistant, **13** whom it will reward with nectar.

Many flowers have evolved to attract specific assistants. For instance, red, tubular flowers are attractive to hummingbirds, whereas yellow, clustered blossoms appeal to butterflies. **14** Colors in the ultraviolet light spectrum are also visible to butterflies and bees. Once an assistant arrives, it invariably brushes up against sticky pollen while drinking and then **15** transporting pollen whenever it moves to the next source of nectar.

**16** A few species of bats drink the nectar of specific flowers with which they have co-evolved. It appears that nectar-drinking in bats developed independently in different hemispheres. In tropical areas of Africa, Asia, and the South Pacific, the trait evolved within the "fruit bat" family Pteropodidae. In the Americas, it evolved within the "leaf-nosed bat" family Phyllostomidae. **17** Across all regions, plants that depend on nectar bats have been developing certain bat-friendly characteristics.

12. (A) NO CHANGE  
(B) respectively  
(C) respectfully  
(D) perceptively
13. (A) NO CHANGE  
(B) who  
(C) that  
(D) him
14. The writer is considering deleting the underlined sentence. Should it be kept or deleted?  
(A) Kept, because it supports the paragraph's topic: colors that attract pollinators.  
(B) Kept, because it adds supporting details about colors that are visible to some pollinators.  
(C) Deleted, because it shifts the focus away from flowers and their adaptations.  
(D) Deleted, because it does not explain how butterflies and bees can see UV light.
15. (A) NO CHANGE  
(B) it transports some pollen as  
(C) transports the pollen when  
(D) it has transported the pollen when
16. Which choice most effectively sets up the information in paragraph 3?  
(A) Hence, plants produce flowers in order to have contact with members of the animal kingdom.  
(B) Nature is replete with surprising species that are the exceptions to the rule.  
(C) What happens when a plant has to compete with too many other flowering plants?  
(D) Most pollinators are insects or birds, but occasionally mammals fill the niche.
17. Which choice maintains the sentence pattern already established in the preceding sentences?  
(A) NO CHANGE  
(B) In both hemispheres, the trait led to the development of bat-friendly flowers.  
(C) Both fruit bats and leaf-nosed bats spurred adaptations in the flowers they visited.  
(D) It appears that nectar-drinking in bats always caused certain flowers to change radically.



Bats are excellent pollinators, **18** giving the plants on which they feed a competitive advantage. Unlike hummingbirds and insects, bats have fur, which holds much larger amounts of **19** pollen, which they use to fly around a wider range than do most other pollinators. Bats also live longer and have more cognitive ability than insects or hummingbirds. They are more likely to remember a flowering plant and return.

On the other hand, flowers must undergo some extreme adaptations to attract bats. The flowers must be sizable to make enough nectar for hungry bats. Bat flowers also bloom at night, when bats are active, so they cannot use reds and yellows to advertise their presence. A more effective way to enhance visibility is to bloom in the open, away from foliage. Flowers might attract bats by protruding above a tree's canopy, or swinging down below it on long stems. As for scent, bats seem to be drawn to musty odors, which many of the flowers have obligingly developed.

**20** A few flowers in the Americas have even adapted to **21** bat's use of echolocation, a process in which bats emit vocalizations and navigate by the echoes they hear. The flowers and leaves of the bats' target plants have developed **22** waxy surfaces and a cupped shape. The dish-like structures reflect sound well, allowing bats to hear the echo of their own soft sound clearly, and to find the flowers with ease.

18. (A) NO CHANGE  
 (B) giving plants that depend on bats as pollinators  
 (C) so that they can give plants that attract them and provide nectar for them  
 (D) which tends to bestow upon their favorite nectar-bearing plants
19. (A) NO CHANGE  
 (B) pollen, additionally, bats  
 (C) pollen; bats also  
 (D) pollen, even though bats
20. Which choice most effectively concludes the paragraph?
- (A) Some researchers describe the odor of bat-attracting flowers as "batty," or smelling like bats.  
 (B) All in all, bat-attracting flowers become so highly specialized that butterflies, bees, and even moths are unlikely to find them.  
 (C) On the whole, bat-attracting flowers rank among the most unique blossoms on Earth.  
 (D) Given all of these constraints, bat-attracting flowers tend to be large, drab, and smelly, but also particularly distinctive.
21. (A) NO CHANGE  
 (B) bats' use of  
 (C) bats use of  
 (D) bats' using
22. (A) NO CHANGE  
 (B) a waxy surface and a cupped shape.  
 (C) waxy surfaces and cupped shapes.  
 (D) surfaces that are waxy and shapes that are cupped.



Refer to the passage below to answer questions 23–33.

## The Writing of the Ancient Maya

Although there were a number of sophisticated cultures in the Americas before European contact, the culture of the Mayan people stands out in 23 one respect. The Mayans developed a coherent system of reading and writing. Modern scholars suspect that most, if not all, of the Mayans in the elite class 24 were literate.

Mayan culture evolved over many centuries in the rainforests and marshes of Central America, including the Yucatán peninsula in what is now Mexico. Early Mayans began forming villages around 2000 BCE. The first evidence of Mayan writing is from around 700 BCE. 25 however it was during the later “Classic Period,” from 250 CE to 900 CE, that literacy flourished. During these centuries, culture radiated from powerful, constantly warring city-states. Mayan cities featured pyramids, temples, palaces—and of course a public plaza—all decorated with writing.

23. Which choice most effectively combines the sentences at the underlined portion?
- (A) one respect because the Mayans  
 (B) one respect, the Mayans  
 (C) one respect: the Mayans  
 (D) one respect which is that the Mayans
24. (A) NO CHANGE  
 (B) were literary  
 (C) was literary  
 (D) was literate
25. (A) NO CHANGE  
 (B) and literacy flourished during the Mayan Classic Period, from 250 CE to 900 CE.  
 (C) but from 250 CE to 900 CE, which was the “Classic Period” for the Maya, was when literacy flourished.  
 (D) and by 250 CE to 900 CE, the Mayan Classic Period saw the flourishing of literacy.





[1] The Mayans also produced books that are now referred to as “codices,” the plural of “codex.” [2] Codices consisted of bark paper folded like an accordion; when unfolded, the pages revealed painted art and text. [3] Unfortunately, the codices were susceptible to mold in the damp **26** climate as the agricultural bounty that had supported an elite class declined. [4] Only three codices survive today **27** because—ironically—Spaniards sent them to Europe. [5] While many Mayan people continued to live in the same territory as their **28** forebears, the unique Mayan writing system was completely forgotten. **29**

[1] During the 19th century, scholars began trying to decode the words of the ancient Maya. [2] But the biggest roadblock for scholars was recognizing that some of the symbols represent phonetic sounds while others represent complete ideas. [3] One challenge was simply learning the ancient Mayan language; today there are 29 modern Mayan languages that have ancient Mayan dialects as their roots. [4] Moreover, scribes seem to have used at least two languages in the texts. [5] Occasionally, Mayan scribes even used symbols in an artistic, nonstandard way, adding yet another mystery **30** for presently working translators to solve now. **31**

26. (A) NO CHANGE  
 (B) climate. The agricultural bounty that had supported an elite class declined.  
 (C) climate. Slowly the southern lowland city-states' populations outgrew their ability to produce food; water shortages may have contributed to the problem.  
 (D) climate. The city-states of the southern lowlands declined after the 8th century CE, and writing appears to have declined with them.
27. (A) NO CHANGE  
 (B) ironic because Spaniards sent them to Europe.  
 (C) being sent ironically to Europe by Spaniards.  
 (D) in Europe because of Spaniards sending them there, ironically.
28. (A) NO CHANGE  
 (B) antecedents  
 (C) descendants  
 (D) lineage
29. The writer wants to add the following sentence to paragraph 3.
- After Spain claimed the continent in the 16th century, a Spanish priest named Diego de Landa began the practice of burning any Mayan codices he could find.
- The most logical placement for the sentence is immediately
- (A) after sentence 2.  
 (B) after sentence 3.  
 (C) after sentence 4.  
 (D) after sentence 5.
30. (A) NO CHANGE  
 (B) for modern translators to solve contemporaneously.  
 (C) for modern-day translators to solve.  
 (D) for current modern-day translators to solve.
31. To make paragraph 4 more logical, sentence 2 should be placed
- (A) where it is now.  
 (B) before sentence 4.  
 (C) after sentence 4.  
 (D) after sentence 5.



Like English, ancient Mayan writing is read from left to right and from top to bottom, but unlike English, each line consists of only two words. Each word is represented by a square that contains up to five glyphs (symbols). The glyphs are either symbols of abstract concepts, or they resemble animals, humans, **32** or objects, and through painstaking work, scholars have identified 800 glyphs, though only about 300 were in use at any one time.

Scholars are finding that much of the text on monuments describes events related to particular leaders, such as birthdates and military conquests. The three surviving books primarily contain almanac-style information about astronomy, agricultural cycles, and religious rituals, indicating that they were resources for priests or other high officials. **33** One can see clearly that Mayans used writing to preserve practical and cultural knowledge.

32. (A) NO CHANGE  
(B) or objects, nevertheless through  
(C) or objects – through  
(D) or objects. Through
33. (A) NO CHANGE  
(B) The translations demonstrate that  
(C) One could say that clearly.  
(D) Therefore, it can be suggested that



Refer to the passage below to answer questions 34–44.

## Percussion

[1] It is not far-fetched to speculate that when humans first began singing, they accompanied their songs with percussion by **34** clapping one's hands or sticks together. [2] No one knows when or where the first drums were made. [3] Yet most people would agree that rhythmic percussion is fundamental to humanity and human culture. [4] It expresses emotions in a form that is universally understood. [5] In this vein, musician Gabriel Roth has called rhythm "the mother tongue." [6] The Malinke people of Guinea in West Africa say that skilled drummers can make drums "talk," and convey an entire emotional story. **35**

**36** Bold and fast-paced percussive rhythms lend excitement to musical expression, perhaps because they make listeners' hearts pump faster. In the past, militaries often used ear-splitting drumming while marching into battle to embolden their **37** own troops and scared their opponents. Similarly, in the 1950s, when Elvis Presley popularized the rhythms of rock n' roll music, teenaged audiences became frenzied with excitement. Parents worried that the music would make their children rebellious. Today, nightclubs play music with deafening beats **38** to create an exhilarating atmosphere, and clothing stores also blast dance music to generate customers' enthusiasm.

The excitement percussion can generate has not gone unnoticed by classical music composers. In the late 18th century, European composers such as Wolfgang Amadeus Mozart began borrowing ideas and instruments from what is now Turkey. They used timpani, triangles, and cymbals when they wanted to send a shiver of excitement through audiences. By the 20th century, European composers were ready to innovate with percussion. In 1913, Igor Stravinsky wrote the score for a **39** ballet—"The Rite of Spring"—which featured booming and irregular drum beats. Together with its unconventional dances and strange subject matter, the piece was much more effective at exciting people than Stravinsky had expected; **40** moreover, it was later used in Walt Disney's animated movie *Fantasia*.

34. (A) NO CHANGE  
(B) clapping one's hands or sticks and rocks.  
(C) clapping hands, rocks, or sticks together.  
(D) clapping together either hands, rocks, and sticks.
35. To make the paragraph more logical, sentence 6 should be placed  
(A) where it is now.  
(B) before sentence 3.  
(C) before sentence 5.  
(D) before sentence 1.
36. Which choice would most effectively establish the main idea of the paragraph?  
(A) Some people think the purpose of percussion is just to keep time for other instruments.  
(B) The roots of the word "percussion" mean "to shake thoroughly."  
(C) There are many percussive instruments used in music.  
(D) Percussion intensifies the emotional effect of music.
37. (A) NO CHANGE  
(B) own troops and scare  
(C) own troops, and scared  
(D) own troops and will scare
38. (A) NO CHANGE  
(B) to create an atmosphere that feels exhilarating.  
(C) creating exhilaration in the atmosphere.  
(D) to create a sense of exhilaration in its atmosphere.
39. (A) NO CHANGE  
(B) ballet, *The Rite of Spring*, which  
(C) ballet, "The Rite of Spring," which  
(D) ballet *The Rite of Spring* which
40. Which choice completes the sentence in a way that supports the paragraph?  
(A) NO CHANGE  
(B) it has been called the beginning of modern music.  
(C) dancers struggled with the ballet's uncountable rhythms.  
(D) at the ballet's premier performance, the audience rioted.



Paradoxically, percussion can have a calming effect. Some Native American tribes have described drumming as the heartbeat of the Earth. Today, recording artists who create lullabies tend to use a soft beat. **41** mimicking heartbeats as well as a rocking motion. Steady percussion has often been used in ceremonial settings to add a sense of awe, or to bring about catharsis. **42** In addition, drums, "singing bowls," and rattles, have a long history of use for soothing and healing.

Many people in the U.S. today still consider percussive rhythm to be therapeutic, especially **43** when people participate in it. Some people gather for "drum circles," where they play hand-drums for relaxation. Hospitals commonly incorporate group percussion sessions to aid in recovery from drug addiction and various other mental health disorders. There is even some evidence that people with autism, a social and communication disorder, may improve their understanding and expression of feelings through drumming. **44**

41. (A) NO CHANGE  
(B) portraying  
(C) feigning  
(D) personifying
42. (A) NO CHANGE  
(B) In addition, drums, "singing bowls," and rattles have  
(C) In addition: drums, "singing bowls," and rattles, have  
(D) In addition, drums, "singing bowls," and rattles, have
43. (A) NO CHANGE  
(B) when people participate in them.  
(C) when everyone participates in it.  
(D) for those who participate in playing it.
44. Which choice most effectively concludes the passage as a whole?  
(A) It appears as true today as ever that percussion allows people to "talk" without words.  
(B) What better evidence could there be that percussion is a kind of language?  
(C) Thus, surely percussion will continue to play a role in medical therapies in the future.  
(D) Clearly, percussion is of vital importance to humans.





# Math Test 4 – No Calculator



25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

## DIRECTIONS

For questions 1 – 15, find the solution to each problem and select the most appropriate answer from the choices provided. For questions 16 – 20, find the solution to each problem and write your answer in the space provided. You may use the blank space in your test booklet for scratch work.

## NOTES

1. The use of a calculator on any part of this section is forbidden.
2. Unless otherwise indicated, all variables and expressions used in this test represent real numbers.
3. Unless otherwise indicated, all figures used in this test are drawn to scale.
4. Unless otherwise indicated, all figures used in this test lie on a plane.
5. Unless specified otherwise, a given function,  $f$ , has the domain the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE



$$A = \frac{1}{2}bh$$



$$c^2 = a^2 + b^2$$

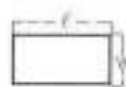


Special Right Triangles

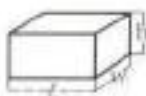


$$A = \pi r^2$$

$$C = 2\pi r$$



$$A = lw$$



$$V = lwh$$



$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}lwh$$

The arc of a circle is 360 degrees or  $2\pi$  radians.

A triangle has angles that sum to 180 degrees.





1. David has a total of  $3m$  books for sale at  $n$  dollars each. He sells all but  $p$  books. Which of the following represents the total dollar amount he received in sales?

- (A)  $n(3m - p)$   
(B)  $n(p - 3m)$   
(C)  $pn - 3m$   
(D)  $3m - pn$

2.

$$\begin{aligned} -2x + 2 &= 9y - 4x \\ 2x + y &= -6 \end{aligned}$$

Based on the system of equations above, what is

the value of the quotient  $\frac{x}{y}$ ?

- (A) -7  
(B) -5  
(C) 5  
(D) 7

3. There are 6 people in a room. Each person shakes hands with everyone else in the room. What is the total number of handshakes?

- (A) 6  
(B) 12  
(C) 15  
(D) 30

4.

## TRI-SCHOOL MEET

	Event I	Event II	Event III
1 <sup>st</sup> Place (5 points)	C	A	
2 <sup>nd</sup> Place (3 points)	A		
3 <sup>rd</sup> Place (1 point)	B		

In a three-school meet, schools A, B, and C each entered one team for each of three events. If the score card above is completed and there are no ties in any event, what is the greatest possible number of points by which B's total score could exceed A's total score?

- (A) 0  
(B) 2  
(C) 4  
(D) 8

5.

$$-6 < 2x + 4 \leq 0$$

What are all the values of  $x$  which satisfy the above inequality?

- (A)  $-5 < x \leq -2$   
(B)  $-3 < x \leq -2$   
(C)  $2 \leq x < 3$   
(D)  $2 \leq x < 5$

6. Given  $f(x) = -3x^2 + 5$  for all real numbers  $x$ , what is the range of the function?

- (A) All real numbers less than or equal to 5  
(B) All integers less than or equal to 5  
(C) All nonnegative real numbers  
(D) All nonnegative integers





7. If  $f(x) = x^2$ , and  $g(x) = x^2 - 6x + 14$ , which of the following best describes the graph of  $g(x)$  relative to  $f(x)$ ?
- (A) Raised 5 units and shifted 3 units to the left  
 (B) Raised 5 units and shifted 3 units to the right  
 (C) Same vertical position shifted 3 units to the left  
 (D) Raised 14 units and shifted 6 units to the right
8. Paul is selling concert tickets at \$5 for adults and \$2 for students. At the end of the day, he has sold 10 tickets but is unsure if he collected \$39 or \$41. Can the number of student tickets sold be determined? If so, how many were sold?
- (A) Yes, 3 were sold.  
 (B) Yes, 4 were sold.  
 (C) Yes, 5 were sold.  
 (D) No, it cannot be determined.
9. Which of the following describes the solution set of the equation  $\sqrt{x+4} = x$ ?
- (A) There is one solution; it is a rational number.  
 (B) There are two solutions; they are rational numbers.  
 (C) There is one solution; it is an irrational number.  
 (D) There are two solutions; they are irrational numbers.
10. An object is fired upward at an initial velocity ( $v_0$ ) of 240 feet per second. The height,  $h(t)$ , of the object as a function of time is  $h(t) = v_0 t - 16t^2$ . How long will it take the object to hit the ground after takeoff?
- (A) 16 seconds  
 (B) 15 seconds  
 (C) 7.5 seconds  
 (D) 4 seconds
11. If  $f(x) = x + 3$  and  $g(x) = \frac{x^2 - 9}{x - 3}$ , which of the following statements are true about the graphs of  $f$  and  $g$  in the coordinate plane?
- I. The graphs are exactly the same.  
 II. The graphs are the same except when  $x = 3$ .  
 III. The graphs have an infinite number of points in common.
- (A) I only  
 (B) II only  
 (C) I and III  
 (D) II and III
12. The function  $f(x)$  has the value 0 if and only if  $x$  is in the set  $[-3, 0, 1]$ . For what values of  $x$  is  $f(x - 3) = 0$ ?
- (A)  $[-3, 0, 1]$   
 (B)  $[0, 1]$   
 (C)  $[0, 3, 4]$   
 (D)  $[3, 0, 2]$



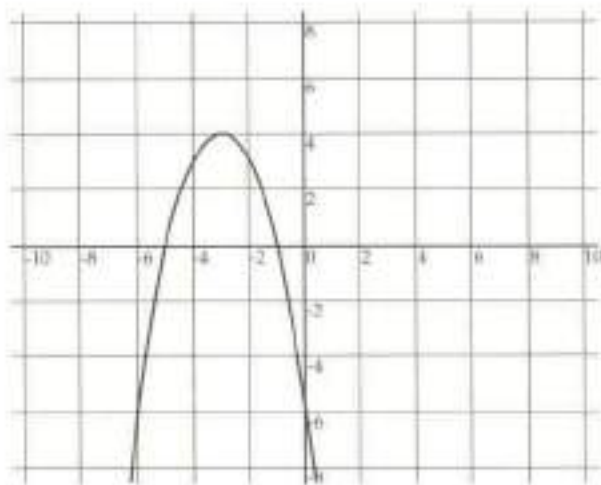
13. Jack and Jill went to Burger King. Jack bought 2 hamburgers and 3 shakes for \$4.21 while Jill bought 3 hamburgers and 2 shakes for \$5.24. The combined cost of a hamburger and a shake is

(A) \$1.03  
 (B) \$1.54  
 (C) \$1.89  
 (D) \$9.45

14. The front, side, and bottom faces of a rectangular solid have areas of 24, 8, and 3 centimeters squared, respectively. What is the volume of the solid in cubic centimeters?

(A) 24  
 (B) 96  
 (C) 192  
 (D) 288

15. What is the equation for the graph below?



(A)  $y = (x + 3)^2 + 4$   
 (B)  $y = -x^2 - 6x - 5$   
 (C)  $y = (x - 3)^2 + 4$   
 (D)  $y = -x^2 - 6x - 9$







## DIRECTIONS

For questions 16 – 20, find the solution to the problem and enter your answer as demonstrated below.

1. Only the answer that is bubbled in on the answer sheet will be credited. The blank spaces above the bubbles are for you to record your answers for accuracy.
2. Only fill in one bubble in any given column.
3. None of the answers on this portion of the test are negative values.
4. If a problem appears to have more than one answer, only enter one answer. If the answer you enter is one of the correct solutions, you will receive full credit for that question.
5. If the correct answer can be expressed as a mixed number, it must be entered as a decimal or an improper fraction.
6. If the correct answer is a decimal that cannot fit into the grid space, you must fill the grid with enough digits to completely fill the space. The number can be rounded or simply shortened but must fill every blank space.

Write answer in boxes.

Answer:  $\frac{5}{36}$       Answer: 4.5

Grid in result.

	5	/	3	6		4	.	5	
	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
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1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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← Fraction line  
← Decimal point

Acceptable ways to grid  $\frac{1}{6}$  are:

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Answer: 302 – either position is correct

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## NOTES

Begin entering answers in any column that accommodates your answer. If you do not need a column do not enter anything in that column.





16. The quadratic  $x^2 - x = 2$  has two solutions. What is the larger of the two solutions?

ANSWER: \_\_\_\_\_

17. If  $\frac{3}{x-3} + \frac{5}{2x-6} = \frac{11}{12}$ , then the value of  $2x - 6$  is

ANSWER: \_\_\_\_\_

18. If  $x + y = 11$ ,  $y + z = 14$  and  $x + z = 13$ , what is the value of  $x + y + z$ ?

ANSWER: \_\_\_\_\_

19. In a weight-lifting competition, the total weight of Peter's two lifts was 750 pounds. If twice the weight of his first lift was 300 pounds more than the weight of his second lift, what was the weight, in pounds, of his first lift?

ANSWER: \_\_\_\_\_

20. A baseball team has won 15 games and lost 9. If these games represent  $16\frac{2}{3}$  percent of all games to be played, how many more games must the team win to achieve a win percentage of 75% for the season?

ANSWER: \_\_\_\_\_





# Math Test 4 – Calculator



55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

## DIRECTIONS

For questions 1 – 30, find the solution to each problem and select the most appropriate answer from the choices provided. For questions 31 – 38, find the solution to each problem and write your answer in the space provided. You may use the blank space in your test booklet for scratch work.

## NOTES

1. The use of a calculator on any part of this section is allowed.
2. Unless otherwise indicated, all variables and expressions used in this test represent real numbers.
3. Unless otherwise indicated, all figures used in this test are drawn to scale.
4. Unless otherwise indicated, all figures used in this test lie on a plane.
5. Unless specified otherwise, a given function,  $f$ , has the domain the set of all real numbers  $x$  for which  $f(x)$  is a real number.

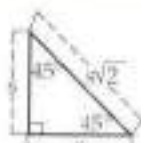
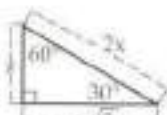
## REFERENCE



$$A = \frac{1}{2}bh$$



$$c^2 = a^2 + b^2$$



Special Right Triangles



$$A = \pi r^2$$

$$C = 2\pi r$$



$$A = lw$$



$$V = lwh$$



$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}lwh$$

The arc of a circle is 360 degrees or  $2\pi$  radians.  
A triangle has angles that sum to 180 degrees.





1. PROPORTIONS SPENT ON RAW MATERIALS BY FACTORY Y IN 1987

Material	Percent (%)
Paper	28
Wood	32
Metal	40

In the table above, if the total amount spent on wood and paper by Factory Y in 1987 was \$277,200, how much was spent on paper?

- (A) \$77,616  
(B) \$129,360  
(C) \$147,840  
(D) \$184,800
2. Which of the following is the equation of a line with  $x$ -intercept  $(6, 0)$  and  $y$ -intercept  $(0, 15)$ ?
- (A)  $y = \frac{5}{2}x - 15$   
(B)  $y = -\frac{5}{2}x - 15$   
(C)  $y = \frac{5}{2}x + 15$   
(D)  $y = -\frac{5}{2}x + 15$
3. Six peaches of a certain variety weigh collectively 1.5 pounds. Twenty pounds are being sold for \$24.00. At this rate, what is the cost, in dollars, of one dozen peaches?
- (A) \$0.30  
(B) \$1.80  
(C) \$3.60  
(D) \$7.20
4. Seven students played a game. Their scores, from lowest to highest, were as follows: 20, 30, 50, 70, 80, 80, and 90.
- Which of the following is true of the scores?
- I. The average score is above 70.  
II. The median is greater than 70.  
III. The mode is greater than 70.
- (A) None  
(B) III only  
(C) I and II only  
(D) II and III only
5. Which ordered pair is in the solution set of the system of inequalities  $y \leq 3x + 1$  and  $x - y > 1$ ?
- (A)  $(-1, -2)$   
(B)  $(1, 2)$   
(C)  $(2, -1)$   
(D)  $(-1, 2)$
6. What is the range of the function defined by  $f(x) = \frac{1}{x} + 2$ ?
- (A) All real numbers.  
(B) All real numbers except  $-\frac{1}{2}$ .  
(C) All real numbers except 0.  
(D) All real numbers except 2.



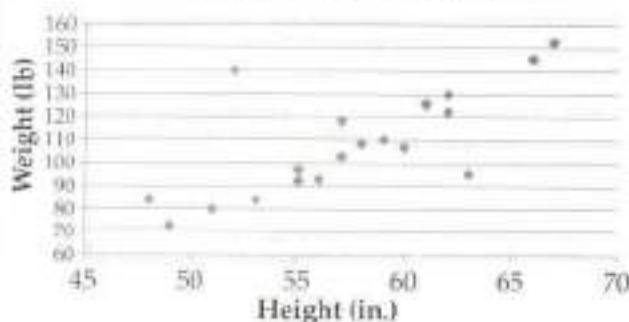


7. The United States' deer population increases 30% every 20 years. If the deer population is  $x$  in the year 2000, what factor of  $x$  will the deer population be in the year 2080?

(A) 2.197  
 (B) 2.636  
 (C) 2.5  
 (D) 2.856

Question 8 and 9 refer to the following information.

Height/Weight Boys age 12



8. Height and weight information was taken for 22 twelve-year-old boys in the same 7th grade class. The data is represented in the scatterplot above. Which of the following best represents the relationship between height ( $x$ ) and weight ( $y$ ) in this group?

(A)  $y = 4x + b$   
 (B)  $y = 0.1x^2 - 200$   
 (C)  $y^2 = x - 1,000$   
 (D)  $y = -3.5x + b$

9. Body Mass Index (BMI) is calculated by using height and weight to determine the value of the expression  $\frac{\text{weight}}{(\text{height})^2}$ . If one inch is equal to 2.54 centimeters, and one pound is equal to 453 grams, by what number must a BMI in pounds and inches be multiplied to produce a BMI in  $\frac{\text{kilograms}}{\text{meters}^2}$ ?

(A) 0.07  
 (B) 0.17  
 (C) 14.2  
 (D) 702

10. A student solves the following system of equations using the substitution method:

$$\begin{aligned} 2x - y &= 5 \\ 3x + 2y &= -3 \end{aligned}$$

Which of the following expresses the first step in the student's substitution process?

(A)  $3x + 2(2x - 5) = -3$   
 (B)  $3x + 2(5 - 2x) = -3$   
 (C)  $3(y + \frac{5}{2}) + 2y = -3$   
 (D)  $3(\frac{5}{2} - y) + 2y = -3$

11. The quadratic equation  $2x^2 + 7x + 5 = 0$  has two solutions. What is the sum of these two solutions?

(A) -7  
 (B)  $-\frac{3}{2}$   
 (C)  $-\frac{7}{2}$   
 (D)  $\frac{7}{2}$





12. At how many points do the curves  $y = x^2$  and  $y = x^{2013}$  intersect?
- (A) 3  
(B) 2  
(C) 1  
(D) 0
13. When Robert was born, his grandfather invested \$1,000 in a college education fund for his grandson. The amount of money in the account,  $A$ , is given by the formula  $A = P(1 + r)^t$ , where  $P$  is the principal,  $r$  is the interest rate, and  $t$  is the time in years. At an interest rate of 4.5%, compounded annually, approximately how much money is in the fund when Robert is 18?
- (A) \$1,810  
(B) \$2,200  
(C) \$3,680  
(D) \$18,810
14. In 1980, the price of a certain antique car was 30 percent more than in 1975. In 1985 the price of the same car was 50 percent more than in 1980. The price of the car in 1985 is what percent greater than in 1975?
- (A) 40%  
(B) 45%  
(C) 90%  
(D) 95%
15. In 2013, the United States Postal Service charged \$0.46 to mail a letter weighing up to 1 ounce and \$0.20 per ounce for each additional ounce. Which function represents the cost in dollars,  $c(z)$ , of mailing a letter weighing  $z$  ounces, where  $z$  is an integer greater than 1?
- (A)  $c(z) = 0.46z + 0.20$   
(B)  $c(z) = 0.46(z - 1) + 0.20$   
(C)  $c(z) = 0.20z + 0.46$   
(D)  $c(z) = 0.20(z - 1) + 0.46$
16. A company decides to give every one of its employees a \$1,000 raise. What happens to the mean and median of the salaries as a result?
- (A) The mean stays the same; the median increases by \$1,000.  
(B) The mean increases by \$1,000; the median stays the same.  
(C) The mean and median are the same.  
(D) The mean and median both increase by \$1,000.





17. Which of the following is true of the intersection of the lines  $4x - y = 7$  and  $x + 3y = 5$ ?

- (A) They intersect at a point  $(x, y)$ ; both  $x$  and  $y$  are positive.
- (B) They intersect at a point  $(x, y)$ ; both  $x$  and  $y$  are negative.
- (C) They intersect at a point  $(x, y)$ ;  $x$  is positive,  $y$  is negative.
- (D) The lines do not intersect.

18. If  $2a = b$ ,  $3b = c$ , and  $a + c = 70$ , what is  $a + b + c$ ?

- (A) 30
- (B) 60
- (C) 70
- (D) 90

19. If  $f(x, y) = \frac{1}{4}x - y$ , which of the following is equal to  $f(8, 3)$ ?

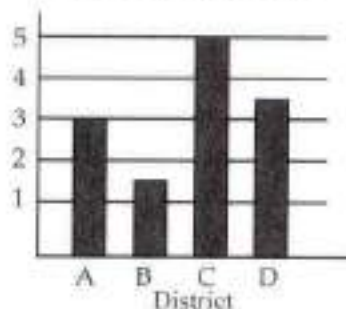
- (A)  $f(12, 2)$
- (B)  $f(16, 6)$
- (C)  $f(2, 1)$
- (D)  $f(-12, -2)$

20. If you have 16 milliliters (mL) of a 24% glucose solution, how much of a 50% glucose solution must be added to this solution to get a final mixture with a glucose concentration of 35%?

- (A) 10.7 mL
- (B) 11.7 mL
- (C) 12.3 mL
- (D) 12.7 mL

21.

TRASH COLLECTION BY DISTRICT IN MAY 2015



The graph above represents trash collection in four districts in a city in a single month. The total trash collected in the four districts is 130,000 tons. Which of the following could label the vertical axis?

- (A) Trash collected (tons)
- (B) Trash collected (thousands of tons)
- (C) Trash collected (tens of thousands of tons)
- (D) Trash collected (hundreds of thousands of tons)

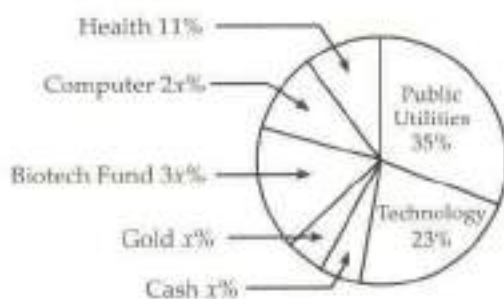




22. Water is flowing into a basement at a rate of 50 liters per hour. The water can be bailed out at a rate of 60 liters per hour. If the water flows for two hours before anyone begins removing it, how long will it take to bail out all the water in the basement?
- (A) 10  
(B) 20  
(C) 30  
(D) 40

23.

**Investment Portfolio Valued  
at \$500,000**



Note: Figure not to scale

The graph shows how \$500,000 is invested. Twenty percent of the amount invested in technology stocks above is reinvested in health stocks. How much total money is invested in health stocks after the transfer?

- (A) \$155,000  
(B) \$130,000  
(C) \$90,000  
(D) \$78,000

24. Peter went upstream in a canoe at an average speed of 12 miles per hour. He returned by the same route at an average speed of 18 miles per hour. What was Peter's average speed for the round trip, in miles per hour?
- (A) 14.0  
(B) 14.4  
(C) 15.0  
(D) 15.6

25. In the United States, 55 million computers, 32 million televisions, and 150 million cellphones were either disposed of or recycled in the past year. If 30% of computers, 20% of televisions, and 10% of cellphones were recycled, and the average weight of a television is twice the average weight of a computer and 100 times the average weight of a cellphone, what is the approximate percentage by weight of recycled electronics made up of cellphones?
- (A) 0.1%  
(B) 0.5%  
(C) 1%  
(D) 10%







26. At Springfield University, there are 10,000 students, half of whom are male and half of whom are female. Each student is enrolled either in the Arts Program or the Science Program, but not in both. Sixty percent of students are in the Arts Program, and 40% of the students in the Science Program are male. What percent of students in the Arts Program are female?

- (A) 26%  
 (B) 43%  
 (C) 50%  
 (D) 52%

27. An equation of the circle with center  $(2, -3)$  and diameter 4 is

- (A)  $x^2 + y^2 - 4x + 6y + 9 = 0$   
 (B)  $x^2 + y^2 - 4x + 6y = 0$   
 (C)  $x^2 + y^2 - 4x + 6y + 13 = 0$   
 (D)  $x^2 + y^2 - 4x - 6y + 9 = 0$

28. If  $f(x) = x^3 + x^2 + 2x + 6$ , then  $f(i) =$

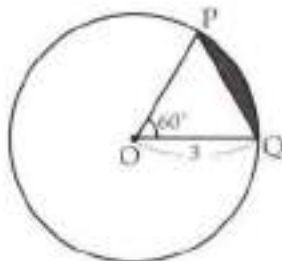
- (A)  $2i$   
 (B)  $2 + i$   
 (C)  $5 - i$   
 (D)  $5 + i$

29. If  $\sin x = \frac{3}{5}$  and  $\cos x < 0$ , then find  $\tan x$ .

(Note:  $\sin^2 x + \cos^2 x = 1$ )

- (A)  $-\frac{4}{3}$   
 (B)  $-\frac{3}{4}$   
 (C)  $\frac{3}{4}$   
 (D)  $\frac{4}{3}$

- 30.



In the figure above, the radius of the circle is 3 and  $\angle POQ = 60^\circ$ . What is the perimeter of the shaded region?

- (A)  $3 + \frac{\pi}{2}$   
 (B)  $\sqrt{3} + \pi$   
 (C)  $3 + \pi$   
 (D)  $2\sqrt{3} + \pi$





**DIRECTIONS**

For questions 31 – 38, find the solution to the problem and enter your answer as demonstrated below.

1. Only the answer that is bubbled in on the answer sheet will be credited. The blank spaces above the bubbles are for you to record your answers for accuracy.
2. Only fill in one bubble in any given column.
3. None of the answers on this portion of the test are negative values.
4. If a problem appears to have more than one answer, only enter one answer. If the answer you enter is one of the correct solutions, you will receive full credit for that question.
5. If the correct answer can be expressed as a mixed number, it must be entered as a decimal or an improper fraction.
6. If the correct answer is a decimal that cannot fit into the grid space, you must fill the grid with enough digits to completely fill the space. The number can be rounded or simply shortened but must fill every blank space.

Write answer in boxes.

Answer:  $\frac{5}{16}$       Answer: 4.5

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← Fraction line  
← Decimal point

Acceptable ways to grid  $\frac{1}{6}$  are:

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Answer: 302 – either position is correct

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**NOTES**

Begin entering answers in any column that accommodates your answer. If you do not need a column do not enter anything in that column.





31. A jar with a 3-gallon capacity is used to fill a tank with water. The jar is partly or fully filled with water from a faucet, and the jar is then taken to the tank where the water is emptied into the tank. If the tank's capacity is 91 gallons, what is the minimum number of trips needed to fill the tank?

ANSWER: \_\_\_\_\_

32. In a car race, David gives Peter a head start of 10 miles. David's car goes 80 miles per hour, and Peter's car goes 60 miles per hour. How long, in minutes, will it take David to catch up to Peter if they leave their starting marks at the same time?

ANSWER: \_\_\_\_\_

33. Solve the following for  $x$ :

$$\frac{5}{3}(x-3) = \frac{3}{2}(x-2)$$

ANSWER: \_\_\_\_\_

34. A box contains 4 red balls and 8 white balls. How much greater is the probability of simultaneously drawing 2 white balls at random than simultaneously drawing 2 red balls at random?

ANSWER: \_\_\_\_\_





35.

$$h = 70 + 5m$$

A runner has a resting heart rate of 70 beats per minute. For every minute he runs, his heart rate increases by a constant number of beats per minute. The runner's heart rate,  $h$ , is modeled by the equation above as a function of  $m$  minutes of running. On the basis of this equation, what is the increase in heart rate for every five minutes of running?

ANSWER: \_\_\_\_\_

36. To find the image length,  $L$ , of a 4-foot-tall object in a spherical mirror with a focal length of 2 feet, the formula  $L = 4 \left( \frac{2}{a-2} \right)^2$  can be used, where  $a$  is the distance, in feet, of the object from the mirror. What is the image length, in feet, of the object when it is 1.5 feet away from the mirror?

ANSWER: \_\_\_\_\_

Questions 37 and 38 refer to the information below.

Employment in Brazil, 1997  
Total Labor Force: 65.5 million

	% Employed	
	Men	Women
Service	42	66
Industry	23	14
Business	15	15
Civil Construction	11	0
Other	9	5

## 37. PART 1

Assuming the workforce is split equally into men and women, how many men, in millions, in Brazil work in Industry?

ANSWER: \_\_\_\_\_

## 38. PART 2

In reality, men held 61% of all jobs in Brazil in 1997. With this in mind, what is the probability that a worker selected at random will be a woman who is employed in Business?

ANSWER: \_\_\_\_\_



## Essay Test 4



50 MINUTES, Prompt-based essay

Turn to Section 5 of your answer sheet to answer the question in this section.

### DIRECTIONS

As you read the passage below, consider how Ricki Lewis uses

- evidence, such as facts or examples, to support claims.
- reasoning to develop ideas and to connect claims and evidence.
- stylistic or persuasive elements, such as word choice or appeals to emotion, to add power to the ideas expressed.

This passage is adapted from Ricki Lewis, “Dan Brown’s *Inferno*: Good Plot, Bad Science,” published in 2014.

When Dan Brown’s latest novel, *Inferno*, was published last summer, several people insisted I read it – because it’s about an insane geneticist. So when my local library asked me to give a talk about a book with genetics in the plot, I chose *Inferno*. The talk is next week, and I had great fun marking up the book.

Dan Brown gets an A, as usual, for writing style. He keeps the reader turning the pages. But this time, the plot is a stretch, and he gets an F in genetics.

I learned that scientific accuracy shouldn’t get in the way of telling a good story at the Catalyst Workshop at the American Film Institute, where every summer a dozen scientists learn screenwriting from the pros. I went in 2005. After a week of dissecting *The Day After Tomorrow*, an exciting end-of-the-world thriller that seems all too possible with the recent crazy weather, we all concluded, as our instructors had said from the outset, that in entertainment, scientific accuracy just doesn’t matter. So it’s okay if the magnetic poles suddenly switch and a person recovers from septicemia\* in a few hours with one shot of penicillin. I love that film.

As anyone who’s read Dan Brown’s *The Da Vinci Code* and *The Lost Symbol* knows, protagonist Robert Langdon is a Harvard professor specializing in symbology who is summoned for emergencies that require him to rocket through Europe running from bad guys and heading off global disasters, while following clues and cues in art. He’s always called “Professor.” Many of my friends are professors, and I have an adjunct title myself, and we don’t call ourselves Professor. Maybe it’s different in the art world.

Having no time for anything other than math and science in college, I admit to being a dunce about the art part of the Dan Brown books. But I can comment on the science.

Early foreshadowing of superficial science is on page 36, where the author confuses cerebellum with cerebrum, and PET scans with CT scans. And he makes the classic trio of errors later on by referring to human cell walls (animals are the only types of organisms without cell walls), “a bacteria,” and each of us having our own



genetic codes (the correspondence between RNA codons and amino acids is universal. We have individual genome sequences.)

But the worst illogic comes towards the end.

Tethered beneath the surface of a gloomy underground lagoon lies a bag filled with yellowish-brown goop that holds enough of a mysterious virus to render much of humanity infertile – somehow. The investigators have set up polymerase chain reaction (PCR) devices throughout the area, which all start blinking red to indicate detection of the “never-before-seen viral pathogen.” What did they use for primers? You can’t amplify a nucleic acid using the PCR without having a smidgeon of DNA or RNA from known pathogens.

Evolution is also handled oddly, although the protagonist claims to be skilled in matters Darwinian. He and the does confuse natural selection and survival of the fittest, which deal with reproductive success, with genetic enhancement to “advance the species” and “create better humans.” I think Brown means that those who survive to have successful sex after the viral scourge will then, either by the viral DNA or some new genetic treatment, churn out kids who get high SAT scores and humanity will be saved. The long-awaited explanation of the science is delivered in a style I call hand-waving – throw out a bunch of terms that presumably readers won’t recognize to make it sound like it makes sense. It doesn’t.

It’s great that a novelist as acclaimed as Dan Brown would base a plotline around genetics. But he squandered an opportunity to teach the public about the good that geneticists do. Why not a subplot of a sick kid? A family that uses the terrifying “germline genetic engineering” to vanquish a terrible genetic disease?

The last thing our science-phobic world needs is another mad scientist—even a fictional one.

*\*septicemia—a type of infection in which bacteria enters the bloodstream*

*\*primers—a molecule that induces the creation of a larger molecule*

Write an essay in which you explain how Ricki Lewis builds an argument to persuade her audience that the misuse of scientific concepts in literature is problematic. In your essay, analyze how the author uses one or more of the features listed in the box above (or features of your own choice) to strengthen the logic and persuasiveness of her argument. Be sure that your analysis focuses on the most relevant features of the passage.

Your essay should not explain whether you agree with the author’s claims, but rather explain how the author builds an argument to persuade her audience.



# SAT<sup>®</sup> Practice Test #5

## IMPORTANT REMINDERS:

1

When you take the official SAT, you will need to use a No. 2 pencil. Do not use a pen or a mechanical pencil.

2

On the official SAT, sharing any of the question on the test violates the College Board's policies and may result in your scores being canceled.

(This cover is modeled after the cover you'll see when you take the official SAT.)

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# Reading Test 5



65 MINUTES, 52 QUESTIONS

Turn to Section 1 of your answer sheet to answer the questions in this section.

**DIRECTIONS** Each passage or pair of passages is accompanied by 10 or 11 questions. Read each passage or pair of passages, and then select the most appropriate answer to each question. Some passages may include tables or graphs that require additional analysis.

Refer to the passage below to answer questions 1–10.

This passage is adapted from Anton Chekhov's short story, "Small Fry," in *The Schoolmistress and Other Stories*, originally published in 1885.

line "Honored Sir, Father and Benefactor!" a petty clerk called Nevyrazimov was writing a rough copy of an Easter congratulatory letter. "I trust that you may spend this Holy Day even as many  
5 more to come, in good health and prosperity. And to your family also!"

The lamp, in which the kerosene was getting low, was smoking and smelling. A stray cockroach was running about the table in alarm  
10 near Nevyrazimov's writing hand. Two rooms away from the office Paramon the porter was for the third time cleaning his best boots, and with such energy that the sound of the blacking-brush and of his expectorations was audible in all the  
15 rooms.

"What else can I write to him, the rascal?" Nevyrazimov wondered, raising his eyes to the smutty ceiling.

On the ceiling he saw a dark circle—the  
20 shadow of the lamp-shade. Below it was the dusty cornice, and lower still the wall, which had once been painted a bluish muddy color. And the office seemed to him such a place of desolation that he felt sorry, not only for himself, but even for the  
25 cockroach.

"When I am off duty I shall go away, but he'll be on duty here all his cockroach-life," he thought, stretching.

Nevyrazimov put his ear to the open  
30 [window] pane and listened. The Easter chimes floated into the room with a whiff of fresh spring air. The booming of the bells mingled with the rumble of carriages, and above the chaos of sounds rose the brisk tenor tones of the nearest  
35 church and a loud shrill laugh.

He moved away from the window and walked wearily about the rooms. The din of the bells grew louder and louder.... There was no need to stand by the window to hear it. And

40 the better he could hear the bells and the louder the roar of the carriages, the darker seemed the muddy walls and the smutty cornice and the more the lamp smoked.

"Shall I book it and leave the office?" thought  
45 Nevyrazimov.

But such a flight promised nothing worth having.... After coming out of the office and wandering about the town, Nevyrazimov would have gone home to his lodging, and in his lodging  
50 it was even grayer and more depressing than in the office.... Even supposing he were to spend that day pleasantly and with comfort, what had he beyond? Nothing but the same gray walls, the same stop-gap duty and complimentary letters.

55 Nevyrazimov stood still in the middle of the office and sank into thought. The yearning for a new, better life gnawed at his heart with an intolerable ache. He had a passionate longing to find himself suddenly in the street, to mingle  
60 with the living crowd, to take part in the solemn festivity for the sake of which all those bells were clashing and those carriages were rumbling. He longed for what he had known in childhood—the family circle, the festive faces of his own people,  
65 the white cloth, light, warmth...! He thought of the carriage in which the lady had just driven by, the overcoat in which the head clerk was so smart, the gold chain that adorned the secretary's chest.... He thought of a warm bed, of the Stanislav order,  
70 of new boots, of a uniform without holes in the elbows.... He thought of all those things because he had none of them.

"Shall I steal?" he thought. "Even if stealing is an easy matter, hiding is what's difficult. Men  
75 run away to America, they say, with what they've stolen, but the devil knows where that blessed America is. One must have education even to steal, it seems."

80 And Nevyrazimov, racking his brain for a means of escape from his hopeless position, stared at the rough copy he had written. The letter was written to a man whom he feared and hated with his whole soul, and from whom he had for the last ten years been trying to wring a post worth



85 eighteen rubles a month, instead of the one he had at sixteen rubles.

"Ah, I'll teach you to run here, you devil!"

He viciously slapped the palm of his hand on the cockroach, who had the misfortune to catch his

90 eye. "Nasty thing!"  
The cockroach fell on its back and wriggled its legs in despair. Nevyrazimov took it by one leg and threw it into the lamp. The lamp flared up and spluttered.

95 And Nevyrazimov felt better.

- The descriptions of "Easter chimes," "spring air," and "the rumble of carriages" (lines 29 - 35) primarily serve to
  - remind Nevyrazimov of experiences from his childhood.
  - highlight reasons for Nevyrazimov's distracted demeanor.
  - inspire Nevyrazimov to make several significant lifestyle changes.
  - contrast with the miserable conditions in which Nevyrazimov is immersed.
- As used in line 33, "chaos" most nearly means
  - tumult.
  - mayhem.
  - turmoil.
  - turbulence.
- Based on the passage, Nevyrazimov's attitude is best described as
  - optimistic yet cautious.
  - fatalistic and resigned.
  - opportunistic and cunning.
  - honest and sincere.
- Which choice provides the best evidence for the answer to the previous question?
  - Lines 16 - 18 ("What else...smutty ceiling.")
  - Lines 51 - 54 ("Even supposing...letters.")
  - Lines 56 - 58 ("The yearning...ache.")
  - Lines 92 - 94 ("Nevyrazimov took...and spluttered.")
- As used in line 60, "solemn" most nearly means
  - earnest.
  - dour.
  - ceremonious.
  - imposing.
- It can be inferred from the passage that the intended recipient of Nevyrazimov's letter is
  - Nevyrazimov's superior at his place of work.
  - Nevyrazimov's friend who refuses to lend him money.
  - a wealthy member of Nevyrazimov's family.
  - a corrupt government official.
- The irony of the contents of the letter that Nevyrazimov is writing at the beginning of the story is that
  - the letter focuses on generosity, but its intended recipient is known for his greed.
  - the letter is flattering and friendly, but Nevyrazimov despises its intended recipient.
  - the letter is formal and serious, yet Nevyrazimov is a flippant and jocular person.
  - the letter shows reverence, yet Nevyrazimov has little respect for religious institutions.
- Which choice provides the best evidence for the answer to the previous question?
  - Lines 1 - 3 ("Honored Sir...letter.")
  - Lines 16 - 18 ("What else...smutty ceiling.")
  - Lines 81 - 87 ("The letter...rubles.")
  - Lines 91 - 93 ("The cockroach...lamp.")
- Over the course of the passage, Nevyrazimov's attitude toward the cockroach shifts from
  - feeling protective of the cockroach to being repulsed by it.
  - feeling sympathy for the cockroach to feeling contempt toward it.
  - being unperturbed by the cockroach to becoming obsessed with it.
  - being disgusted by the cockroach to developing a begrudging sense of camaraderie with it.
- Nevyrazimov probably kills the cockroach to
  - convey his desire to keep his workplace clean.
  - show his disdain toward those whom he perceives as beneath him.
  - take out his frustrations regarding his station in life.
  - demonstrate that he is determined to make positive changes to his life.



Refer to the passage below to answer questions 11 – 21.

The following passage is adapted from a speech given by lawyer Andrew Hamilton in 1735. While what is now the east coast of the United States was still a British colony, a newspaper publisher named John Peter Zenger was jailed for printing criticisms of the British colonial governor. In court, Andrew Hamilton (no relation to Alexander Hamilton) defended Zenger. The following is an excerpt of Hamilton's defense in court. (He refers to the prosecutor as "Mr. Attorney.")

line It is said, and insisted upon by Mr. Attorney,  
that government is a sacred thing; that it is to be  
supported and revered; it is government that  
protects our persons and estates; that prevents  
5 treasons, murders, robberies, riots, and all  
the train of evils that overturn kingdoms and  
states and ruin particular persons; and if those  
in the administration, especially the supreme  
magistrates, must have all their conduct censured  
10 by private men, government cannot subsist. This  
is called a licentiousness not to be tolerated. It  
is said that it brings the rulers of the people into  
contempt so that their authority is not regarded,  
and so that in the end the laws cannot be put in  
15 execution.

These, I say, and such as these, are the  
general topics insisted by men in power and their  
advocates. But I wish it might be considered  
at the same time how often it has happened  
20 that the abuse of power has been the primary  
cause of these evils, and that it was the injustice  
and oppression of these great men which has  
commonly brought them into contempt with the  
people. The craft and art of such men are great,  
25 and who that is the least acquainted with history  
or with the law can be ignorant of the specious  
pretenses which have often been made use of  
by men in power to introduce arbitrary rule and  
destroy the liberties of a free people...

30 The loss of liberty to a generous mind is  
worse than death; and yet we know there have  
been those in all ages who, for the sakes of  
preferment or some imaginary honor, have freely  
lent a helping hand to oppress, nay, to destroy,  
35 their country. This brings to my mind that saying  
of the immortal Brutus, when he looked upon the  
creatures of Caesar, who were very great men,  
but by no means good men: "You Romans," said  
Brutus, "if yet I may call you so, consider what  
40 you are doing; remember that you are assisting  
Caesar to forge those very chains which one day  
he will make yourselves wear." This is what every  
man that values freedom ought to consider; he  
should act by judgment and not by affection or  
45 self-interest...

Power may justly be compared to a great

river; while kept within its bounds, it is both  
beautiful and useful, but when it overflows its  
banks, it is then too impetuous to be stemmed; it  
50 bears down all before it, and brings destruction  
and desolation wherever it comes. If, then, this be  
the nature of power, let us at least do our duty,  
and, like wise men who value freedom, use our  
utmost care to support liberty, the only bulwark  
55 against lawless power, which, in all ages, has  
sacrificed to its wild lust and boundless ambition  
the blood of the best men that ever lived...

The question before the court, and you,  
gentlemen of the jury, is not of small nor private  
60 concern; it is not the cause of a poor printer, nor  
of New York alone, which you are now trying.  
No! It may, in its consequence, affect every free  
man that lives under a British government on the  
main continent of America. It is the best cause;  
65 it is the cause of liberty; and I make no doubt  
but your upright conduct, this day, will not only  
entitle you to the love and esteem of your fellow  
citizen, but every man who prefers freedom to a  
life of slavery will bless and honor you as men  
70 who have baffled the attempt of tyranny, and, by  
an impartial and uncorrupt verdict, have laid a  
noble foundation for securing to ourselves, our  
posterity, and our neighbors that to which nature  
and the laws of our country have given us a  
75 right – the liberty of both exposing and opposing  
arbitrary power (in these parts of the world at  
least) by speaking and writing truth...



11. In the context of the passage, Hamilton's use of the phrase "it is government that protects our persons and estates" (lines 3 – 4) is primarily meant to
- explain why people should value and respect the government.
  - introduce a list of "evils" and crimes.
  - propose better law enforcement in the colonies.
  - repeat one of the justifications for the charges.
12. As used in line 9, "censured" most nearly means
- censored.
  - admonished.
  - evaluated.
  - sentenced.
13. In lines 26 – 27, Hamilton refers to "specious pretenses" primarily to
- describe false reasons commonly given for oppression.
  - define the types of laws that forbid free speech.
  - clarify the difference between his stance and his opponent's.
  - comment on the arrogance of British government officials.
14. Within the passage, paragraph 2 (lines 16 – 29) can best be described as
- a rebuke of the prosecution's disrespectful charges.
  - a partial concession to some of the opponent's points.
  - a rebuttal of the prosecution's argument.
  - an introduction to the Roman history that follows.
15. In the third paragraph (lines 30 – 45), Hamilton strongly suggests that people who assist tyrants
- do not value liberty.
  - often expect some kind of promotion in return.
  - expect the tyrant to promote freedom of speech.
  - want to destroy their countries.
16. Which choice provides the best evidence for the answer to the previous question?
- Lines 16 – 18 ("These, I say...advocates.")
  - Lines 31 – 35 ("and yet we...their country.")
  - Lines 38 – 42 ("You Romans,...wear.")
  - Lines 46 – 51 ("Power may...it comes.")
17. In lines 38 – 42 ("You Romans'...'yourselves wear"), Hamilton implies that
- the British governor plans to enslave everyone.
  - those who help an oppressive government will go to jail.
  - the British governor is acting exactly like Caesar did in Rome.
  - people who assist in denying liberty to others will also lose their liberty.
18. The main rhetorical effect of comparing power to a great river (lines 46 – 57) is to
- emphasize its constant potential danger.
  - remind people that power is always destructive.
  - predict that the government will be swept away.
  - place the present struggle in a larger context.
19. In line 54, "bulwark" most nearly means
- large weapon.
  - convincing argument.
  - defensive wall.
  - stern warning.
20. In paragraph 5 (lines 58 – 77), Hamilton discusses the possible consequences of the jury's decision in order to
- persuade members to take courageous action.
  - inspire members to speak out themselves.
  - make sure that members can come to a unanimous decision.
  - explain details of the case that were confusing.
21. Which choice indicates Hamilton's predictions for the historical importance of the case?
- Line 60 – 61 ("it is not...now trying.")
  - Lines 62 – 64 ("It may, in its...of America.")
  - Lines 65 – 68 ("I make...fellow citizen")
  - Lines 70 – 77 ("by an impartial...truth.")



Refer to the passage below to answer questions 22 – 32.

This passage is adapted from Jean-Henri Fabre (trans. Bernard Miall), *Social Life in the Insect World*, originally published in 1911. The excerpt is a portion of Fabre's observations of crickets in captivity and outdoors during the crickets' year-long life cycle.

line April comes to an end, and the song of the Cricket commences. At first we hear only timid and occasional solos; but very soon there is a general symphony, when every scrap of turf has its performer. I am inclined to place the Cricket at the head of the choristers of spring. . . The lark hushes her song, that the blue-grey fields of lavender, swinging their aromatic censers before the sun, may hear the Cricket alone at his humble, solemn celebration.

5 But here the anatomist intervenes, roughly demanding of the Cricket: "Show me your instrument, the source of your music!" Like all things of real value, it is very simple; it is based on the same principle as that of the locusts; there is the toothed fiddlestick and the vibrating tympanum.

10 The right wing-cover overlaps the left and almost completely covers it, except for the sudden fold which encases the insect's flank. This arrangement is the reverse of that exhibited by the green grasshopper, the Decticus, the Ephemera, and their relations. The Cricket is right-handed, the others left-handed. The two wing-covers have the same structure. To know one is to know the other. Let us examine that on the right hand.

15 It is almost flat on the back, but suddenly folds over at the side, the turn being almost at right angles. This lateral fold encloses the flank of the abdomen and is covered with fine oblique and parallel nervures\*. The powerful nervures of the dorsal portion of the wing-cover are of the deepest black, and their general effect is that of a complicated design, not unlike a tangle of Arabic calligraphy.

20 Seen by transmitted light the wing-cover is of a very pale reddish color, excepting two large adjacent spaces, one of which, the larger and anterior, is triangular in shape, while the other, the smaller and posterior, is oval. Each space is surrounded by a strong nervure and goffered by slight wrinkles or depressions. These two spaces represent the mirror of the locust tribe; they constitute the sonorous area. The substance of the wing-cover is finer here than elsewhere, and shows traces of iridescent though somewhat smoky color.

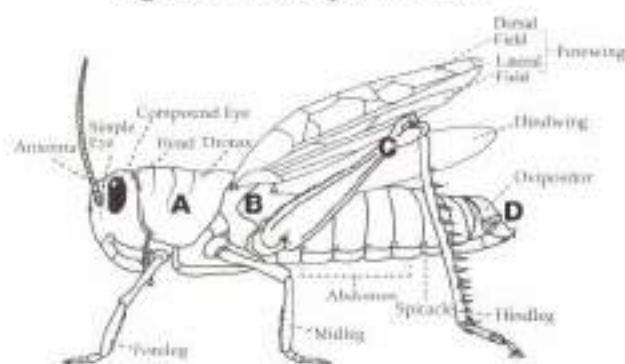
25 These are parts of an admirable instrument, greatly superior to that of the Decticus. The five hundred prisms of the bow biting upon the ridges of the wing-cover opposed to it set all four tympanums vibrating at once; the lower pair by

30 direct friction, the upper pair by the vibration of the wing-cover itself. What a powerful sound results! The Decticus, endowed with only one indifferent "mirror," can be heard only at a few paces; the Cricket, the possessor of four vibratory areas, can be heard at a hundred yards.

35 The Cricket rivals the Cigale [cicada] in loudness, but his note has not the displeasing, raucous quality of the latter. Better still: he has the gift of expression, for he can sing loud or soft. The wing-covers, as we have seen, are prolonged in a deep fold over each flank. These folds are dampers, which, as they are pressed downwards or slightly raised, modify the intensity of the sound, and according to the extent of their contact with the soft abdomen now muffle the song to a mezza voce and now let it sound fortissimo.

\* nervures: the hollow veins that form the framework of an insect's wing

Figure 1: Anatomy of a Cricket



22. In the context of the metaphor introduced in paragraph 1, the blue-grey fields of lavender fill the role of the
- audience.
  - orchestra.
  - stage crew.
  - soloist.
23. Based on paragraph 3 (lines 18 – 26), the arrangement of the wings of the green grasshopper is
- right over left.
  - left over right.
  - side by side.
  - highly complex.
24. The sentence “To know one... the other” (lines 25 – 26) is used primarily to convey the idea that
- one need not study different species of locust individually.
  - insects are swarm animals and do not possess individuality.
  - the wing structures of the Cricket and the grasshopper are essentially the same.
  - apart from their positioning, the two wing-covers of the Cricket can be thought of as identical.
25. The author includes the sentence “Let us examine...right hand.” (line 26) primarily to
- indicate that the discussion that follows refers to a single wing.
  - highlight the differences between mirror images.
  - emphasize that the cricket and the grasshoppers are related.
  - assert the greater importance of the right over the left wing.
26. In paragraph 4 (lines 27 – 35), the author compares the Cricket’s wing to a “tangle of Arabic calligraphy” primarily to
- point out that they were historically used as a source of ink.
  - connect crickets to the geographical area from which they originated.
  - give the reader a sense of their elegance and beauty.
  - suggest that their patterns acted as a form of camouflage.
27. As used in paragraph 5 (lines 36 – 47), the terms “anterior” and “posterior” most likely refer to
- species of Crickets.
  - positions on an insect’s body.
  - shapes of wing structures.
  - functions in producing sound.
28. The phrase “the mirror of the locust tribe” (lines 43) refers to
- the unique reproductive rituals that characterize the species.
  - the way in which individuals in the species appear in their adult stage.
  - the mechanism by which members of the species recognize each other.
  - a biological apparatus that reflects sound.
29. The passage identifies which of the following as the primary factor in crickets’ “gift of expression”?
- Their differences from the “raucous” cicadas
  - Their ability to lift and lower their wing-covers.
  - Their ability to fold their wing-covers.
  - Their skill at chirping loudly.
30. As used in (line 61), “quality” most nearly means
- cost.
  - fabric.
  - tone.
  - trait.
31. According to the passage, which of the following positions on the diagram above is most likely the site of the tympanum?
- Position A
  - Position B
  - Position C
  - Position D
32. The author uses the musical notation terms “mezza voce,” and “fortissimo” (lines 62 – 69) in reference to the Cricket primarily to
- emphasize the melodious resonance of a Cricket’s call.
  - suggest that Crickets speak to each other through song.
  - note the most important difference between the two species.
  - describe the Cricket in terms of its native land.



Refer to the passage below to answer questions 33–43.

This passage is adapted from a speech given by United States President Ronald Reagan on January 28, 1986. On the morning of January 28, 1986, a NASA space shuttle, the *Challenger*, exploded just after launching. All seven crew members aboard were killed, including Christa McAuliffe, who would have been the first teacher in space. Students in many schools were watching the live coverage when the explosion took place. In the evening, United States President Ronald Reagan addressed the nation with the following televised speech.

Ladies and gentlemen, I'd planned to speak to you tonight to report on the state of the Union, but the events of earlier today have led me to change those plans. Today is a day for mourning and remembering. Nancy and I are pained to the core by the tragedy of the shuttle *Challenger*. We know we share this pain with all of the people of our country. This is truly a national loss.

Nineteen years ago, almost to the day, we lost three astronauts in a terrible accident on the ground. But we've never lost an astronaut in flight; we've never had a tragedy like this. And perhaps we've forgotten the courage it took for the crew of the shuttle. But they, the *Challenger* Seven, were aware of the dangers, but overcame them and did their jobs brilliantly. We mourn seven heroes: Michael Smith, Dick Scobee, Judith Resnik, Ronald McNair, Ellison Onizuka, Gregory Jarvis, and Christa McAuliffe. We mourn their loss as a nation together.

For the families of the seven, we cannot bear, as you do, the full impact of this tragedy. But we feel the loss, and we're thinking about you so very much. Your loved ones were daring and brave, and they had that special grace, that special spirit that says, "Give me a challenge, and I'll meet it with joy." They had a hunger to explore the universe and discover its truths. They wished to serve, and they did. They served all of us. We've grown used to wonders in this century. It's hard to dazzle us. But for 25 years the United States space program has been doing just that. We've grown used to the idea of space, and perhaps we forget that we've only just begun. We're still pioneers. They, the members of the *Challenger* crew, were pioneers.

And I want to say something to the schoolchildren of America who were watching the live coverage of the shuttle's takeoff. I know it is hard to understand, but sometimes painful things like this happen. It's all part of the process of exploration and discovery. It's all part of taking a chance and expanding man's horizons. The future doesn't belong to the fainthearted; it belongs to the brave. The *Challenger* crew was pulling us into the future, and we'll continue to follow them.

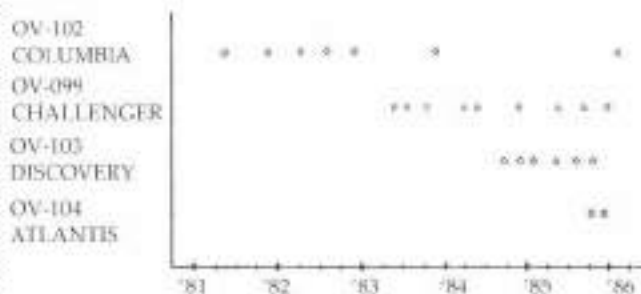
I've always had great faith in and respect for our space program, and what happened today does nothing to diminish it. We don't hide our space program. We don't keep secrets and cover things up. We do it all up front and in public. That's the way freedom is, and we wouldn't change it for a minute. We'll continue our quest in space. There will be more shuttle flights and more shuttle crews and, yes, more volunteers, more civilians, more teachers in space. Nothing ends here; our hopes and our journeys continue. I want to add that I wish I could talk to every man and woman who works for NASA or who worked on this mission and tell them: "Your dedication and professionalism have moved and impressed us for decades. And we know of your anguish. We share it."

There's a coincidence today. On this day 390 years ago, the great explorer Sir Francis Drake died aboard ship off the coast of Panama. In his lifetime the great frontiers were the oceans, and an historian later said, "He lived by the sea, died on it, and was buried in it." Well, today we can say of the *Challenger* crew: Their dedication was, like Drake's, complete.

The crew of the space shuttle *Challenger* honored us by the manner in which they lived their lives. We will never forget them, nor the last time we saw them, this morning, as they prepared for their journey and waved goodbye and "slipped the surly bonds of earth" to "touch the face of God."

\* Lines from the poem "High Flight," by John Gillespie Magee, Jr.

Space Flights by Shuttle and Date



SOURCE: "Shuttle Flights as of January 1986," Space Shuttle Mission STS-51-L, Press Kit, January 1986, NASA.



33. What main effect does the phrase "Nancy and I are pained to the core..." (lines 5 - 6) have on the tone of the passage?
- (A) It creates a morbid tone, focusing on the pain experienced by the crew.
  - (B) It creates a personal tone, connecting to audience members' emotions.
  - (C) It creates a tranquil tone, reminding viewers to turn to family for support.
  - (D) It creates an impassioned tone, foreshadowing a description of deep flaws in the system.
34. Reagan says, "This is truly a national loss" (line 8), and "We mourn their loss as a nation together" (line 19 - 20), primarily to
- (A) indicate that he is not speaking for political gain.
  - (B) persuade all American viewers to feel devastated.
  - (C) promise that the victims will not be forgotten.
  - (D) define how history will view the explosion.
35. In the context of the passage, "bear" (line 21) most nearly means
- (A) experience.
  - (B) produce.
  - (C) convey.
  - (D) withstand.
36. The speech strongly suggests that President Reagan believes
- (A) the Challenger's destruction was inexplicable.
  - (B) some members of the public will fault the crew members.
  - (C) the space shuttle program takes the lives of special people.
  - (D) the crew members' lives were not wasted by the explosion.
37. Which choice provides the best evidence for the answer to the previous question?
- (A) Line 11 - 12 ("But we've never...like this.")
  - (B) Lines 16 - 19 ("We mourn...McAuliffe.")
  - (C) Lines 28 - 29 ("They wished...all of us.")
  - (D) Lines 32 - 34 ("We've grown used...began.")
38. According to the chart, at the time of the crash, NASA's space shuttle program
- (A) had used the Challenger more than all the other shuttles combined.
  - (B) had begun to phase out the Challenger for newer shuttles.
  - (C) relied on the Challenger more than the other shuttles in 1983 and 1984.
  - (D) overused the Challenger in 1985, contributing to safety issues in 1986.
39. In the context of the passage, "quest" (line 53) most nearly means
- (A) inquiry.
  - (B) search.
  - (C) pilgrimage.
  - (D) pursuit.
40. In the speech, the president most strongly implies that the accident
- (A) should not cause NASA to lose funding.
  - (B) should be investigated to determine fault.
  - (C) may have been caused by enemies of democracy and freedom.
  - (D) may cause NASA employees to quit their jobs.
41. Which choice provides the best evidence for the answer to the previous question?
- (A) Line 45 - 46 ("The Challenger...follow them.")
  - (B) Lines 49 - 51 ("We don't hide...in public.")
  - (C) Lines 56 - 57 ("Nothing ends...continue.")
  - (D) Lines 62 - 63 ("And we know...share it.")
42. President Reagan's mention of Sir Francis Drake in the speech primarily serves as
- (A) an indicator of how long explorers remain famous after their deaths.
  - (B) an analogy for the historical contribution of the Challenger crew.
  - (C) an example of how often risk-takers die in pursuit of their goals.
  - (D) a symbol of a frontier that is easier for viewers to understand.
43. It is reasonable to conclude that the main goal of the speech is to
- (A) put the accident within a historical context.
  - (B) comfort the families of the deceased crew members.
  - (C) provide inspiration at a discouraging time.
  - (D) remind the public that space exploration has just begun.





Questions 44 – 52 are based on the following passages.

Passage 1 is adapted from Carolyn Graybeal, "Did you know 'storm spotters' in your community keep you safe during severe weather?" published in 2015. Passage 2 is from Eva Lewandowski, "Declining monarch population means increased need for citizen scientists," published in 2015.

### Passage 1

During hazardous weather, we rely on the knowledge, skill and expertise of meteorologists and designated emergency personnel to keep us safe and in the know. They in turn rely on data supplied by not just satellites and Doppler radars but also a network of citizen scientists.

But wait. With all our sophisticated technology, what could a few volunteers possibly contribute?

"Radars can tell us that there is heavy snowfall, but radars don't tell us how much, or if rain is mixing with the snow, or what damage is occurring. Our spotters do," explains Tanja Fransen of the National Weather Service in Glasgow, Montana.

Skywarn, a national network of more than 350,000 volunteers, was created after a particularly devastating series of tornadoes ripped through Midwestern states in 1965. Overseen by National Oceanic and Atmospheric Administration's (NOAA)'s National Weather Service, the Skywarn program trains citizens to identify severe storms and provide accurate reports of storm developments and effects.

During a storm, volunteers send in reports to National Weather Service forecaster offices about what is happening locally. Meteorologists use this valuable 'ground truth' to validate data from their instruments and fill in information gaps, enabling them to make better predictions about what the storm might do next.

Skywarn storm spotters are a diverse group of people varying in age, background and skill level. What they do have in common is an interest in weather and public service. To be a Skywarn storm spotter, volunteers must attend free training courses which cover the basics of storm formations, accurate reporting techniques and of course, storm safety. Last year alone, NOAA trained over 70,000 storm spotters.

The Skywarn network includes a subset of licensed amateur radio operators who provide additional assistance during storms. The National Weather Service forecast offices utilize amateur radio to maintain communication between on the ground storm spotters and forecasters. And during especially large storms, which can knock out phone service, amateur radio volunteers help keep their communities informed of new warnings and other critical information.

### Passage 2

The annual estimates of the monarch population are taken at the monarch's overwintering site in central Mexico. Most of the monarchs in North America live east of the Rocky Mountains, and each fall they migrate thousands of miles south to their overwintering location in Mexico, where they cluster together on oyamel fir trees. In the spring those same monarchs fly north, where they produce new generations that spread throughout the United States and Canada. Their vast summer range can make it difficult to get precise estimates of the population size, but in winter the monarchs are bunched tightly together, making population estimates more feasible.

Instead of counting individual monarchs, scientists record the amount of land that the overwintering monarch population covers.

This year, the monarchs covered 1.13 hectares; that's a little more than two football fields' worth of land. That might sound like a staggeringly small size, but it's actually a 69 percent increase over last year's population, which was the smallest on record.

...Planting native nectar plants and native milkweed, the only plant on which monarchs will lay eggs, is an easy way to help, but people who want to get more involved will find a whole host of monarch citizen science projects in need of volunteers. These projects study monarchs as they migrate and reproduce in the United States and Canada, and provide insight into how disease, climate change, and habitat loss are affecting the monarch population. Citizen science is so important to monarch research that since 2000, almost two-thirds of the published results on monarch field research have used citizen science data (Ries, L., and K.S. Oberhauser, in press).



44. As used in line 2, "expertise" most nearly means
- (A) adroitness.
  - (B) prowess.
  - (C) aptitude.
  - (D) dexterity.
45. In Passage 1, paragraph 3 (lines 16 – 24) is primarily concerned with establishing a contrast between
- (A) hazardous weather and damage on the ground.
  - (B) contributions by individuals and by networks.
  - (C) heavy snowfall and snow mixed with rain.
  - (D) information gleaned from different sources.
46. In Passage 1, the central claim about the Skywarn program is that it
- (A) provides an opportunity for public service.
  - (B) educates the public about meteorology.
  - (C) improves the accuracy of storm predictions.
  - (D) prevents severe storm damage.
47. Which choice provides the best evidence for the answer to the previous question?
- (A) Lines 16 – 19 ("Skywarn, a national...1965.")
  - (B) Lines 20 – 24 ("Overseen by...effects.")
  - (C) Lines 27 – 31 ("Meteorologists use...next.")
  - (D) Lines 34 – 35 ("What they do...service.")
48. The author of Passage 1 suggests that amateur radio operators can
- (A) radio police units and paramedics in their areas.
  - (B) provide details that ordinary storm spotters cannot.
  - (C) take responsibility for emergency evacuations.
  - (D) function even during phone and power outages.
49. The author of Passage 2 implies that citizen scientists
- (A) observe the monarch population when it is most active.
  - (B) should focus on adding the monarch's host plant in their gardens.
  - (C) supplant professional naturalists in the study of monarch butterflies.
  - (D) provide the most reliable data.
50. Which choice provides the best evidence for the answer to the previous question?
- (A) Lines 65 – 67 ("Instead of...covers.")
  - (B) Lines 70 – 73 ("That might...record.")
  - (C) Lines 79 – 83 ("Those projects...population.")
  - (D) Lines 83 – 87 ("Citizen science...data.")
51. The authors of Passage 1 and Passage 2 would most likely agree that
- (A) citizen science data are somewhat useful.
  - (B) citizen science volunteers must undergo training.
  - (C) networks of citizens can monitor immense territories.
  - (D) public enthusiasm for citizen science projects tends to be low.
52. The main purpose of both passages is to
- (A) describe a particular case of public participation in science.
  - (B) encourage readers to become citizen science volunteers.
  - (C) criticize the science community's dependence on technology.
  - (D) inform readers about potential environmental crises.



# Writing and Language Test 5



35 MINUTES, 44 QUESTIONS

Turn to Section 2 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each of the following passages is accompanied by approximately 11 questions. Some questions will require you to revise the passages in order to improve coherence and clarity. Other questions will require you to correct grammatical errors in the passages. Passages may be accompanied by graphs, charts, or tables that you must consider when making revisions. For most questions, you may select the "NO CHANGE" option if you believe that portion of the passage is clear, concise, and grammatically correct as is.

Within the passages, highlighted numbers followed by underlined text indicate which part of the text corresponds with each question. Bracketed numbers [1] indicate sentence number. These bracketed numbers are only relevant to problems that require you to add or rearrange sentences in a paragraph.

Refer to the passage below to answer questions 1–11.

## Software Developer

Every time a computer user hits a key or clicks on an icon, the user is giving a command to the computer. [1] such as "Open this file." The reason the command brings about the desired result is that a programmer has given the computer precise instructions about how to respond to that command. A person [2] whose job involves writing instructions for computers is called a "software developer."

[1] "Applications" software developers focus specifically on setting up pathways for people to give commands to computers. [2] The applications developers learn programming languages, which they use to create menus of possible actions. [3] Essentially, they tell a computer that if a user does *this*, [3] they must do *that*. [4] A device within the computer translates the code into machine language, and from then on, the computer is programmed to respond appropriately to a user's choice. [5] When the user hits the "x" key, an "x" will appear on the screen, for example. [4]

1. (A) NO CHANGE  
(B) such as "open  
(C) such as: "open  
(D) such as, "Open

2. (A) NO CHANGE  
(B) who's  
(C) where his or her  
(D) that's

3. (A) NO CHANGE  
(B) one  
(C) it  
(D) someone

4. The writer wants to add the following sentence to the paragraph.

The developers' series of instructions are referred to as "code."

The best placement for the sentence is immediately

- (A) after sentence 1.  
(B) after sentence 2.  
(C) after sentence 3.  
(D) after sentence 4.



**5** In addition to applications, some software developers focus on “systems,” a term which refers to the inner functioning of the computer. Others focus on “networks,” or the ways that computers communicate with other computers. Regardless of their specific tasks, all software developers spend their days puzzling out solutions to problems. They must use logic and creativity to craft and **6** ameliorate a section of code until they obtain the desired result. Software developers may find work in public agencies, or in private companies, such as software publishers, financial institutions, and **7** so on.

[1] Working conditions vary greatly for software developers. [2] However, developers commonly must work overtime to meet project deadlines, or be on call during nights and weekends in case there are technical problems. [3] Some developers share offices and collaborate in teams, while some work in cubicles or private offices. [4] Some meet regularly with clients during the business day, and some work from home on their own schedules. [5] Most developers work at least 40 hours a week. **8**

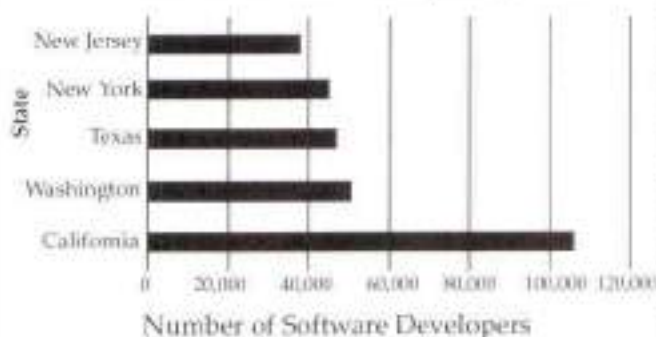
People who work in the software development field often have a bachelor’s degree in computer science or a related major, although some employers put more emphasis on experience. Software developers should expect to continually learn new programming languages and other tools. Some employers make a distinction between software developers and software engineers; the latter generally have more responsibility for designing and maintaining systems overall **9** than software developers.

5. (A) NO CHANGE  
(B) Contrary to  
(C) As a result of  
(D) As with
6. (A) NO CHANGE  
(B) renovate  
(C) enhance  
(D) adjust
7. The writer wants to replace the underlined section with a different type of private company that employs software developers. Which choice would best accomplish this goal?  
(A) local governments  
(B) banks  
(C) electronics manufacturers  
(D) police departments
8. To make the paragraph more logical, sentence 5 should be placed  
(A) where it is now.  
(B) before sentence 2.  
(C) before sentence 1.  
(D) after sentence 3.
9. (A) NO CHANGE  
(B) than software developers’  
(C) than software developers do.  
(D) then software developers.



Software developers are highly valued in today's world economy. According to the U.S. Bureau of Labor Statistics, there are already more than 1 million people working in software development in the United States, **10** with the majority of software developers in the U.S. working from California, Washington, and Texas. Some jobs in the field have been transferred to developing nations, but the unemployment rate among software developers in the U.S. is still a low 2.8 percent. The bureau predicts strong job growth for software developers **11** because of new software being in demand from now on all around the world.

Number of Software Developers by State



SOURCE: adapted from the Bureau of Labor Statistics, *Occupational Employment Statistics*, "Occupational Employment and Wages, May 2014."

10. Which choice accurately incorporates information from the graph into the passage?
- (A) NO CHANGE  
 (B) and approximately ten percent of software developers in the U.S. work in California.  
 (C) with California supporting more software developers than Texas, New York, and New Jersey combined.  
 (D) and California hosts the fastest-growing population of software developers.
11. (A) NO CHANGE  
 (B) as a consequence of software developers' ability to produce new software, which is going to be in demand more and more.  
 (C) notwithstanding the growing societal importance of their creative skills.  
 (D) due to an ever-increasing global demand for new software.



Refer to the passage below to answer questions 12 – 22.

## Biology of Hunger

— 1 —

**12** The complex system for digestion of food and excretion of waste in the human body is always working to break down food for energy and nutrients, but skipping a meal does not give the system a rest. Instead of resting, the system triggers physiological and psychological effects so that a hungry person will not be able to ignore the stomach's emptiness. Indeed, the person may **13** fail concentrating on anything else.

— 2 —

**14** When the stomach finishes processing and passing along all of the food it has, its walls release a hormone called ghrelin into the bloodstream. In response to this and other signals, the hypothalamus – the brain's center for automatic responses – signals the muscular walls of the digestive organs to release digestive fluids and begin contracting. The activity causes hunger pangs and the noise of air bubbles being squeezed. An empty system has none of the contents that would normally muffle the sound.

— 3 —

**15** If no food enters the digestive system, the body used up its stores of glucose, its main fuel, within about 12 hours. At this point the body begins to rely upon fatty acids from its stored fat. Fatty acids provide fuel to cells effectively, with one exception: brain cells rely almost exclusively on glucose. To keep glucose flowing, the liver is forced **16** to break down protein from the body's muscles and convert it to glucose. The liver also converts some fatty acids into ketone bodies, which are special molecules that serve as an alternative fuel for brain cells. As starvation progresses and the body's stored fat becomes depleted, however, the liver must increase its conversion of protein from muscles and other tissues.

12. (A) NO CHANGE  
(B) The digestive system  
(C) The complex system for digestion in the human body  
(D) The human digestive system
13. (A) NO CHANGE  
(B) find it difficult to concentrate  
(C) be challenged by having to concentrate  
(D) have a problem with concentrating
14. The author wants to add a topic sentence here. Which choice most effectively establishes the main topic of the paragraph?  
(A) It is actually quite accurate to describe an empty stomach as "growling."  
(B) The stomach stretches to accommodate big meals.  
(C) The stomach has two strategies to break down foods: mechanical and chemical.  
(D) Hormones play crucial roles in many bodily processes, including digestion.
15. (A) NO CHANGE  
(B) The body depletes its main fuel, glucose, after about 12 hours with no food.  
(C) The body had used up its stores of glucose, its main fuel, within about 12 hours of no food.  
(D) The body's main fuel, glucose, becomes used up after about 12 hours, if no food is eaten.
16. (A) NO CHANGE  
(B) to break down protein from the body's muscles and converting it  
(C) be breaking down protein from the body's muscles and converting it  
(D) breaking down protein from the body's muscles and to convert it



-- 4 --

Besides stimulating appetite, the brain has other ways of motivating food-foraging behavior. The brain releases the hormone cortisol, which initiates processes that provide a burst of energy. It also cuts back on its release of serotonin, the "happiness hormone." Therefore, a hungry person usually feels **17** restless and sad, or irritable. This emotional state predisposes **18** them to lose interest in both work and play, and to think only about the next meal.

-- 5 --

The biochemical processes that occur inside the body during prolonged hunger cause increasingly severe symptoms. These may include **19** low blood pressure, dehydration, weakness, a feeling of being cold, and headache. People at this stage become anxious and depressed. They feel less concern for others, and they may hoard or steal food. As they feel vulnerable, they are more likely to trust strong authority figures. **20** Eventually, starving people become quiet and withdrawn, reserving all remaining energy just to stay alive. Even if food becomes available again, it sometimes takes months to **21** retrieve mental health and sociability, and even longer to recover muscle strength. **22**

Question **22** asks about the previous passage as a whole.

17. (A) NO CHANGE  
(B) restless, and sad and irritable.  
(C) restless, sad, and irritable.  
(D) restless and sad, and irritable.
18. (A) NO CHANGE  
(B) him or her  
(C) one  
(D) us
19. (A) NO CHANGE  
(B) feelings of low blood pressure, dehydration, weakness, cold, and headache.  
(C) low blood pressure, dehydration, feelings of weakness and chilliness, and headache.  
(D) low blood pressure, dehydration, weakness, chilliness, and headache.
20. The writer is considering deleting the underlined sentence. Should it be kept or deleted?
- (A) Kept, because it illustrates the paragraph's focus on increasingly severe symptoms.  
(B) Kept, because it supports the paragraph's emphasis on sociability.  
(C) Deleted, because it blurs the paragraph's focus on physical and mental symptoms.  
(D) Deleted, because it does not provide enough information about reserving energy.
21. (A) NO CHANGE  
(B) regrow  
(C) regain  
(D) revise

Think about the previous passage as a whole as you answer question 22.

22. To make the passage most logical, paragraph 4 should be placed
- (A) after paragraph 1.  
(B) after paragraph 2.  
(C) where it is now.  
(D) after paragraph 5.



Refer to the passage below to answer questions 23 – 33.

## Trends in Psychotherapy

A large body of psychiatric research indicates that a combination of medication and psychotherapy can often ease psychological distress in patients. **23** Only medical doctors can prescribe medications, whereas psychotherapy typically involves conversation with a trained therapist. During the conversation, a patient explains troubling thoughts or feelings, and the therapist listens carefully.

Sigmund Freud introduced the concept of psychotherapy in the early 20th century. At that time, people who experienced mental health problems were often isolated and sometimes physically **24** constrained. Freud's basic approach was revolutionary. He correctly predicted that many mental symptoms would eventually be treatable with medications, and he proposed that many symptoms of distress were not innate **25** but rather stemmed from traumatic experiences. He listened to **26** his patients' talk and tried to help them gain insights into why they thought and felt as they did. Although Freud's specific theories about stages of development have been largely rejected, **27** he was still important.

23. (A) NO CHANGE  
 (B) Whereas medical doctors only can prescribe medications.  
 (C) Only medications can be prescribed by medical doctors, whereas  
 (D) Prescribing medications can be done by medical doctors, whereas only
24. (A) NO CHANGE  
 (B) restrained  
 (C) repressed  
 (D) retained
25. The writer is considering deleting the underlined section. Should the section be kept or deleted?  
 (A) Kept, because it supports the paragraph's emphasis on the effects of childhood trauma.  
 (B) Kept, because it supports the paragraph's focus on Freud's analytical approach.  
 (C) Deleted, because it blurs the paragraph's emphasis on innate psychological distress.  
 (D) Deleted, because it incorrectly confuses the concepts of trauma and symptoms of distress.
26. (A) NO CHANGE  
 (B) his patient's talk.  
 (C) his patients' talks  
 (D) his patients talk
27. The writer wants to conclude the paragraph with a sentence that emphasizes Freud's innovations in therapy. Which choice would best accomplish this goal?  
 (A) NO CHANGE  
 (B) his theories about stages of development are still taught in college.  
 (C) his analytic "talk therapy" approach has proven hugely influential.  
 (D) he had the ideas that changed attitudes toward the mentally ill.





Some post-Freudian researchers felt that psychological **28** therapy should be more scientific than Freud. They preferred a “behavioral” approach that focused on changing patients’ observable behaviors. Behaviorists propose that all learning is a result of positive or negative consequences. For example, we may learn as toddlers that shouting gets us attention, which is a kind of reward; as a result, we will shout more often. Contrarily, bad experiences dissuade us from continuing a behavior. We may learn to fear swimming because of a **29** childhood experience of being swept off our feet by a strong current, obviously a negative consequence.

**30** Perhaps a child’s shouting is causing problems in school; a therapist might teach his parents to praise the child every time he lowers his voice. Due to the rewarding praise, he is likely to begin to speak more softly. Perhaps a patient fears getting in water; a therapist might recommend that she wade in a shallow pool where presumably there will be no waves or currents. **31** Next, to go in a deeper pool. Step by step, due to the water yielding pleasure rather than threat, the patient can overcome her fear.

One popular current therapy focuses on relearning **32** your thought habits. Cognitive Behavioral Therapy (CBT) involves teaching patients to recognize their own “cognitive distortions,” or automatic negative thoughts. For example, a young man who tends to regard small problems as **33** catastrophes, may have a disagreement with his girlfriend and automatically assume that their relationship is over. CBT might help him to challenge his catastrophic thinking. Through CBT, he may improve both his moods and his relationships.

28. (A) NO CHANGE  
(B) therapies should be more scientific than Freud.  
(C) therapy should be more scientific than Freud’s was.  
(D) therapy should be Freud’s.
29. (A) NO CHANGE  
(B) negative childhood experience of being swept up by a strong current.  
(C) childhood experience in a strong current of water, which was obviously a negative outcome.  
(D) childhood experience in which a strong current of water swept us off our feet, a negative consequence.
30. Which choice most effectively establishes the main topic of the paragraph?  
(A) Behaviorists look at many possibilities as they begin therapy with patients.  
(B) Behaviorists believe that children can learn how to behave by positive reinforcement.  
(C) Behaviorism aims to help people learn or unlearn certain behaviors.  
(D) Behaviorism holds that all learning is a result of positive or negative consequences.
31. (A) NO CHANGE  
(B) Next, a deeper pool would work.  
(C) A deeper pool could be gone into next.  
(D) Next, the patient could go into a deeper pool.
32. (A) NO CHANGE  
(B) his or her thought habits.  
(C) thought habits.  
(D) their thought habits.
33. (A) NO CHANGE  
(B) catastrophes may  
(C) catastrophes—may  
(D) catastrophes: may



Refer to the passage below to answer questions 34 – 44.

## The Krampus

For the approximately 2 billion people who celebrate Christmas each year, Saint Nicholas **34** (you probably know him as Santa Claus) serves as **35** a signal of altruism and kindness. On Christmas Eve, he departs from his home in the North Pole and travels around the world, rewarding virtuous and obedient children with gifts. In most cultures, Santa Claus brings naughty children coal instead of gifts, punishing them for their indiscretions. However, many Germanic cultures believe that **36** something much more menacing than Santa Claus visits naughty children in December.

In Germany, Austria, and Hungary, children leave one of their shoes outside their doors on the night of December 5 (their Christmas Eve). The next day, considered Saint Nicholas' Day, children check the shoes they left out. Well-behaved children find shoes filled with toys and food, gifts from **37** Santa Claus; children who have behaved poorly find only a cane rod, a warning from Santa Claus' half-demon, half-goat counterpart, the Krampus. According to folklore, the Krampus beats naughty children with a cane rod before tossing them in a sack and **38** hauling them to the underworld. Clearly, Germanic children have good reason to behave come December.

**39** The night of December 5 is Krampus' Night. Around this time, cities and towns host "Krampus Runs," when men dress up as the Krampus and chase people through the streets. Although the Krampus Runs themselves have a Halloween-like air of playfulness, Krampus costumes can be terrifyingly elaborate, often incorporating curved horns, suits of dark fur, cloven feet, and masks depicting fanged goat heads with pointed tongues. For over a century, many Europeans have also sent each other holiday cards featuring the Krampus, who is usually depicted in the process of carrying off children.

34. (A) NO CHANGE  
(B) (usually Santa Claus)  
(C) (commonly referred to as Santa Claus)  
(D) (known internationally as Santa Claus to people around the world)
35. (A) NO CHANGE  
(B) a sign  
(C) a mark  
(D) an emblem
36. (A) NO CHANGE  
(B) something much more menacing than Santa Claus visits naughty children in December.  
(C) something much more menacing than Santa Claus, visits naughty children in December.  
(D) something much more menacing than Santa Claus visits naughty children, in December.
37. (A) NO CHANGE  
(B) Santa Claus, badly behaved children  
(C) Santa Claus; poorly behaved children  
(D) Santa Clause; poor behaved children
38. (A) NO CHANGE  
(B) hauls them  
(C) hauled them  
(D) being hauled
39. Which choice most effectively establishes the main topic of the paragraph?  
(A) The Krampus has been a part of some cultures' Christmas traditions since at least the 17th century.  
(B) Whereas Americans celebrate Christmas at the end of December, many Germanic cultures begin their celebrations at the beginning of the month.  
(C) The Krampus' physical characteristics change slightly depending on who you ask.  
(D) Despite its terrifying appearance and sinister intentions, the Krampus sits at the center of several European traditions.



Many scholars suspect that the Krampus comes from pagan traditions, and that iterations of the Krampus antedate the celebration of Christmas. **40** In Norse mythology, the Krampus is the son of Hel, ruler of the underworld. As Christianity spread throughout Central and Northern Europe during the Middle Ages, **41** they appropriated many pagan traditions and figures, including the Krampus. Over time, the Krampus was conflated with the Devil, another underworld denizen often depicted with goat-like features.

In recent years, the Krampus has seen a sudden rise in popularity, especially in the United States. Many **42** assign this surge to the rise of Christmas "counterculture," as more people come to regard shopping for Christmas gifts as promoting rampant consumerism, they turn to other, less conventional symbols of the holidays. **43** After all, what subverts the notion of gift giving more than the celebration of the Krampus, a goat-demon with a penchant for snatching **44** children!

40. The writer is considering deleting the underlined sentence. Should the sentence be kept or deleted?
- (A) Kept, because it introduces the main topic of Norse mythology in popular culture.  
 (B) Kept, because it adds relevant information about the Krampus' pagan origins.  
 (C) Deleted, because it deviates from the paragraph's focus on modern Christian traditions.  
 (D) Deleted, because it directly contradicts information presented in the previous sentence.
41. (A) NO CHANGE  
 (B) it  
 (C) this  
 (D) these
42. (A) NO CHANGE  
 (B) equate  
 (C) attribute  
 (D) impart
43. (A) NO CHANGE  
 (B) Thus,  
 (C) Finally,  
 (D) However,
44. (A) NO CHANGE  
 (B) children.  
 (C) children?  
 (D) children....





# Math Test 5 – No Calculator



25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

## DIRECTIONS

For questions 1 – 15, find the solution to each problem and select the most appropriate answer from the choices provided. For questions 16 – 20, find the solution to each problem and write your answer in the space provided. You may use the blank space in your test booklet for scratch work.

## NOTES

1. The use of a calculator on any part of this section is forbidden.
2. Unless otherwise indicated, all variables and expressions used in this test represent real numbers.
3. Unless otherwise indicated, all figures used in this test are drawn to scale.
4. Unless otherwise indicated, all figures used in this test lie on a plane.
5. Unless specified otherwise, a given function,  $f$ , has the domain the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE



$$A = \frac{1}{2}bh$$



$$c^2 = a^2 + b^2$$



Special Right Triangles



$$A = \pi r^2$$

$$C = 2\pi r$$



$$A = lw$$



$$V = lwh$$



$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}lwh$$

The arc of a circle is 360 degrees or  $2\pi$  radians.  
A triangle has angles that sum to 180 degrees.





1. A college dining hall took a survey of 260 students on their favorite meals. One-fifth of students selected macaroni and cheese as their favorite, and 15% selected breakfast sandwiches as their favorite. How many students chose a food other than the two above?
- (A) 52  
(B) 65  
(C) 91  
(D) 169
2. How is the graph of  $g(x) = -x^2$  related to the graph of  $f(x) = x^2$ ?
- (A) Reflected vertically  
(B) Reflected horizontally  
(C) Shifted upwards  
(D) Shifted to the left
3. A cell phone provider charges \$0.40 for the first minute of a call and \$0.20 for each additional minute. The customer is charged at the beginning of each minute. What is the cost of a 12.25-minute call?
- (A) \$2.60  
(B) \$2.65  
(C) \$2.80  
(D) \$2.85
4. A linear regression  $C = 13.2m + 20.5$  models the relationship between calories burned on a new exercise machine,  $C$ , and the number of minutes a person uses the machine,  $m$ . Which of the following statements about this model must be true?
- I. A person that spends 22 minutes using the machine burns approximately 311 calories.  
II.  $C$  and  $m$  are inversely related.  
III. A person burns approximately 13.2 calories per minute while on the machine.
- (A) I only  
(B) III only  
(C) I and II only  
(D) I and III only
5. If  $S = \frac{11(n-2)}{5}$ , what is  $n$  in terms of  $S$ ?
- (A)  $5S - 9$   
(B)  $\frac{5(5S+2)}{11}$   
(C)  $\frac{5S}{11} + 2$   
(D)  $\frac{5S+2}{11}$



6. A line in the  $xy$ -plane that has the equation  $x = 3$
- (A) has a point at  $(0, 3)$ .
  - (B) is a line that has a slope of 3.
  - (C) is a line that is parallel to  $y = 3x$ .
  - (D) is a line that is parallel to the  $y$ -axis.
7. If  $x$  is not equal to zero, for what value(s) of  $x$  is  $x + 1 = \frac{20}{x}$ ?
- (A) 4 only
  - (B) -5 only
  - (C) -4 or 5
  - (D) -5 or 4
8. A line with the equation  $y = mx + 4$  passes through quadrant IV. What must be true of  $m$ ?
- (A)  $m = 0$
  - (B)  $m < 0$
  - (C)  $0 < m < 1$
  - (D)  $m > 0$
9. The point  $(2, 4)$  is on the graph of the function  $f(x)$ . Which of the following points is on the graph of  $f(x+3)$ ?
- (A)  $(5, 4)$
  - (B)  $(-1, 4)$
  - (C)  $(2, 1)$
  - (D)  $(2, 7)$
10. If  $f(x) = 2x + 1$ , then  $\frac{f(x+h) - f(x)}{h}$  is
- (A)  $\frac{1}{2}$
  - (B) 2
  - (C)  $\frac{h-1}{h}$
  - (D)  $\frac{2h+2}{h}$
11. The area of a rectangle is 192 feet squared. If the width of the rectangle is  $\frac{3}{4}$  of its length, what is the width of the rectangle?
- (A) 12 feet
  - (B) 16 feet
  - (C) 24 feet
  - (D) 144 feet





12. If  $f(x) = (x-2)(2-x)^{-1}$  for all values of  $x$  except 2, which of the following statements must be true?
- I.  $f(1) = f(-1)$
  - II.  $f(4) = f(0)$
  - III.  $f\left(\frac{1}{2}\right) = f(-2)$
- (A) I only  
(B) I and II only  
(C) II and III only  
(D) I, II, and III
13. The expression  $2^0 - \left(\frac{1}{2}\right)^{-2} + (4-1)^{-1}$  is equal to
- (A) -5
  - (B)  $-\frac{8}{3}$
  - (C)  $-\frac{5}{3}$
  - (D)  $\frac{13}{12}$
14. A journeyman mechanic works at an auto shop. He services cars, SUVs, and trucks, and he is paid according to the type of vehicle: \$14 per hour for cars and SUVs, and \$36 per hour for trucks. Cars and SUVs take an average of 2 hours to service, whereas trucks require an average of 4 hours each. This past week, he worked 48 hours and made a total of \$1,288. How many trucks did he service?
- (A) 7
  - (B) 10
  - (C) 22
  - (D) 119
15. The angle  $a$  is an acute angle. If  $\sin a = x$ , and  $b = 90^\circ - a$ , what is the value of  $\cos b$ ?
- (A)  $x$
  - (B)  $\frac{1}{x}$
  - (C)  $90 - x$
  - (D) Cannot be determined.





**DIRECTIONS**

For questions 16 – 20, find the solution to the problem and enter your answer as demonstrated below.

1. Only the answer that is bubbled in on the answer sheet will be credited. The blank spaces above the bubbles are for you to record your answers for accuracy.
2. Only fill in one bubble in any given column.
3. None of the answers on this portion of the test are negative values.
4. If a problem appears to have more than one answer, only enter one answer. If the answer you enter is one of the correct solutions, you will receive full credit for that question.
5. If the correct answer can be expressed as a mixed number, it must be entered as a decimal or an improper fraction.
6. If the correct answer is a decimal that cannot fit into the grid space, you must fill the grid with enough digits to completely fill the space. The number can be rounded or simply shortened but must fill every blank space.

Write answer in boxes.

Answer:  $\frac{5}{16}$       Answer: 4.5

Grid in result.

← Fraction line  
← Decimal point

Acceptable ways to grid  $\frac{1}{6}$  are:

Answer: 302 – either position is correct

**NOTES**

Begin entering answers in any column that accommodates your answer. If you do not need a column do not enter anything in that column.







16. A bag contains balls that are red, green, or blue. One-third of the balls are red, and  $\frac{2}{7}$  are blue. The number of green balls is eight fewer than twice the number of blue balls. How many green balls are in the bag?

ANSWER: \_\_\_\_\_

17. If  $\frac{2}{x} + \frac{3}{y} = 21$ , and  $\frac{4}{x} - \frac{1}{y} = 7$ , what is the value of  $\frac{y}{x}$ ?

ANSWER: \_\_\_\_\_

18. If  $a$ ,  $b$ , and  $c$  are positive integers and  $\frac{16}{5} = a + \frac{1}{b + \frac{1}{c}}$ , what is the value of  $a + b + c$ ?

ANSWER: \_\_\_\_\_

19. If the expression  $\frac{3x^2 - 2x^2 - 3}{x + 2}$  is written in the equivalent form  $A + \frac{B}{x + 2}$ , what is the value of  $B$ ?

ANSWER: \_\_\_\_\_

20. If a sector of a circle has an arc length of  $2\pi$  inches and an area of  $6\pi$  square inches, what is the length of the radius of the circle?

ANSWER: \_\_\_\_\_





# Math Test 5 – Calculator



55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

## DIRECTIONS

For questions 1 – 30, find the solution to each problem and select the most appropriate answer from the choices provided. For questions 31 – 38, find the solution to each problem and write your answer in the space provided. You may use the blank space in your test booklet for scratch work.

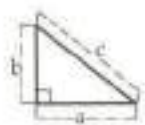
## NOTES

1. The use of a calculator on any part of this section is allowed.
2. Unless otherwise indicated, all variables and expressions used in this test represent real numbers.
3. Unless otherwise indicated, all figures used in this test are drawn to scale.
4. Unless otherwise indicated, all figures used in this test lie on a plane.
5. Unless specified otherwise, a given function,  $f$ , has the domain the set of all real numbers  $x$  for which  $f(x)$  is a real number.

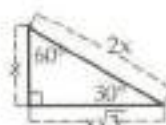
## REFERENCE



$$A = \frac{1}{2}bh$$



$$c^2 = a^2 + b^2$$



Special Right Triangles



$$A = \pi r^2$$

$$C = 2\pi r$$



$$A = lw$$



$$V = lwh$$



$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}lwh$$

The arc of a circle is 360 degrees or  $2\pi$  radians.  
A triangle has angles that sum to 180 degrees.





1. What is the slope of the line  $m$  with equation  $2x - 5y = 10$ ?

(A)  $-\frac{2}{5}$

(B)  $\frac{5}{2}$

(C)  $\frac{2}{5}$

(D)  $-2$

2. The concentration of a substance in a solution is  $2 \times 10^5$  milligrams per millimeter. How many milligrams of the substance are in  $3 \times 10^8$  milliliters?

(A)  $6 \times 10^{-13}$

(B)  $5 \times 10^{-13}$

(C)  $5 \times 10$

(D)  $6 \times 10^3$

3. What is the solution set of this system of equations?

$$\begin{aligned}x^2 - y &= -3 \\2x^2 - y &= -2\end{aligned}$$

(A)  $\{(-1, -4), (-1, 4)\}$

(B)  $\{(-1, -4), (1, 4)\}$

(C)  $\{(-1, 4), (1, -4)\}$

(D)  $\{(-1, 4), (1, 4)\}$

4. Tom deposits \$100 into a bank, and the amount in his bank account increases by 5% each year. Christine deposits \$100 into a different bank, and the amount in her bank account increases by \$5 each year. Which statement is true about the amounts in Tom's and Christine's bank accounts?

(A) The amount in Tom's bank account can be modeled by an exponential function and the amount in Christine's bank account can be modeled by a linear function.

(B) The amount in Tom's bank account can be modeled by a linear function and the amount in Christine's bank account can be modeled by an exponential function.

(C) The amounts in both bank accounts can both be modeled by exponential functions.

(D) The amounts in both bank accounts can both be modeled by linear functions.

5. John has four more nickels than dimes in his pocket, for a total of \$1.25. Which equation could be used to determine the number of dimes,  $x$ , in his pocket?

(A)  $0.10(x + 4) + 0.05(x) = \$1.25$

(B)  $0.05(x + 4) + 0.10(x) = \$1.25$

(C)  $0.10(4x) + 0.05(x) = \$1.25$

(D)  $0.05(4x) + 0.10(x) = \$1.25$





6. Two functions,  $y = |x - 3|$  and  $3x + 3y = 27$ , are graphed on the same coordinate plane. Which statement is true about the solution to the system of equations?
- (A)  $(3, 0)$  is the solution to the system because it satisfies the equation  $y = |x - 3|$ .  
(B)  $(9, 0)$  is the solution to the system because it satisfies the equation  $3x + 3y = 27$ .  
(C)  $(6, 3)$  is the solution to the system because it satisfies both equations.  
(D)  $(3, 0)$ ,  $(9, 0)$ , and  $(6, 3)$  are the solutions to the system of equations because they all satisfy at least one of the equations.
7. Tim plays a video game five times and achieves the following scores in this order:
- 4,526   4,599   4,672   4,745   4,818
- The scores follow a pattern. Which expression could be used to determine his score on playing the game for the  $n^{\text{th}}$  time?
- (A)  $73n + 4,453$   
(B)  $73(n + 4,453)$   
(C)  $4,453n + 73$   
(D)  $4,526n$
8. Anna works out for one hour with a mixture of running and walking. She burns fifteen calories per minute while running and ten calories per minute while walking, and burns 700 calories overall. How many minutes does Anna spend running?
- (A) 10  
(B) 20  
(C) 30  
(D) 40
9. A cetologist wants to estimate the size of a whale population. She observes their migration over several weeks and bases her estimation of the population on her count. The data indicates that there are 3 whales migrating through a particular 5-mile stretch of ocean every hour for 8 weeks. Based on this information, what is the approximate whale population in the area?
- (A) 200  
(B) 3,000  
(C) 4,000  
(D) 20,000
10. When Mike eats at a restaurant, he always tips from eight to twenty percent of the cost of the meal. Which of the following must be true?
- (A) When the cost of the dinner is \$10.00, the tip is between \$2.00 and \$8.00.  
(B) When the cost of the dinner is \$15, the tip is between \$1.20 and \$3.00.  
(C) When the tip is \$3.00, the amount of the dinner is between \$11.00 and \$23.00.  
(D) When the tip is \$2.40, the amount of the dinner is between \$3.00 and \$6.00.





Questions 11 and 12 refer to the information below.

The chart below shows the current enrollment in all social studies classes (Geography, U.S. History, World Cultures, and Government) at Iron Mountain High School.

COURSE TITLE	SECTION	PERIOD	ENROLLMENT
Geography	A	1	23
Geography	B	2	24
U.S. History	A	2	25
U.S. History	B	3	29
U.S. History	C	4	24
World Cultures	A	3	27
Government	A	4	26
Government	B	6	27

11. What is the average number of students enrolled per section in U.S. History?
- (A) 25  
(B) 26  
(C) 27  
(D) 29
12. Every student in the school is required to read the same book in preparation for a talk that will be given at a school assembly by the author. The school purchases two classroom sets of thirty books each, but shortly afterwards three books go missing from one set and five go missing from the other. If one class period uses both sets at a time, and each student needs his own book, which period(s) will not have enough books for its(their) students?
- (A) Period 2 only  
(B) Period 3 only  
(C) Period 4 only  
(D) Periods 3 and 4
13. Francisco spent ten dollars on hot dogs and hamburgers at a baseball game. Hot dogs are three dollars each, and hamburgers are four dollars each. How many hot dogs and hamburgers did he buy?
- (A) One hot dog and one hamburger  
(B) One hot dog and two hamburgers  
(C) Two hot dogs and one hamburger  
(D) Two hot dogs and two hamburgers
14. If  $\frac{x+2}{x-5} \geq 0$ , then which of the following is true of  $x$ ?
- (A)  $x \geq -2$   
(B)  $-2 \leq x \leq 5$   
(C)  $x \leq -2$  or  $x > 5$   
(D)  $x > 5$





Questions 15 – 18 refer to information below.

Types of Wildlife Habitat on Public Lands 2012  
(100,000's acres)

	CA	NV	OR	UT
Shrub/Scrub	119	392	125	146
Herbaceous	5.5	20	7.2	17
Evergreen Forest	7.0	44	21	37
Mixed Forest	0	0	1.7	0
Barren Land	16	44	2.9	25
Other	2.3	2.5	3.3	3.0

15. Approximately what percentage of Utah's wildlife habitat is either herbaceous or evergreen forest?
- (A) 7.5  
(B) 24  
(C) 27  
(D) 31
16. Which state has the highest proportion of its wildlife habitat classified as barren land?
- (A) California  
(B) Nevada  
(C) Oregon  
(D) Utah
17. An ecologist projects that 15% of Oregon's herbaceous habitat will be transformed into a shrubby habitat over the next ten years. According to this projection, what will be the total amount of shrubby habitat in Oregon in ten years time?
- (A) 126,000 acres  
(B) 11.8 million acres  
(C) 12.6 million acres  
(D) 13.5 million acres
18. A developer bought 3% of California's public barren lands several years ago at \$350 per acre. Since then, the value of the land has increased by 850%. Approximately how much would the developer stand to profit if he sold the land today in its entirety?
- (A) \$126 million  
(B) \$131 million  
(C) \$143 million  
(D) \$149 million
19. A band is recording an album. They rent a studio at \$200 per day, which gives them access for 12 hours. The day rate cannot be prorated, so studio time must be purchased by the day. Their sound engineer costs \$28 per hour, and is needed for half the total recording time. If it will take 50 hours to complete, what is the average cost per hour over the entire course of recording?
- (A) \$31.60  
(B) \$34  
(C) \$44.50  
(D) \$48
20. What is the equation of the line that passes through the point (8, -3) and is perpendicular to the line  $2x - 3y - 10 = 0$ ?
- (A)  $y = -\frac{3}{2}x + 9$   
(B)  $y = -\frac{2}{3}x + \frac{7}{3}$   
(C)  $y = -\frac{3}{2}x - 13$   
(D)  $y = -\frac{1}{2}x + 1$





21. In your search for a summer job, you are given the following offers.
- Offer 1:** At Timmy's Tacos, you will earn \$4.50 an hour. However, you will be required to purchase a uniform for \$45.00. You will be expected to work 20 hours each week.
- Offer 2:** At Kelly's Car Wash, you will earn \$3.50 an hour. No special attire is required. You must agree to work 20 hours each week.
- Before deciding which job offer you wish to take, you consider the factors. Which conclusion below is NOT true?
- (A) If I work 8 weeks at Kelly's Car Wash and save all my earnings, I'll be able to save \$560.  
 (B) If I take the job at Timmy's Tacos, I'll have to work 10 hours just to pay for purchasing my uniform.  
 (C) If I only plan to work for two weeks, I should choose the job at Kelly's Car Wash.  
 (D) The job at Timmy's Tacos pays more if I work more than forty hours.

22. The table below shows the number of words typed by the same student during five timed sessions. Which equation best models a line of best fit for this data?

Time ( $t$ ) in minutes	Number of words Typed ( $w$ )
2	122
3	182
4	240
6	368
9	538

- (A)  $w = -117t + 102$   
 (B)  $w = 102t - 117$   
 (C)  $w = 60t + 3$   
 (D)  $w = 3t + 60$

23.

Student	1 <sup>st</sup> Test Score	2 <sup>nd</sup> Test Score
Amy	25	50
Bill	30	90
Charlie	42	84
Danny	50	75

According to the table above, which two students had the same percent improvement in scores from the first to the second test?

- (A) Bill and Charlie  
 (B) Bill and Danny  
 (C) Amy and Dora  
 (D) Amy and Charlie
- 24.



A right circular cylinder has a height of 12 and a radius of 3. If  $X$  and  $Y$  are two points on the surface of the cylinder, what is the maximum possible length of  $\overline{XY}$ ?

- (A)  $3\sqrt{17}$   
 (B) 6  
 (C)  $6\sqrt{5}$   
 (D)  $5\sqrt{6}$





25. Rebecca is flying from New York to San Francisco. The regular cost of a ticket is \$378 plus a tax of 22%. She applies a frequent-flyer discount, which takes 10% off the price of airfare. In addition, there is a flat \$25 charge for each checked bag under 50 pounds, and a fee of \$2.50 per pound if the bag weighs more than 50 pounds. What is the total cost of the flight, in dollars, including bag fees, if she checks two bags that weigh 55 pounds and 62 pounds?

- (A) \$477.54  
(B) \$492.04  
(C) \$504.54  
(D) \$507.54

26. A train goes from Town A to Town B. If the train averages 50 miles per hour, then it will be 20 minutes late. If it averages 80 miles per hour, then it will be 10 minutes early. When will it arrive with respect to the scheduled arrival time if it goes 60 miles per hour?

- (A) Early by 3 minutes.  
(B) Early by  $\frac{7}{3}$  minutes.  
(C) Late by 10 minutes.  
(D) Late by  $\frac{20}{3}$  minutes.

27. If  $x \neq 0$ ,  $y \neq 0$ , and  $x \neq y$ , then which of the following expressions is equivalent to  $\frac{x^4 - y^4}{x - y}$ ?

- (A)  $\frac{1}{xy}$   
(B)  $\frac{1}{(x - y)^2}$   
(C)  $\frac{y^2 - x^2}{xy}$   
(D)  $\frac{x^2 - y^2}{xy}$

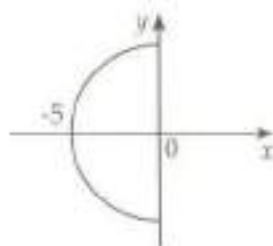
28. The expression  $\frac{3 - 4i}{5 + 3i}$  is equivalent to

- (A)  $\frac{27 - 29i}{34}$   
(B)  $\frac{27 - 29i}{16}$   
(C)  $\frac{3 - 29i}{34}$   
(D)  $15 - 8i$

29. A segment of a circle has central angle  $24^\circ$  and arc length 8.4 cm. Find its area to the nearest square centimeter.

- (A)  $64 \text{ cm}^2$   
(B)  $72 \text{ cm}^2$   
(C)  $84 \text{ cm}^2$   
(D)  $96 \text{ cm}^2$

- 30.



In the semicircle above, the center is at  $(0, 0)$ . Which of the following are the  $y$ -coordinates of two points on this semicircle whose  $x$ -coordinates are equal?

- (A)  $y = 0, -5$   
(B)  $y = 4, -4$   
(C)  $y = 1, -3$   
(D)  $y = 2, -4$







## DIRECTIONS

For questions 31 – 38, find the solution to the problem and enter your answer as demonstrated below.

1. Only the answer that is bubbled in on the answer sheet will be credited. The blank spaces above the bubbles are for you to record your answers for accuracy.
2. Only fill in one bubble in any given column.
3. None of the answers on this portion of the test are negative values.
4. If a problem appears to have more than one answer, only enter one answer. If the answer you enter is one of the correct solutions, you will receive full credit for that question.
5. If the correct answer can be expressed as a mixed number, it must be entered as a decimal or an improper fraction.
6. If the correct answer is a decimal that cannot fit into the grid space, you must fill the grid with enough digits to completely fill the space. The number can be rounded or simply shortened but must fill every blank space.

Write answer → in boxes.

Grid in result.

Answer:  $\frac{5}{36}$

	5	/	3	6	
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2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Answer: 4.5

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7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

← Fraction line  
← Decimal point

Acceptable ways to grid  $\frac{1}{6}$  are:

	1	/	6	
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	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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	.	1	6	6
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7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	.	1	6	7
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	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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6	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

Answer: 302 – either position is correct

	3	0	2	
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4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	3	0	2	
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3	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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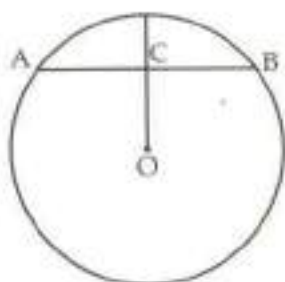
## NOTES

Begin entering answers in any column that accommodates your answer. If you do not need a column do not enter anything in that column.





31.



A circle with center  $O$  has a radius of five units. The chord  $\overline{AB}$  has a length of eight units and is perpendicular to the radius  $r$ . What is the length of  $\overline{OC}$ ?

ANSWER: \_\_\_\_\_

32. Lauren has \$80 in her savings account. When she receives her paycheck, she makes a deposit which brings the balance up to \$120. By what percent does the total amount in her account increase as a result of this deposit?

ANSWER: \_\_\_\_\_

33. The oxygen saturation of a lake is calculated by dividing the amount of dissolved oxygen in a liter of lake water by the lake water's dissolved oxygen capacity, and then converting that number into a percentage. If the lake currently has 6.4 milligrams of dissolved oxygen per liter, and the dissolved oxygen capacity is 9.5 milligrams per liter, what is the oxygen saturation level of the lake, expressed as a percentage?

ANSWER: \_\_\_\_\_

34. The amount of interest earned on savings is directly proportional to the amount of money saved. If \$104 in interest is earned on \$1,300, how much in interest, in dollars, will be earned on \$1,800 in the same period of time?

ANSWER: \_\_\_\_\_





35. A number,  $k$ , is increased by 10. If the fifth root of the resulting number equals 2, then  $k$  is

ANSWER: \_\_\_\_\_

36. The selling price of a coat is \$91 plus overhead and profit margin. If the overhead is 20% of the selling price and the profit is 10% of the selling price, what is the selling price? (Give you answer to the nearest dollar.)

ANSWER: \_\_\_\_\_

Questions 37 and 38 refer to the information below.

A shipping company needs to transport 25 containers. The company has a fleet of five trucks, and each truck can make the trip to the destination in two days. Each truck averages 10 mpg, and the cost of diesel fuel is \$2.50/gallon. Once the last container is delivered, trucks stay at their destination until dispatched to their next job.

37. **Part 1:**

What is the fuel cost associated with the job, to the nearest dollar, if the distance to the destination is 250 miles?

ANSWER: \_\_\_\_\_

38. **Part 2:**

The shipping company adds three trucks to its fleet. In terms of days, how much faster will it be able to complete the same job?

ANSWER: \_\_\_\_\_



## Essay Test 5



50 MINUTES, Prompt-based essay

Turn to Section 5 of your answer sheet to answer the question in this section.

### DIRECTIONS

As you read the passage below, consider how Mathew Meyer uses

- evidence, such as facts or examples, to support claims.
- reasoning to develop ideas and to connect claims and evidence.
- stylistic or persuasive elements, such as word choice or appeals to emotion, to add power to the ideas expressed.

Adapted from “The Other Side of American Football,” by Mathew Meyer. ©2015 by KALLIS EDU.

A high school boy wants to play in the big game, so he doesn't tell his parents or coaches that he still feels dizzy from an injury weeks ago. After a hard collision in the game, he walks off the field, collapses on the sideline, and dies. A college quarterback wins three national championships, and is dead at age 30. Three National Football League (NFL) superstars earn huge salaries, win Super Bowls, and look forward to long, golden retirements. Instead, all three commit suicide, and are posthumously diagnosed with Chronic Traumatic Encephalopathy (CTE).

CTE is a degenerative brain disease caused by repetitive bruising of the brain. The symptoms include headaches, depression, violent outbursts, memory and motor loss, and dementia. No one knows how many concussions or hard collisions it takes, but it cannot be ignored; the football world must face up to the vulnerability of the human brain.

And fans of football (like myself) must face the question: what kind of country sacrifices the lives of young athletes so it can watch a game? What kind of country spends billions on a sport that kills its heroes? America must ban high school football, restrict football in college, and radically change the professional game, before thousands more men and boys ruin their lives. More than 4,500 retired NFL players are already suing the league over concussion-related illness.

Between 1990 and 2010, 243 high school and college players died. More than 200 were high school players. In the 2005/2006 season, there were more than 500,000 injuries in high school football. More than 50,000 were broken bones or concussions. Already, brain injuries have led high schools in many states, including California, Colorado, and New York, to cancel games, seasons, the sport itself.

Concussions in high school may be more dangerous than those in the NFL, because teenagers' bodies are more vulnerable. Also, high school athletes don't have NFL trainers and doctors. And, many high school boys lie about or hide their brain injuries.



The injuries in college football parallel those in high school. However, an ominous specter looms over the college game. College players suffer much more from CTE than previously thought. In fact, some players diagnosed with CTE were never diagnosed with a concussion. Owen Thomas, a University of Pennsylvania player with no history of concussion, committed suicide in 2010. His autopsy revealed CTE. Cullen Finnerty, a star quarterback who won three NCAA championships, was diagnosed with Stage 2 CTE after dying at age 30. Finnerty had one concussion in college, and none before.

CTE is epidemic in the NFL. When the nation's largest brain bank studied the brains of 79 deceased former players, it found clear evidence of CTE in 76 of them. Last year, the NFL admitted in Federal court that it knows that many retired players will develop long-term cognitive problems.

Some of the NFL's greatest have been ruined by CTE. Andre Waters tackled so hard that the NFL named a rule after him. He suffered at least 15 concussions. After he committed suicide, an autopsy revealed that he had the brain of an 80-90 year old with dementia. "Football killed him," the doctor said. Waters was 44 years old.

Junior Seau was twelve times an All-Star, with six consecutive seasons with more than 100 tackles. Two years after retiring, showing more and more symptoms of CTE, Seau committed suicide. He was 43 years old.

Dave Duerson was a star player for the Super Bowl champion 1985 Chicago Bears. He won two Super Bowls. Duerson also earned an Economics degree from Notre Dame, studied business at Harvard, and was successful in business. Then CTE symptoms began. His business and investments failed. A violent outburst led to a guilty plea for domestic battery. He hid his symptoms, and lied to cover his failing memory. When he shot himself, Duerson left explicit instructions to check for CTE. His autopsy showed clear evidence of disease in the regions of the brain controlling judgement, inhibition, impulse control, mood, and memory. He was 50 years old.

Brain damage is changing the league. After the 2014/2015 season, star rookie Chris Borland retired, walking away from millions of dollars from the San Francisco 49ers. He explained that he wanted to avoid concussions and CTE. Three other young players retired, citing health concerns and leaving tens of millions in salary on the table. Jason Worlds, a Pittsburgh Steelers' linebacker, gave up \$15 million.

If football is to survive as a sport, the NFL needs to invest millions in technology and make changes to stop brain injuries. College football needs to do the same, and to limit collisions in practice. American high schools need to stop playing tackle football, and find something safer to do on a Friday night.

Write an essay in which you explain how Mathew Meyer builds an argument to persuade his audience that football-related head injuries are more common and more damaging than people realize. In your essay, analyze how the author uses one or more of the features listed in the box above (or features of your own choice) to strengthen the logic and persuasiveness of his argument. Be sure that your analysis focuses on the most relevant features of the passage.

Your essay should not explain whether you agree with the author's claims, but rather explain how the author builds an argument to persuade his audience.

# SAT® Practice Test #6

## IMPORTANT REMINDERS:

1

When you take the official SAT, you will need to use a No. 2 pencil. Do not use a pen or a mechanical pencil.

2

On the official SAT, sharing any of the question on the test violates the College Board's policies and may result in your scores being canceled.

(This cover is modeled after the cover you'll see when you take the official SAT.)

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# Reading Test 6



65 MINUTES, 52 QUESTIONS

Turn to Section 1 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each passage or pair of passages is accompanied by 10 or 11 questions. Read each passage or pair of passages, and then select the most appropriate answer to each question. Some passages may include tables or graphs that require additional analysis.

Refer to the passage below to answer questions 1 – 10.

This passage is adapted from Oscar Wilde, *The Picture of Dorian Gray*, originally published in 1890.

line "Dorian Gray? Is that his name?" asked Lord Henry, walking across the studio towards Basil Hallward.

"Yes, that is his name. I didn't intend to tell it

5 to you."

"But why not?"

"Oh, I can't explain. When I like people immensely, I never tell their names to anyone. It is like surrendering a part of them. I have grown to love secrecy. It seems to be the one thing that can make modern life mysterious or marvelous to us. The commonest thing is delightful if one only hides it. When I leave town now I never tell my people where I am going. If I did, I would lose all my pleasure. It is a silly habit, I dare say, but somehow it seems to bring a great deal of romance into one's life. I suppose you think me awfully foolish about it?"

"Not at all," answered Lord Henry, "not at all, my dear Basil. You seem to forget that I am married, and the one charm of marriage is that it makes a life of deception absolutely necessary for both parties. I never know where my wife is, and my wife never knows what I am doing. When we meet—we do meet occasionally, when we dine out together, or go down to the Duke's—we tell each other the most absurd stories with the most serious faces. My wife is very good at it—much better, in fact, than I am. She never gets confused over her dates, and I always do. But when she does find me out, she makes no row at all, I sometimes wish she would; but she merely laughs at me."

"I hate the way you talk about your married

35 life, Harry," said Basil Hallward, strolling towards the door that led into the garden. "I believe that you are really a very good husband, but that you are thoroughly ashamed of your own virtues. You are an extraordinary fellow. You never say a moral thing, and you never do a wrong thing. Your cynicism is simply a pose."

"Being natural is simply a pose, and the most irritating pose I know," cried Lord Henry, laughing; and the two young men went out into the garden together and ensconced themselves on a long bamboo seat that stood in the shade of a tall laurel bush. The sunlight slipped over the polished leaves. In the grass, white daisies were tremulous.

50 After a pause, Lord Henry pulled out his watch. "I am afraid I must be going, Basil," he murmured, "and before I go, I insist on your answering a question I put to you some time ago."

"What is that?" said the painter, keeping his

55 eyes fixed on the ground.

"You know quite well."

"I do not, Harry."

"Well, I will tell you what it is. I want you to explain to me why you won't exhibit Dorian

60 Gray's picture. I want the real reason."

"I told you the real reason."

"No, you did not. You said it was because there was too much of yourself in it. Now, that is childish."

65 "Harry," said Basil Hallward, looking him straight in the face, "every portrait that is painted with feeling is a portrait of the artist, not of the sitter. The sitter is merely the accident, the occasion. It is not he who is revealed by the painter; it is rather the painter who, on the colored canvas, reveals himself. The reason I will not exhibit this picture is that I am afraid that I have shown in it the secret of my own soul."



- As used in line 12, "delightful" most nearly means
  - sublime.
  - alluring.
  - enjoyable.
  - distracting.
- Basil wants to withhold Dorian Gray's name from Lord Henry because
  - Basil is ashamed that he is acquainted with Dorian Gray.
  - Basil enjoys withholding the names of people whose company he enjoys.
  - Basil believes that Lord Henry will be jealous of his friendship with Dorian Gray.
  - Basil tries not to talk about his personal life with Lord Henry.
- Lord Henry talks to Basil about marriage primarily to
  - shift the conversation away from Dorian Gray.
  - explain why he can relate to Basil's fondness for secrecy.
  - provide a description of his wife.
  - encourage Basil to get married.
- Based on paragraph 5 (lines 19 – 33), it can be inferred that Lord Henry's wife
  - has a cruel sense of humor.
  - is well-respected among her peers.
  - is a skillful liar.
  - has little respect for Harry.
- Which contradiction does Basil use to characterize Lord Henry?
  - Lord Henry's virtuous actions undermine the immorality he espouses.
  - Lord Henry's predictable behaviors belie his supposed love of deception.
  - Lord Henry claims to be adventurous but rarely tries new things.
  - Lord Henry appears confident but is filled with self-doubt.
- As used in line 41, "pose" most nearly means
  - pretense.
  - position.
  - posture.
  - stance.
- In the last paragraph (lines 65 – 73), Basil reveals
  - the personal nature of his artwork.
  - the reason he rarely paints portraits.
  - the biggest challenges he faces when painting.
  - the reason he decided to become an artist.
- Which choice provides the best evidence for the answer to the previous question?
  - Lines 39 – 41 ("You never say...a pose.")
  - Lines 58 – 60 ("I want you...Dorian Gray's picture.")
  - Line 68 – 69 ("The sitter...the occasion.")
  - Lines 69 – 71 ("It is not he...reveals himself.")
- In the context of the passage, Basil and Lord Henry differ in that
  - Basil values the beauty provided by nature whereas Lord Henry prefers city life.
  - Basil encourages social interaction whereas Lord Henry simply begrudgingly accepts it.
  - Basil maintains secrecy through silence whereas Lord Henry maintains secrecy through deception.
  - Basil appreciates the subjectivity of art whereas Lord Henry prefers rationality and objectivity.
- The conversation between Basil and Harry most closely resembles that between
  - old friends catching up on current events.
  - business associates celebrating their successes.
  - family members quarreling over trivial matters.
  - mortal enemies settling a score.





Refer to the passage below to answer questions 11 – 20.

This passage is adapted from Susanna Heckman, "Marrying Older, But Sooner." ©2015 by KALLIS EDU.

Most developed countries report that more young people are postponing marriage until later in life than has been the case historically. The romantic image of fresh-faced brides and grooms in their early 20s is now largely a myth. In Hong Kong, for example, men tend to be at least 31 years old, and women around 28, when they marry for the first time; in South Korea, the averages are 32 and 29, respectively. Many European countries record even higher average ages, with Sweden topping the charts at 35 for men and 33 for women. North American figures are also rising, with the average age for men in the U.S. being 29, and for women, 27.

Grandparents and parents of the current crop of young adults most likely married younger and had more children. These older generations may worry about their offspring "boomeranging" from independent living back to the family home, putting off marriage seemingly forever.

The lack of a healthy income has been a factor in the postponement, according to many economists. Since the global economic recession began in 2008, couples increasingly cannot afford to start a new life together. Even many people with full-time jobs live with their parents. Popular culture has coined many terms to describe this phenomenon. In Brazil, singles living with their parents have been called "the Kangaroo Generation," referring to young kangaroos living in their maternal pouches. In Greece, young people have bitterly called themselves the "700 Euros Generation," referring to the legal minimum wage as all they can hope to earn.

The "Sampo Generation" in South Korea, meanwhile, is also a bitter reference to young adults who have reached their 30s without achieving a reliable income that can sustain a family. *Sampo* translates as "give up three," namely the three goals of attaining a career, getting married, and having children. In Japan, popular perception is even darker, with the "Satori Generation" supposedly not even caring about a successful career or a romantic attachment of any kind, let alone marriage.

Some demographers have encouraged taking a longer-term perspective. They say that comparing today's statistics with those from periods of strong economic growth is misleading. In the U.S., for example, the average ages at first marriage seem high when compared to the period of economic boom after World War II. In 1956, a man typically got married at 23. But looking back to 1890, a man usually waited until his late

20s. U.S. Census Bureau blogger Jonathan Vespa points out that, in the U.S., "The 1950s and 1960s stand out as the exception for marriage, not the norm."

Data also indicate that, from a historical perspective, young single people have always tended to live at home with their families, calling into question the current anxiety about generations acting like boomerangs or kangaroos. In the 1940s, more than 70 percent of singles in their 20s lived with their parents. By this standard, the picture looks different; perhaps what has changed are the expectations about what young people *should* be able to achieve in terms of their career. It may be unfair to compare younger generations to their Baby Boomer parents and grandparents, who came of age in the 1960s and 1970s, when economic conditions were more favorable. People's expectations may have also been influenced by watching films or television programs that portray fictional young adults living in enormous apartments and seldom working.

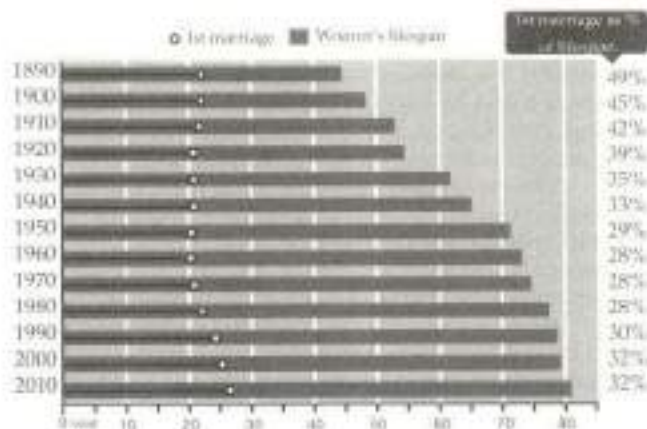
Another way to gain perspective on the data is to look at marriage in terms of historical increases in lifespan. Census experts say that even taking into account the slight skewing of data by higher infant mortality in the 19th century, it is clear that people are marrying earlier in their expected lifespan than ever before. In 1890, an American woman was likely to get married at 22, and to live to be 45. She was marrying nearly halfway into her life. Today, a young woman can expect to live to be 80. If she gets married at around 27, that is only about a third of the way through the typical lifespan. Figures for men are similar.

"Despite marrying at older ages," Vespa writes, "Americans are actually marrying sooner in their lifetime than they did a century ago."

Besides economic circumstances, then, it is quite possible that changes in life expectancy have had an effect on individuals' personal decisions. They may feel that they simply have more time to gain an education and job experience before launching into marriage and parenthood.



## Marrying Older, but Sooner?



SOURCE: U.S. Census Bureau, *Decennial Censuses, 1890-1940 and Current Population Survey, Annual Social and Economic Supplements.*

11. In paragraph 1, the author most likely mentions "romantic image" (line 4) in order to
- draw an analogy with actual circumstances.
  - provide a realistic context for claims in the text.
  - indicate the most ideal approach to marriage.
  - introduce stereotypes that contradict reality.
12. As used in line 15, the word "crop" most nearly means
- yield.
  - coalition.
  - cutting.
  - group.
13. The passage strongly suggests that middle-aged and older people
- advise younger generations not to move back home.
  - feel impatient for their adult children to get married.
  - do not want to support their offspring.
  - prefer that their children stay at home into their 20s.
14. Which choice best describes the structure of paragraph 3 (lines 21 - 34)?
- Description followed by logical analysis
  - Problem followed by a proposed solution
  - Claim followed by anecdotal support
  - Facts followed by an overall conclusion
15. The author most strongly implies which of the following about the "Satori Generation"?
- It is based on depressing and indisputable facts.
  - It may reflect a current stereotype rather than a reality.
  - It does not describe any actual individuals in Japan.
  - It probably demonstrates multiple factors at work in Japanese society.
16. The author uses the phrase "by this standard" (lines 65 - 66) primarily to
- establish an alternative norm.
  - refute the statistical evidence.
  - argue for a new set of ideals.
  - encourage particular life choices.
17. Which claim about average age at marriage is best supported by the graph?
- Lines 56 - 58 ("The 1950s and 1960s... norm.")
  - Lines 64 - 65 ("In the 1940s...their parents.")
  - Lines 69 - 73 ("It may be unfair...favorable.")
  - Lines 78 - 80 ("Another way...lifespan.")
18. The graph indicates that, based on past trends,
- average age at first marriage will gradually catch up to lifespan.
  - average lifespan will level off at about where it is now.
  - average age at first marriage will not rise much higher.
  - average age at first marriage will dip down again in the near future.



19. The main rhetorical effect of the quotation in lines 92 – 94 is to
- (A) introduce a new perspective to the discussion.  
 (B) emphasize the main conclusion from the data.  
 (C) persuade the reader that the data is accurate.  
 (D) restate information from the beginning of the article.
20. Based on the passage, it can be inferred that the author's hypothesis about people marrying later is which of the following?
- (A) There are more varied opportunities for the current generation.  
 (B) Young people nowadays tend to be more mature when entering marriage.  
 (C) Economic factors affect the trend but are not the cause of it.  
 (D) Longer life expectancy leads people to take their relationships less seriously.

Refer to the passage below to answer questions 21 – 30.

Mary Bates, "Monkey Faces Give Clues to Species and Individual Identity," © 2015 by Conde Nast.

In a new study, researchers looked at whether there were clues in certain components or the overall configurations of monkey faces that could reliably send signals to other monkeys – about the species that a face belonged to or the individual identity of a monkey.

William Allen and James Higham, of New York University, previously found that in guenons, a group of Old-World monkeys, species that live near one another tend to look more different from one another, an adaptation that helps prevent hybridization\* between species.

In their latest study, Allen and Higham looked at overall face pattern and specific features like eyebrow patches and nose-spots. They examined the performance of a machine learning algorithm to see whether those traits could be used to distinguish between different guenon species or different individuals within a species.

"Essentially, we tried to get a computer to do something as similar as possible to what a guenon viewing other guenons' faces would do," says Allen. "This meant taking measurements of visual attributes from photographs of guenon faces and asking a computer to try and separate different groups as accurately as possible on the basis of these measurements. Once it has learnt how to separate groups with one set of data we can then

test if its classification 'rules' also work to classify new data that it has not seen before."

Allen and Higham found that across the 12 species of guenon studied, both overall face pattern and differences in eyebrows and nose-spots could be used to reliably categorize species and individuals. These traits did not help classify guenons with respect to age or sex, however.

The researchers say this pattern makes sense, as guenons often form mixed-species groups in which members of the same species can develop complex social relationships, but the presence of other species creates a risk of hybridization.

Higham says that facial patterns do not seem to be different between males and females, and do not seem to change as individuals age, suggesting that facial patterns do not play much of a role in mate choice within specific guenon species.

"Guenons live in stable social groups where they learn and remember things about each other over time," says Higham. "Perhaps if they have individual recognition, and can reliably determine which social partner they are interacting with, then this is sufficient, as other characteristics can then be associated with that individual."

The fact that guenon faces support both species and individual identification has interesting implications for how evolution shapes the design of signals that have conflicting requirements. Guenon faces may represent a compromise, or trade-off, in that they allow individuals within a species to look similar enough so that their species can be ascertained, but also unique enough so that others can tell who a familiar individual is by their face alone.

Animals that can recognize individuals from their facial appearance include humans as well as species as diverse as chimpanzees, sheep, and paper wasps.

Allen says such individual recognition is far from ubiquitous in the animal kingdom. "Generally, it only evolves in species that have complex social systems within which individuals form relatively stable long-term relationships," he says.

Higham and Allen are optimistic about the use of algorithms and machine learning to look at animal visual communication. "We think that machine learning approaches have a really big future in studies of the evolution of animal visual signals, enabling researchers to assess the potential informative content of signals, and hence determine the selective pressures that are likely to have led to their evolution," says Higham.

\* hybridization: mating between individuals of different species that results in offspring with combined genetic material.



21. As used in line 3, “configurations” most nearly means
- (A) confluences.
  - (B) geometries.
  - (C) alignments.
  - (D) arrangements.
22. According to the passage, guenon species that live near each other look more different than those that live far from each other because these differences
- (A) assist in the formation of social bonds.
  - (B) prevent interspecies breeding.
  - (C) reinforce familial structures important in raising offspring.
  - (D) allow guenon monkeys to form mixed-species groups, which are favorable to survival.
23. Which choice provides the best evidence for the answer to the previous question?
- (A) Lines 1 – 6 (“In a new...a monkey.”)
  - (B) Lines 31 – 35 (“Allen and Higham...and individuals.”)
  - (C) Lines 37 – 41 (“The researchers say...of hybridization.”)
  - (D) Lines 58 – 63 (“Guenon faces may...face alone.”)
24. As used in line 14, “features” most nearly means
- (A) presentations.
  - (B) secrets.
  - (C) highlights.
  - (D) characteristics.
25. The experimental procedure outlined in paragraph 4 (lines 20 – 30) is most similar to
- (A) running a mouse through a maze using positive and negative reinforcement.
  - (B) programming a computer to redraw photographs of human faces.
  - (C) teaching monkeys to form simple words using blocks that have letters on them.
  - (D) training a police dog to sniff contraband.
26. Based on the passage, the computer algorithm was able to identify an individual guenon’s
- (A) social status.
  - (B) species affiliation.
  - (C) sex.
  - (D) approximate age.
27. Based on the passage, the work of Allen and Higham is primarily concerned with
- (A) the computer modeling of recognition processes.
  - (B) the similarities between monkey and human behaviors.
  - (C) the evolution of facial recognition across species.
  - (D) the role of facial recognition in mating behaviors.
28. The author uses the phrase “trade-off” (line 59) primarily to
- (A) clarify a technical concept using a phrase from common speech.
  - (B) make an analogy between biology and economics.
  - (C) inject humor into a serious discussion.
  - (D) suggest that scientists and non-scientists interact more.
29. The passage strongly suggests that Allen and Higham share which assumption?
- (A) There are still many Old-World monkey species to be discovered.
  - (B) Interbreeding between species produces offspring that have lower rates of survival.
  - (C) Guenon monkeys recognize other species to avoid mating with them.
  - (D) Computer programs can perfectly mimic biological processes.
30. According to the last paragraph (lines 74 – 83), Higham and Allen suggest that their studies in animal recognition are significant because
- (A) they produce important data regarding mate selection across all species.
  - (B) they may provide insight into the nature and development of animal communication.
  - (C) they address questions of human evolution from primate ancestors.
  - (D) they can be used to improve recognition technologies for human faces.



Refer to the passage below to answer questions 31–41.

This passage is adapted from Susanna Heckman, "Palm Oil." ©2015 by KALLIS EDU.

*line* In zoos around the world, some of the most popular animals among visitors are the shaggy, red-haired apes—the orangutans. Young orangutans endearingly chase, play, and roll  
5 around their enclosures. Older orangutans sit quietly and treat visitors to soulful gazes.

In 2008, the Singapore Zoo held a memorial service for a female orangutan named Ah Meng, and 4,000 people attended. At the zoo in  
10 Houston, Texas, people pay hundreds of dollars for paintings created by orangutans, including "Doc," who was also known as one of the most dotting ape dads ever. At the San Diego Zoo, Ken Allen, another male orangutan, inspired his own  
15 fan club in the 1980s. He became iconic because he repeatedly outwitted his keepers by breaking out of his enclosure, apparently so that he could peacefully wander around the zoo and look at the other animals.

Celebrity status for orangutans in zoos  
20 notwithstanding, wild orangutans struggle to remain in existence today. They are one of countless species threatened by deforestation of their tropical habitat in Indonesia and Malaysia.  
25 Unfortunately for orangutans and other wildlife, the same equatorial conditions which support lush rainforests—year-round warmth, humidity, and rain—are ideal for cultivating a wildly popular product: palm oil.

The forests of Malaysia and Indonesia have  
30 long been logged for timber. But increasingly, the forests are cleared completely out of the way to make way for oil-producing palm trees. In Malaysia, tidy rows of cultivated palm trees  
35 already cover an estimated 14 percent of the total land area. A report by the United Nations Environment Program, "Last Stand of the Orangutan," predicted that Indonesia's national  
40 parks would be 98 percent destroyed by 2022 due to illegal clearing, mostly for large palm oil plantations.

The constant pressure to expand the palm  
45 oil industry comes from its profitability. The oil comes from the fruit of particular palm trees, which produce for around 25 years. Therefore, the trees are more stable sources of income than annual crops. They also have a much higher  
50 yield per acre than other vegetable oil crops, making them efficient in terms of land use. Not surprisingly, local governments tend to support palm plantations because they have the potential to lift many of the rural poor out of poverty. This is especially true in Indonesia, where millions live on less than two dollars per day.

55 Meanwhile, global demand for palm oil has skyrocketed. The oil is solid at room temperature, similar to butter. Thus it is useful not only for cooking, but for packaged foods such as cookies. It is also a common ingredient in cosmetics, soaps,  
60 and detergents.

Environmental groups have attempted to educate consumers in the United States and Europe about the oil's impact. The research  
65 group Earthwatch Institute has called palm oil "one of the main reasons for massive rainforest destruction in some of the most wildlife-rich places on Earth." Some zoos have urged visitors to avoid buying products containing palm oil. And the group SumOfUs.org drew millions  
70 of social network viewers when it parodied a commercial for a popular snack in the U.S. that contains palm oil. The parody reveals the source of the snack as a burned-out, barren field in the midst of a rainforest.

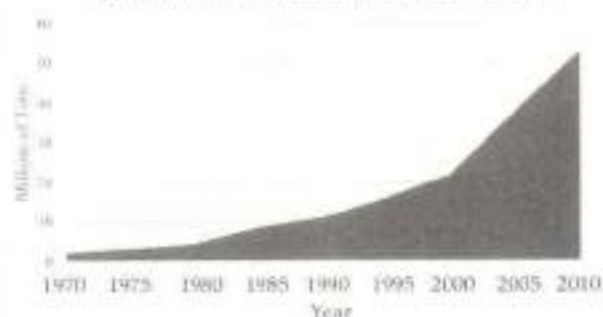
75 The media has also aired claims that profits from the industry are enriching a small elite. Human rights groups say that, in general, laborers earn very little, and the industry is rife with abusive labor practices. Meanwhile,  
80 members of indigenous forest tribes lose their livelihoods altogether when forests are bulldozed. The Rome-based Inter-Press Service (IPS) quotes one indigenous activist, Mina Setra, as direly predicting that the industry "will expand until it  
85 pushes us into the ocean."

The bad press has created a niche market for palm oil that is grown in a more responsible manner. Some palm oil producers have teamed  
90 up with environmental groups and consultants to create a system of certifying oil so that it can be labeled "sustainable."

The certification system gathers  
95 environmental groups including the World Wildlife Fund with investors, growers, producers, traders, buyers, and governments. These "stakeholders" form the Roundtable on Sustainable Palm Oil (RSPO), which certifies as  
100 "sustainable" any oil that is not from illegally cleared forest land. About 15 percent of all palm oil produced is now RSPO-certified. However, companies say that it is not yet possible for them to trace the source of all palm fruit that they use. Several multinational food companies have  
105 vowed to make every part of the supply chain transparent. They are in a race against time; environmentalists using satellite data report the widespread continuation of illegal burning and clearing of rainforests in the archipelago.



Global Palm Oil Demand (1970-2010)



SOURCE: USDA report "Indonesia: Rising Global Demand Fuels Palm Oil Expansion," 2010.

31. The passage strongly suggests that
- orangutans could become extinct fairly soon.
  - logging rainforests for timber is decreasing.
  - a benefit of palm oil is the tidiness of palm plantings.
  - the United Nations is helping to enforce laws in Indonesia.
32. Which choice provides the best evidence for the answer to the previous question?
- Lines 22 – 24 ("They are one... Malaysia.")
  - Line 30 – 31 ("The forests... for timber.")
  - Lines 33 – 36 ("In Malaysia, tidy... land area.")
  - Lines 36 – 41 ("A report by the... plantations.")
33. What function does paragraph 3 (lines 20-29) serve in the passage as a whole?
- It supports claims made in the first two paragraphs.
  - It illustrates an important example.
  - It provides important background information.
  - It transitions to the main topic.
34. As used in line 46, the word "stable" most nearly means
- settled.
  - reliable.
  - inflexible.
  - sturdy.
35. In paragraph 5 (lines 42 – 54), the author implies that
- there is no other land-use in the region that could turn such a profit.
  - palm oil plantations have already improved the lives of poor Indonesians.
  - equivalent yields from other vegetable oil crops would require more land.
  - it is nearly impossible for local governments to enforce laws about land use.
36. The author refers to poverty in Indonesia (lines 52 – 54) primarily to
- persuade the reader to support palm oil in spite of its environmental impact.
  - introduce a discussion about jobs and the environment.
  - argue that annual crops cannot adequately feed populations in the region.
  - help explain one reason that policymakers allow palm oil plantations.
37. Paragraph 8 (lines 75 – 85) is primarily concerned with establishing a contrast between
- the media vs. palm oil growers and manufacturers.
  - a thriving few vs. many who are impoverished.
  - job opportunities vs. the rights of local villages.
  - agriculture lifestyles vs. hunting and gathering lifestyles.
38. As used in line 86, "press" refers to
- weights.
  - a pushing crowd.
  - reports.
  - machinery.
39. What is the author's main point about palm oil certification?
- The RSPO process generally cannot be trusted.
  - Some food companies are more transparent than others.
  - Consumers may be able to decrease rainforest destruction.
  - Laws may be able to decrease rainforest destruction.



40. Which choice provides the best evidence for the answer to the previous question?
- (A) Lines 86 – 88 (“The bad press...manner.”)  
 (B) Lines 92 – 95 (“The certification system... governments.”)  
 (C) Lines 99 – 100 (“About 15...RSPO-certified.”)  
 (D) Lines 105 – 108 (“They are in...archipelago.”)
41. Do the data in the graph provide support for the author’s claim that “global demand for palm oil has skyrocketed” (lines 55 – 56)?
- (A) Yes, because between 2000 and 2010, demand increased substantially.  
 (B) Yes, because it shows global demand growing from near zero to over 50 million tons.  
 (C) No, because there is no way to tell if the demand was actually met.  
 (D) No, because the term “skyrocketed” is misleading, as demand has risen steadily since 1970.

Refer to the passage below to answer questions 42 – 52.

Passage 1 is adapted from Jean-Baptiste Lamarck, *Zoological Philosophy*, originally published in 1809. In this passage, Lamarck is outlining a theory that accounts for physiological variations between and within species. Passage 2 is adapted from Charles Darwin, *On the Origin of Species*, originally published in 1859.

### Passage 1

line But changed circumstances produce changed wants, [and] changed wants [produce] changed actions. If the new wants become constant, the animals acquire new habits, which are no less  
 5 constant than the wants which gave rise to them. And such new habits will necessitate the use of one member rather than another, or even the cessation of the use of a member which has lost its utility.

10 The frequent use of an organ, if constant and habitual, increases its powers, develops it, and makes it acquire dimensions and potency such as are not found among animals which use it less.

15 Of this principle, the web-feet of some birds, the long legs and neck of the stork, are examples. Similarly, the elongated tongue of the ant-eater, and those of lizards and serpents.

20 The effect of use is curiously illustrated in the form and figure of the giraffe. This animal, the largest of mammals, is found in the interior of Africa, where the ground is scorched and destitute of grass, and has to browse on the foliage of trees. From the continual stretching thus necessitated over a great space of time in all  
 25 the individuals of the race, it has resulted that the

fore legs have become longer than the hind legs, and that the neck has become so elongated that the giraffe, without standing on its hind legs, can  
 30 raise its head to a height of nearly twenty feet. Observation of all animals will furnish similar examples.

### Passage 2

Naturalists continually refer to external conditions, such as climate, food, etc., as the only  
 35 possible cause of variation. In one limited sense, as we shall hereafter see, this may be true; but it is preposterous to attribute to mere external conditions the structure, for instance, of the woodpecker, with its feet, tail, beak, and tongue,  
 40 so admirably adapted to catch insects under the bark of trees. In the case of the mistletoe, which draws its nourishment from certain trees, which has seeds that must be transported by certain birds, and which has flowers with separate sexes  
 45 absolutely requiring the agency of certain insects to bring pollen from one flower to the other, it is equally preposterous to account for the structure of the [plant], with its relations to several  
 50 distinct organic beings, by the effects of external conditions, or of habit, or of the volition of the plant itself.

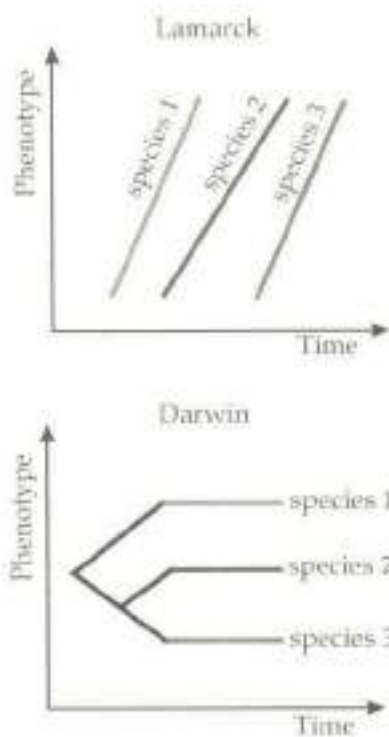
How have all the exquisite adaptations of one part of the body to another part, and to the conditions of life, and of one organic being to  
 55 another being, been perfected? For everywhere we find these beautiful adaptations.

The answer is to be found in the struggle for life. Owing to this struggle, variations, however slight, and from whatever cause proceeding, if  
 60 they be in any degree profitable to the individuals of a species in their infinitely complex relations to other organic beings and to their physical conditions of life, will tend to the preservation of such individuals, and will generally be inherited  
 65 by the offspring. The offspring, also, will thus have a better chance of surviving, for, of the many individuals of any species which are periodically born, but a small number can survive. I have called this principle, by which each slight  
 70 variation, if useful, is preserved, by the term Natural Selection, in order to mark its relation to man’s power of selection. But the expression, often used by Mr. Herbert Spencer, of the Survival of the Fittest, is more accurate.

75 We have seen that man, by selection, can certainly produce great results, and can adapt organic beings to his own uses, through the accumulation of slight but useful variations given to him by the hand of Nature. Natural Selection  
 80 is a power incessantly ready for action, and is as immeasurably superior to man’s feeble efforts as the works of Nature are to those of Art.



Lamarck's and Darwin's  
Ideas of Evolution



42. As used in line 7, "member" most nearly means
- (A) participant.  
(B) appendage.  
(C) element.  
(D) supporter.
43. The author mentions "scorched" ground that is "destitute of grass" (lines 21 – 22) as an example of
- (A) conditions that compel a species to move to another area.  
(B) scarcity that provokes competition within a species.  
(C) the distribution of resources evoking certain behaviors.  
(D) displays of dominance in the food chain.
44. Which choice provides the best evidence for the answer to the previous question?
- (A) Lines 1 – 3 ("But changed...actions.")  
(B) Lines 3 – 5 ("If the new...them.")  
(C) Lines 10 – 13 ("The frequent...less.")  
(D) Lines 23 – 30 ("From the...feet.")
45. As used in line 38, "structure" most nearly means
- (A) organization.  
(B) design.  
(C) anatomy.  
(D) edifice.
46. Based on Passage 2, the "struggle for life" introduced in line 57 – 58 most probably includes
- (A) competition among individuals for food.  
(B) various uses of the term "Natural Selection."  
(C) destructive conditions imposed by human society.  
(D) rivalry among siblings for their parents' affection.
47. Which choice provides the best evidence for the answer to the previous question?
- (A) Lines 36 – 46 ("but it is...the other.")  
(B) Lines 58 – 65 ("Owing to...the offspring.")  
(C) Lines 68 – 72 ("I have...selection.")  
(D) Lines 75 – 79 ("We have seen...Nature.")
48. An example of the process described in lines 75 – 79 ("We have seen...Nature.") is
- (A) the environmental impact of humanity's overuse of natural resources.  
(B) the hunting of an endangered species to the point of extinction.  
(C) the creation of different dog breeds to fill various practical roles.  
(D) the use of rats and mice in cancer-related research.
49. According to the graphs, a major disagreement between the authors is whether
- (A) organisms should be divided into two or three kingdoms.  
(B) phenotype is important when categorizing species.  
(C) species can become extinct under certain conditions.  
(D) life on Earth originated once or multiple times.
50. The author of Passage 2 (Darwin) would most likely claim that the author of Passage 1 (Lamarck)
- (A) relies too heavily on casual observation to formulate a valid argument.  
(B) overlooks the importance of predation in determining physiological variations.  
(C) incorrectly assesses the function of the giraffe's long neck.  
(D) misinterprets the role of environmental factors in determining variation among species.





51. Which claim from Passage 2 most effectively undermines Passage 1's claim in lines 6–13?
- (A) Lines 33–35 (“Naturalists...variation.”)
  - (B) Lines 52–55 (“How have all...been perfected?”)
  - (C) Lines 58–65 (“Owing to...the offspring.”)
  - (D) Lines 75–79 (“We have seen...Nature.”)
52. The first paragraph of Passage 2 effectively serves to
- (A) refute the thesis of Passage 1.
  - (B) contrast woodpeckers and mistletoes.
  - (C) expand on the discussion of the giraffe in Passage 1.
  - (D) introduce the “struggle for life” outlined later in the passage.



# Writing and Language Test 6



35 MINUTES, 44 QUESTIONS

Turn to Section 2 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each of the following passages is accompanied by approximately 11 questions. Some questions will require you to revise the passages in order to improve coherence and clarity. Other questions will require you to correct grammatical errors in the passages. Passages may be accompanied by graphs, charts, or tables that you must consider when making revisions. For most questions, you may select the "NO CHANGE" option if you believe that portion of the passage is clear, concise, and grammatically correct as is.

Within the passages, highlighted numbers followed by underlined text indicate which part of the text corresponds with each question. Bracketed numbers [1] indicate sentence number. These bracketed numbers are only relevant to problems that require you to add or rearrange sentences in a paragraph.

Refer to the passage below to answer questions 1 – 11.

### Market Research Analyst

[1] A fashion buyer must decide whether to order skirts that are short or long; an appliance maker has to foresee whether toaster ovens will become obsolete. While some companies may rely on intuition when trying to meet consumers' demands, most probably prefer [2] to consider as much data as they possibly can. The task of amassing and making sense of such data often falls to specialists known as market research analysts.

- Which choice most effectively introduces the passage?
  - Some professionals become accustomed to taking risks.
  - Selling goods involves accurately predicting what people want to buy.
  - Sales in fashion and electrical appliances are sensitive to trends.
  - Market research analysts must convey the "big picture" to clients.
- NO CHANGE
  - to consider using data.
  - using data.
  - data usage.



[1] Market research analysts look for various indicators of market trends. [2] These processes give analysts a sense of who might buy the product and ways to gain a competitive edge over other producers. [3] They may use current sales figures to estimate competitors' "market share," or percentage of overall sales of a product. [4] They may conduct focus groups or telephone surveys to elicit opinions about products and preferences of different demographic groups. [5] They may examine the current economy and **3** its affect on buying power. **4**

**5** Analysts collect relevant data and a report is written integrating all of the information. They may create visual displays and write explanatory texts. For example, a report for an ice cream **6** producer who is planning to launch a line of ice cream cakes may include graphs, charts, and maps. It may show that the typical American **7** household, particularly among affluent people, are getting smaller as the population shifts toward older adults whose children have grown. As a result, households are buying smaller freezers and having smaller gatherings.

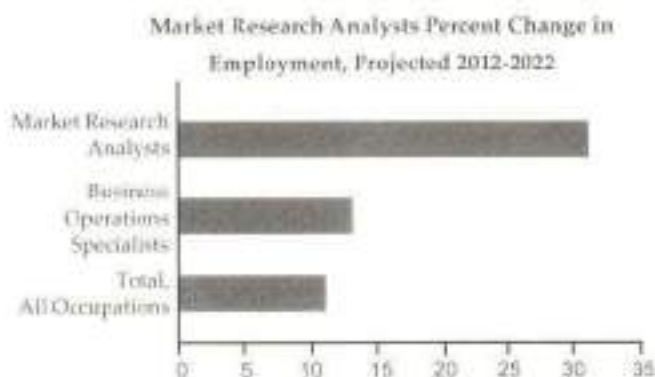
**8** Surveys may indicate that older people say that they would like ice cream cakes to have less frosting. The report may conclude that there is a potential market for small ice cream cakes for adults.

3. (A) NO CHANGE  
(B) it's affect on  
(C) its effect on  
(D) it's effect on
4. For the sake of the cohesion of this paragraph, sentence 2 should be placed  
(A) where it is now.  
(B) before sentence 1.  
(C) after sentence 3.  
(D) after sentence 5.
5. (A) NO CHANGE  
(B) Analysts collect the data and write reports  
(C) Analysts collect much data and a report is written  
(D) Data is collected and reports are written
6. (A) NO CHANGE  
(B) producer, who is planning to launch a line of ice cream cakes, may  
(C) producer, who is planning to launch a line of ice cream cakes may  
(D) producer who is planning to launch a line of ice cream cakes, may
7. (A) NO CHANGE  
(B) household, particularly affluent people, are getting  
(C) household, particularly among affluent people, are now  
(D) household, particularly among affluent people, is getting
8. The writer is considering deleting the underlined sentence. Should it be kept or deleted?  
(A) Kept, because it supports the paragraph's description of older, affluent adults.  
(B) Kept, because it contributes important details about consumer preferences.  
(C) Deleted, because it blurs the paragraph's focus on the market for small ice cream cakes.  
(D) Deleted, because it does not support the paragraph's focus on how to sell ice cream cakes.



9 Most market research analysts hold a bachelor's or master's degree in marketing, economics, math, or statistics. They can enrich their skills by studying sociology, psychology, and business administration as well. Finally, market research analysts must possess good writing and speaking skills.

As of 2012, there were 414,700 market research analysts in the United States, according to the U.S. Bureau of Labor Statistics. 10 Market research analysts job outlook is promising; 11 the field will definitely grow. The bureau says the growth will be driven by the trend in all industries to make more use of data.



SOURCE: Adapted from United States Bureau of Labor Statistics, *Occupational Outlook Handbook*.

9. Which choice most effectively provides a transition for the new paragraph?
- (A) Such ability to gather and interpret market data requires a solid academic background.  
 (B) Certainly, it is recommended that interested students pursue a college education.  
 (C) Studying math is essential to obtaining a job as a market research analyst.  
 (D) Market research analysts must be logical, rational thinkers with a dash of creativity.
10. (A) Market research analyst job outlook  
 (B) Market research analysts' job outlook  
 (C) Market research analysts jobs outlook  
 (D) Market research analyst's job outlook
11. The writer wants to conclude the sentence with evidence of the improving job outlook for market research analysts. Which choice best accomplishes this goal with data from the graph?
- (A) NO CHANGE  
 (B) job experts are optimistic that graduates will find jobs in the field.  
 (C) according to analysts, there will be 132,704 job openings by 2022.  
 (D) analysts predict that the number of jobs will increase 32 percent by 2022.



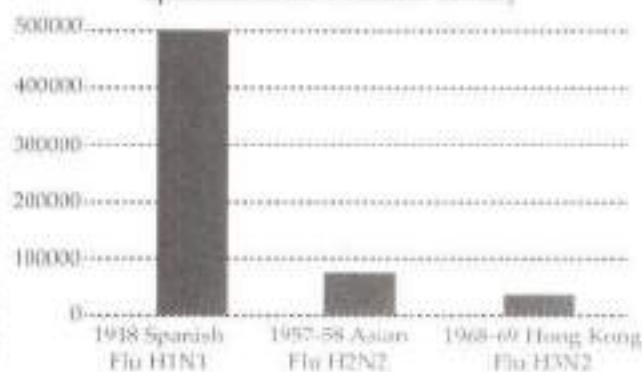
Refer to the passage below to answer questions 12–22.

## Influenza Research

Medical research institutions usually have policies requiring their scientists' studies to be reasonably **12** safe and that any risk is outweighed by the potential for meaningful results. But even within the scientific community, researchers can fervently disagree about **13** both qualities.

Recent research into the influenza (flu) virus has provoked particularly heated debate about risks versus benefits. The stakes are high because, although most cases of the flu are fairly mild, as **14** people's immune systems can offer swift resistance, more deadly flu outbreaks do occur periodically. **15** Many of these outbreaks begin on poultry or livestock farms where animals carry strains of the flu that become transmissible to humans. Due to the ever-present possibility of such epidemics, researchers would like to be able to track flu strains that are always circulating in birds and mammals. Ideally, **16** scientists identify hazardous strains, predict when and how they could threaten humans, and stockpile an effective vaccine.

United States Deaths - Major Flu Epidemics in the Twentieth Century



SOURCE: Adapted from National Institute of Allergy and Infectious Diseases, "Timeline of Human Flu Pandemics."

12. (A) NO CHANGE  
(B) safe. Any risk should be  
(C) safe, and any risk is  
(D) safe; that any risk is
13. The writer wants to finish the sentence with a phrase that emphasizes the scientists' basic disagreements. Which choice would best accomplish this goal?
- (A) NO CHANGE  
(B) the two judgments.  
(C) most things.  
(D) what is safe and what is meaningful.
14. (A) NO CHANGE  
(B) a person's  
(C) peoples'  
(D) personal
15. The author wants to add a sentence here. Which choice adds relevant and accurate information based on the chart?
- (A) The deadliest of these outbreaks, the Spanish Flu, killed up to half of the U.S. population in 1918.  
(B) Half of all deaths in the United States in the past century can be attributed to devastating flu outbreaks.  
(C) For instance, in the last century alone, three flu outbreaks have killed over half of a million people in the United States.  
(D) For example, the leading cause of death in the United States in 1918 was the Spanish Flu.
16. (A) NO CHANGE  
(B) scientists would have identified  
(C) scientists can identify  
(D) scientists could identify



In pursuit of that ideal, some researchers have taken a controversial approach called “gain-of-function.” In the laboratory, they produce new strains of the flu virus that have “gained” abilities, or **17** functions. In other words, they **18** got more efficient and capable at infecting and harming the human body. The purpose of creating these tiny enemies is to understand the types of genetic mutations that occur in them. These researchers claim that by knowing which strains have particular mutations and how the strains **19** may evolve—scientists may be able to prevent pandemics.

[1] However, critics decry gain-of-function teams’ efforts to create virulent flu strains. [2] Lab workers repeatedly selected resistant strains for reproduction until they created versions that cannot be neutralized by human antibodies. [3] For example, critics question why one laboratory has replicated the “Spanish flu,” the strain that was responsible for a 1918 global pandemic that killed at least 50 million people. [4] The same lab also produced a more lethal version of a deadly strain that erupted in 2009. [5] That is, the lab created a strain that can overcome all human immune responses. **20**

17. Which choice most effectively combines the sentences at the underlined portion?
- (A) functions, so, in other words, they  
 (B) functions, they  
 (C) functions; specifically, they  
 (D) functions, but they
18. (A) NO CHANGE  
 (B) gained a lot of ability to infect and harm  
 (C) became more able to infect and harm  
 (D) could do a better job of infecting and harming
19. (A) NO CHANGE  
 (B) may evolve, scientists may be  
 (C) may evolve, scientists may be,  
 (D) may evolve: scientists may be
20. To make the paragraph more logical, sentence 2 should be placed
- (A) where it is now.  
 (B) before sentence 1.  
 (C) before sentence 5.  
 (D) after sentence 5.



Gain-of-function researchers say that their samples are not dangerous because they can be treated with common antiviral medications and deactivated by soap and water. Critics remain unconvinced about the strains' harmlessness. They argue that the strains should not be stored. **21** Nor should researchers create new ones.

Furthermore, critics challenge the usefulness of such research. Lab-created specimens do not provide information about how strains might evolve in natural settings. Critics add that the work is impractical because strains of the influenza virus exist in countless animals worldwide and are highly unpredictable. **22** Thus, opponents and proponents of the research remain starkly polarized regarding its risks and benefits.

21. Which choice most effectively supports the argument stated in the previous sentence?
- (A) NO CHANGE  
(B) They simply create too high of a risk, which does not guarantee safety.  
(C) High-security labs have accidentally released dangerous germs in the past.  
(D) They claim that a flu strain has escaped from at least one laboratory in the past – from somewhere in China in 1977 – causing a pandemic.
22. Which choice most effectively concludes the passage?
- (A) NO CHANGE  
(B) As the information above demonstrates, however, the research is perfectly safe.  
(C) Opponents also point out the risk of terrorist groups copying the research.  
(D) Thus, opponents of the research continue to influence the scientific community worldwide.



Refer to the passage below to answer questions 23 – 33.

## Mancala

Mancala may be the oldest and most widely played board game on Earth. It is known across many cultures and appears in many **23** languages; besides the name “mancala,” the game has an estimated 800 other names. It has so many variations in procedures and rules that it is more accurate to think of mancala as a family of games.

The word “mancala” stems from an Arabic word meaning “to move or transfer.” **24** Consequently, the common procedure of all mancala games is to transfer game pieces, dropping them one by one and thus simulating sowing seeds in the ground. To begin the game, rows of shallow pits are filled with equal numbers of pebbles or other small objects that serve as playing pieces. Two players face each other across the board. They take turns scooping up the pieces in one pit and “sowing” them in the subsequent pits until they run out. A player has some choices about which pits to scoop out first, and has **25** a ton of opportunities to “capture” playing pieces. Usually, **26** the player, who collects the most pieces wins the game.

**27** The exact origin and the diffusion of mancala spreading across the ancient world remain mysterious. Mancala’s origins may be northern or eastern Africa, the eastern Mediterranean, or the Persian Gulf. Archaeological evidence in these areas sometimes includes game-sized rows of shallow pits. Without finding written or pictorial evidence, however, **28** it is impossible to know how the pits were actually used. **29** By around 500 CE, people in East Africa were playing mancala games. Regardless of exactly how or where it developed, mancala spread widely, probably through trade and migration. It has flourished ever since in many African, Arab, Asian, and European cultures.

23. (A) NO CHANGE  
(B) languages, besides the name “mancala”  
(C) languages besides the name “mancala,”  
(D) languages, besides, the name “mancala”
24. (A) NO CHANGE  
(B) Concurrently.  
(C) Significantly.  
(D) Indeed,
25. (A) NO CHANGE  
(B) a lot of  
(C) multiple  
(D) maximum
26. (A) NO CHANGE  
(B) the player who collects the most pieces  
(C) the player, who collects the most pieces,  
(D) the player who collects the most pieces,
27. (A) NO CHANGE  
(B) The game’s dissemination across the ancient world remains  
(C) The way that mancala ended up all over the ancient world remains  
(D) The origin of mancala and its diffusion by spreading across the ancient world remain
28. (A) NO CHANGE  
(B) it is uncertain  
(C) it is impossible to determine  
(D) archaeologists cannot determine
29. (A) NO CHANGE  
(B) It is clear to everyone that by around 500 CE,  
(C) Pottery shards do indicate that by around 500 CE,  
(D) There is a claim that by around 500 CE,





Researchers speculate that one reason for the enduring popularity of mancala-style games has been its accessibility. Kings and sultans can play, but so can peasants. All manner of elegant mancala boards exist, but a patch of dirt will also do. Playing pieces **30** can be any materials. The simple motions of scooping and distributing the pieces seem to be enjoyable to all people.

**31** Mancala games may fascinate people due to their continual challenges, because **32** they become gradually more complex as players grow and learn. Psychological researchers believe that with practice, mancala players tend to increase their abilities to evaluate visual information, such as how many pieces are in which pits, and to recognize

**33** circumstances. This recognition helps players draw on a store of learned strategies as they plan their next move.

30. Which choice maintains the sentence pattern already established in the paragraph?
- (A) NO CHANGE
  - (B) can be made of precious materials or almost anything else.
  - (C) can be smoothed glass, dried beans, river pebbles, or cowrie shells.
  - (D) can be jewels, but dried beans will serve equally well.
31. The author wants to add a sentence here. Which choice results in the most effective transition to the information that follows in the paragraph?
- (A) Beyond its simple pleasures, however, mancala has an inexplicable draw.
  - (B) Yet there must be something more special than that about mancala games for them to have universal popularity.
  - (C) However, why would people play mancala their whole lives, and pass it on to their children?
  - (D) Mancala games are particularly conducive to socializing, as onlookers gather to watch.
32. (A) NO CHANGE  
(B) the games  
(C) the challenges  
(D) people
33. (A) NO CHANGE  
(B) contexts  
(C) patterns  
(D) generalizations



Refer to the passage below to answer questions 34 – 44.

### Shakespeare's "Problem Plays"

William Shakespeare wrote at least 37 plays between 1590 and 1612. He had an unerring ability to mesmerize audiences. Even today, audiences love his moving tragedies, such as *Romeo and Juliet*; his historical plays, such as *Henry V*; and his romantic comedies, such as *A Midsummer Night's Dream*. However, **34** the last few plays that Shakespeare wrote tend to be unappreciated: *Cymbeline*, *Winter's Tale*, and *The Tempest*. Directors and literary critics often refer to them as "the problem plays."

One reason it is hard to appreciate the problem plays is **35** their ambiguous mood. They **36** precede as great tragedies, but they end happily. Shakespeare wrote them after 1604, **37** the beginning of a new English era under King James. These "tragicomedies" first create suspense by having characters concoct evil schemes, and then stumble upon surprisingly peaceful resolutions. Nearly everyone lives, **38** and many give speeches.

34. (A) NO CHANGE  
 (B) *Cymbeline*, *The Winter's Tale*, and *The Tempest*, which tend to be unappreciated, were the last few plays that Shakespeare wrote.  
 (C) the unappreciated last few plays of Shakespeare are *Cymbeline*, *The Winter's Tale*, and *The Tempest*.  
 (D) Shakespeare's last few plays, *Cymbeline*, *The Winter's Tale*, and *The Tempest*, tend to be unappreciated.
35. Which choice most effectively establishes the main topic of the paragraph?  
 (A) NO CHANGE  
 (B) that they have too many characters.  
 (C) that they tend to be tedious.  
 (D) their outdated themes.
36. (A) NO CHANGE  
 (B) proceed  
 (C) prevaricate  
 (D) propel
37. (A) NO CHANGE  
 (B) following the death of Elizabeth I, a great supporter of the arts.  
 (C) when the new king of England, James I, was promoting reconciliation with former enemies.  
 (D) a time when England was beginning to establish colonies in its empire.
38. The writer wants to complete the sentence with another example of tragicomedies' unusual structure. Which choice would best accomplish this goal?  
 (A) NO CHANGE  
 (B) and goes back to everyday routines.  
 (C) and even cruel characters become reformed.  
 (D) with especially the lead characters surviving.



To a greater extent than in other Shakespeare plays, the problem **39** plays have followed convoluted plots and subplots, involving betrayals, deceit, errors, and unbelievable coincidences. For example, in the midst of *Cymbeline*, a princess disguises herself as a male servant in order to travel and find her **40** exiled husband. She seeks shelter along the way with foresters whom she does not realize are her long-lost brothers. Through several twists in the story, she ends up waking up from a sleeping potion and finding herself next to a corpse, which is actually the body of the **41** princesses enemy whom the foresters have killed, but whom she thinks must be her husband because he is dressed in her husband's clothes. Many more plot twists ensue before all of the characters explain, confess, and restore order.

The problem plays can also provoke a sense of unease in audience members. In the above-mentioned scene in *Cymbeline* in which the princess wakes up and thinks the headless corpse next to her is her beloved husband's, the audience is aware of the true identity of the corpse. Thus, people may not know exactly how to react to **42** her grief, unlike Juliet when she sees the lifeless body of her beloved in *Romeo and Juliet*.

Therefore, Shakespeare's last plays push the boundaries of drama and comedy in a way that still seems unconventional. Shakespeare's focus on forgiveness may still surprise **43** the audience because they may expect that bad behavior will be punished. But Shakespeare may have been contemplating his own desire for grace and forgiveness regarding what he perceived as his own faults. In *The Tempest*, the main character, a magician who controls events on an island—just like a playwright controls events in a play—directly addresses the audience at the end. He requests that the audience show him forgiveness for his tyranny, as his goal was only “to please.” He says he will be stuck on the island unless the audience frees him by clapping. **44**

39. (A) NO CHANGE  
(B) plays will follow convoluted plots  
(C) plays are following convoluted plots  
(D) plays follow convoluted plots
40. (A) NO CHANGE  
(B) excommunicated  
(C) expatriated  
(D) extradited
41. (A) NO CHANGE  
(B) prince's enemy  
(C) princess' enemy  
(D) princess is enemy
42. (A) NO CHANGE  
(B) her grief, unlike the scene with Juliet  
(C) her grief, unlike that of Juliet  
(D) her, unlike Juliet's feelings
43. (A) NO CHANGE  
(B) people because they may  
(C) all audiences because they may  
(D) one because it may
44. Which choice most effectively concludes the paragraph?
- (A) Many critics believe that Shakespeare wrote the character to represent himself, as a way of saying farewell to the theater with humility.
- (B) What the character really wants, as Shakespeare makes clear in this speech, is to escape the island on which he has been stuck for 12 years.
- (C) Thus, as in an aside, Shakespeare's character reaches through the so-called “fourth wall” that usually separates actor from audience.
- (D) Hopefully, audiences will someday look upon Shakespeare's “problem plays” more favorably.





# Math Test 6 – No Calculator



25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

## DIRECTIONS

For questions 1 – 15, find the solution to each problem and select the most appropriate answer from the choices provided. For questions 16 – 20, find the solution to each problem and write your answer in the space provided. You may use the blank space in your test booklet for scratch work.

## NOTES

1. The use of a calculator on any part of this section is forbidden.
2. Unless otherwise indicated, all variables and expressions used in this test represent real numbers.
3. Unless otherwise indicated, all figures used in this test are drawn to scale.
4. Unless otherwise indicated, all figures used in this test lie on a plane.
5. Unless specified otherwise, a given function,  $f$ , has the domain the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE



$$A = \frac{1}{2}bh$$



$$c^2 = a^2 + b^2$$

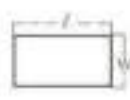


Special Right Triangles

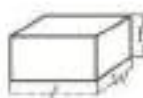


$$A = \pi r^2$$

$$C = 2\pi r$$



$$A = lw$$



$$V = lwh$$



$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}lwh$$

The arc of a circle is 360 degrees or  $2\pi$  radians.  
A triangle has angles that sum to 180 degrees.





1. Find all values of  $x$  that satisfy following inequality:

$$\frac{x}{2} - 1 \leq 1 - \frac{x}{2}$$

- (A)  $x \leq -2$   
 (B)  $x \leq 0$   
 (C)  $x \leq 2$   
 (D) All real numbers
2. George is mailing Christmas gifts to his family. Three family members live in California, and eight live in New York. If the cost of sending a package to California,  $x$ , is three times the cost of sending a package to New York, which of the following represents the total cost of shipping?
- (A)  $\frac{11}{3}x$   
 (B)  $\frac{17}{3}x$   
 (C)  $9x$   
 (D)  $11x$
3. If  $f(x) = ax^2 + bx + c$  is concave downward, which of the following must be true?
- (A)  $a < 0$   
 (B)  $a > 0$   
 (C)  $b^2 - 4ac > 0$   
 (D)  $b^2 - 4ac < 0$
4. It takes about 4 joules of energy to raise the temperature of 1 milliliter of water by one degree Celsius. How many joules of energy will it take to raise the temperature of 3 liters of water by 8 degrees Celsius?
- (A) 9.6  
 (B) 960  
 (C) 9,600  
 (D) 96,000

5. Four consecutive integers are summed, and the total is assigned the variable  $x$ . What is the sum of the next four consecutive integers in terms of  $x$ ?
- (A)  $x + 16$   
 (B)  $x + 4$   
 (C)  $4x + 4$   
 (D)  $4x + 16$
6. Carol is catering an office Super Bowl party. She plans to serve macaroni and cheese as well as pizzas. She figures that one pizza will feed two people, and one pan of macaroni and cheese will feed six people. If she expects at least 30 and at most 60 attendees, and cannot exceed a ratio, in favor of either food, of 2 to 1, what is the maximum number of pizzas she can order?
- (A) 4  
 (B) 6  
 (C) 12  
 (D) 15
7. Kim's Fruit Market prices fruit by the piece. A small bag of three apples and two pears costs \$1.85. A large bag of seven apples and five pears costs \$4.45. Which of the following must be true?
- (A) An apple and a pear are the same price.  
 (B) A pear costs \$0.05 more than an apple.  
 (C) A pear costs \$0.10 more than an apple.  
 (D) An apple costs \$0.05 more than a pear.



8. The current population of a town is 10,000. If the population,  $P$ , increases by 20% each year, which equation could be used to find the population after  $t$  years?
- (A)  $P = 10,000(0.2)^t$   
 (B)  $P = 10,000(1.2)^t$   
 (C)  $P = 10,000(0.8)^t$   
 (D)  $P = 10,000(1.8)^t$
9. Solve for  $x$ :  $\frac{5}{x+1} \geq 1$
- (A)  $x \leq -4$  or  $x > 1$   
 (B)  $-1 < x \leq 4$   
 (C)  $x \leq -1$  or  $x > 4$   
 (D)  $-4 < x \leq 1$
10. An opinion poll asked which of two candidates, A or B, would make a good mayor. Of respondents, 70% chose candidate A and 60% chose candidate B. Each person polled chose at least one candidate, and 900 of them chose both candidates. How many people were polled?
- (A) 1,000  
 (B) 2,000  
 (C) 3,000  
 (D) 4,000
11. What is the range of  $f(x) = \sqrt{4-x^2}$ ?
- (A)  $y \geq 0$   
 (B)  $y \geq 2$   
 (C)  $-2 \leq y \leq 2$   
 (D)  $0 \leq y \leq 2$
12. If  $a$  is any positive integer, then which of the following is NOT a true statement?
- (A)  $2a + 1$  is always an odd integer.  
 (B)  $\sqrt{a}$  is always a real number.  
 (C)  $\sqrt{-a}$  is always an imaginary number.  
 (D)  $a^2$  is always an odd integer.
13. Which of the following is NOT true concerning the line containing the points  $(4, 3)$  and  $(-2, -6)$ ?
- (A) It has an  $x$ -intercept greater than its slope.  
 (B) It is parallel to the line  $y = \frac{3}{2}x + 10$ .  
 (C) It is perpendicular to  $2x + 3y = 10$ .  
 (D) It has  $y$ -intercept 3.
14. If  $x$  and  $f(x)$  are given in the table below, and  $f(f(x)) = 10$ , then  $x =$
- |        |    |   |   |    |    |
|--------|----|---|---|----|----|
| $x$    | 3  | 5 | 7 | 8  | 10 |
| $f(x)$ | 10 | 2 | 3 | 12 | 1  |
- (A) 3  
 (B) 5  
 (C) 7  
 (D) 8
15. Three day laborers are tasked with loading trucks in a warehouse. The first worker is the fastest, and he works twice as quickly as the second laborer, who works twice as quickly as the third laborer. The three together can load a truck in three hours. How long, in hours, would it take the fastest laborer to load the truck alone?
- (A)  $1\frac{1}{3}$   
 (B)  $4\frac{1}{2}$   
 (C)  $5\frac{1}{4}$   
 (D)  $10\frac{1}{2}$



## DIRECTIONS

For questions 16 – 20, find the solution to the problem and enter your answer as demonstrated below.

1. Only the answer that is bubbled in on the answer sheet will be credited. The blank spaces above the bubbles are for you to record your answers for accuracy.
2. Only fill in one bubble in any given column.
3. None of the answers on this portion of the test are negative values.
4. If a problem appears to have more than one answer, only enter one answer. If the answer you enter is one of the correct solutions, you will receive full credit for that question.
5. If the correct answer can be expressed as a mixed number, it must be entered as a decimal or an improper fraction.
6. If the correct answer is a decimal that cannot fit into the grid space, you must fill the grid with enough digits to completely fill the space. The number can be rounded or simply shortened but must fill every blank space.

Write answer in boxes.

Answer:  $\frac{5}{36}$       Answer: 4.5

	5	/	3	6		4	.	5	
	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grid in result.	0	0	0	0		0	0	0	
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	2	2	2	2		2	2	2	
	3	3	3	3		3	3	3	
	4	4	4	4		4	4	4	
	5	5	5	5		5	5	5	<input checked="" type="radio"/>
	6	6	6	6		6	6	6	
	7	7	7	7		7	7	7	
	8	8	8	8		8	8	8	
	9	9	9	9		9	9	9	

← Fraction line  
← Decimal point

Acceptable ways to grid  $\frac{1}{6}$  are:

	1	/	6			.1	6	6			.1	6	7
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	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grid in result.	0	0	0	0		0	0	0			0	0	0
	1	1	1	1		1	1	1			1	1	1
	2	2	2	2		2	2	2			2	2	2
	3	3	3	3		3	3	3			3	3	3
	4	4	4	4		4	4	4			4	4	4
	5	5	5	5		5	5	5			5	5	5
	6	6	6	6		6	6	6			6	6	6
	7	7	7	7		7	7	7			7	7	7
	8	8	8	8		8	8	8			8	8	8
	9	9	9	9		9	9	9			9	9	9

Answer: 302 – either position is correct

	3	0	2			3	0	2	
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grid in result.	0	0	0	0		0	0	0	
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	2	2	2	2		2	2	2	
	3	3	3	3		3	3	3	
	4	4	4	4		4	4	4	
	5	5	5	5		5	5	5	
	6	6	6	6		6	6	6	
	7	7	7	7		7	7	7	
	8	8	8	8		8	8	8	
	9	9	9	9		9	9	9	

## NOTES

Begin entering answers in any column that accommodates your answer. If you do not need a column do not enter anything in that column.





16. The sum of two numbers is  $2\frac{1}{2}$ . The sum of twice the first number plus three times the second number is seven. What is their product?

ANSWER: \_\_\_\_\_

17. The lines of  $x + 2y = 7$  and  $2x - ky = 5$  are perpendicular if the value of  $k$  is

ANSWER: \_\_\_\_\_

18.



NOTE: figure not drawn to scale

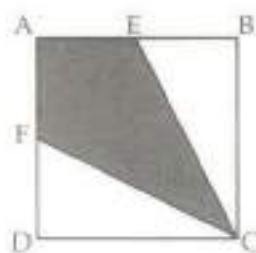
For the right triangle ACDE above,  $\cos C = \frac{1}{2}$ . If the hypotenuse is 10 centimeters long, what is the length of side  $d$ ?

ANSWER: \_\_\_\_\_

19. If a rectangular prism has faces with areas of 8, 10, and 20 centimeters squared, then what is the volume of the prism in centimeters cubed?

ANSWER: \_\_\_\_\_

20.



In the figure, ABCD is a square with side of length 2. If E is the midpoint of line segment AB and F is the midpoint of line segment AD, the area of quadrilateral CFAE, in units squared, is

ANSWER: \_\_\_\_\_







# Math Test 6 – Calculator



55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

## DIRECTIONS

For questions 1 – 30, find the solution to each problem and select the most appropriate answer from the choices provided. For questions 31 – 38, find the solution to each problem and write your answer in the space provided. You may use the blank space in your test booklet for scratch work.

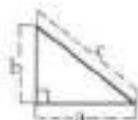
## NOTES

1. The use of a calculator on any part of this section is allowed.
2. Unless otherwise indicated, all variables and expressions used in this test represent real numbers.
3. Unless otherwise indicated, all figures used in this test are drawn to scale.
4. Unless otherwise indicated, all figures used in this test lie on a plane.
5. Unless specified otherwise, a given function,  $f$ , has the domain the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE



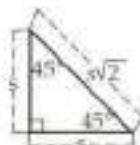
$$A = \frac{1}{2}bh$$



$$c^2 = a^2 + b^2$$

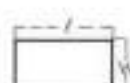


Special Right Triangles

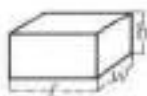


$$A = \pi r^2$$

$$C = 2\pi r$$



$$A = lw$$



$$V = lwh$$



$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}lwh$$

The arc of a circle is 360 degrees or  $2\pi$  radians.  
A triangle has angles that sum to 180 degrees.

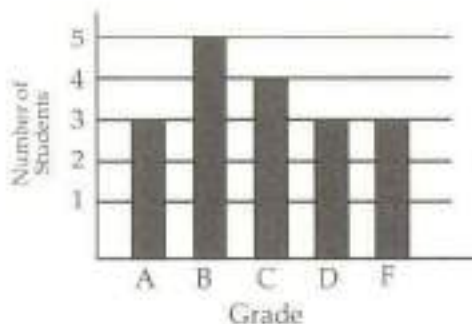




1. A band wants to distribute its music on CDs. The recording equipment costs \$250, and blank CDs cost \$5.90 for a package of 10. Which of the following represents the total, in dollars, it costs to produce  $n$  CDs, if  $n$  is a multiple of 10?

- (A)  $(250 + 0.59)n$   
(B)  $250 + 0.59n$   
(C)  $(250 + 5.90)n$   
(D)  $250n + 5.90$

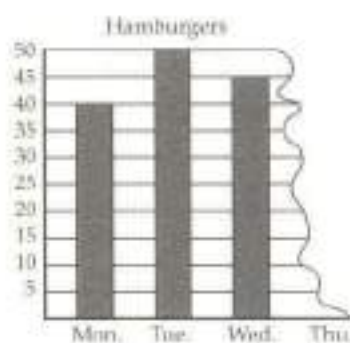
2.



The bar graph above shows the grades in a mathematics class for the last grading period. If A, B, C and D are satisfactory grades, what fraction of grades shown in the graph are satisfactory?

- (A)  $\frac{1}{6}$   
(B)  $\frac{2}{3}$   
(C)  $\frac{3}{4}$   
(D)  $\frac{5}{6}$
3. A man 5 feet 8 inches tall casts a shadow of 8 feet. What is the height, in feet, of a pole that casts a shadow of 96 feet? (1 foot = 12 inches)
- (A)  $4\frac{1}{2}$   
(B) 13  
(C) 39  
(D) 68

4.



A bar graph above shows the number of hamburgers sold by a fast food chain over 4 days. However, the information on the hamburgers sold on Thursday was lost. If exactly 25% of the chain's hamburgers were sold on Wednesday, how many hamburgers were sold on Thursday?

- (A) 40  
(B) 45  
(C) 50  
(D) 55
5. Find the value of  $x$  if  $\frac{x}{12} - \frac{x+2}{4} < 0$ .
- (A)  $x < -3$   
(B)  $x > -3$   
(C)  $x < 3$   
(D)  $x > 3$
6. Which of the following is TRUE about the line whose equation is  $4x - 2y - 10 = 0$ ?
- (A) The  $x$ -intercept is 4 and the  $y$ -intercept is -2.  
(B) The  $x$ -intercept is  $\frac{5}{2}$  and the  $y$ -intercept is 5.  
(C) The  $x$ -intercept is  $\frac{5}{2}$  and the  $y$ -intercept is -5.  
(D) The  $x$ -intercept is 5 and the  $y$ -intercept is  $\frac{5}{2}$ .





7. A problem from the Rhind papyrus (1650 BCE) states: "A quantity and its  $\frac{1}{2}$ , its  $\frac{2}{3}$ , and its  $\frac{1}{7}$ , added together, becomes 388." What is this quantity?

(A) 42  
(B) 84  
(C) 126  
(D) 168

8. The function  $f$  is defined by  $f(x) = x^2 + ax + a$  where  $a$  is a constant. What is  $f(5)$  in terms of  $a$ ?

(A)  $25 + a$   
(B)  $25 + 2a$   
(C)  $5 + a^2$   
(D)  $25 + 6a$

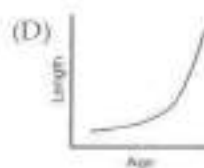
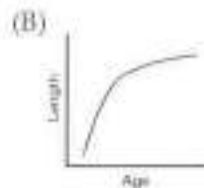
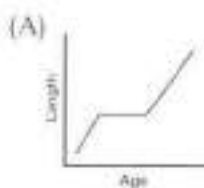
9. During 100 minutes of playing time, each of 5 teams plays each of the other 4 teams exactly once. Only 2 teams play at any given time. If the total playing time for each team is the same, what is the total number of minutes that each team plays?

(A) 50  
(B) 40  
(C) 36  
(D) 30

10.

Age (in weeks)	2	3	4	5	6
Length (cm)	6	15	20	22	23

The measurements of a fish at different ages are given in the table above. Which of the following graphs could represent the information in the table?



11. Two classes were given a math test. The first class has 25 students and the average test score was 86%. The second class had 15 students and its average score was 94%. If the teacher combined the test scores of both classes, what is the average of both classes together?

(A) 88%  
(B) 89%  
(C) 90%  
(D) 91%





12.

## SALES OF WILDLIFE TOURS

Price of Tour	\$5.00	\$10.00	\$20.00
Number of Purchased Tours	120,000	95,000	65,000

A wildlife company offered tours for three different prices during a single year. Based on the information above, how much more money did the company make when the price was \$20.00 than when the price was \$5.00?

- (A) \$35,000  
(B) \$70,000  
(C) \$350,000  
(D) \$700,000
13. Peter wants to purchase 2 dozen pencils and a pen. Those items cost \$8.45, and he does not have enough money. Instead, he decides to purchase 8 fewer pencils and pays \$6.05. How much does the pen cost?
- (A) \$0.33  
(B) \$1.15  
(C) \$1.25  
(D) \$1.65
14. A student is asked to add two numbers, A and B. However, the student accidentally subtracted B from A and got 4. This number differs from the correct answer by 12. Which of the following is A?
- (A) 4  
(B) 5  
(C) 6  
(D) 10

15. An electrician works for commission. He charges an average of \$75 per job, and it takes him an average of 90 minutes to complete a job. If the electrician works 45 hours per week, what is the minimum commission rate, needed to make at least \$950 per week?
- (A) 22%  
(B) 33%  
(C) 42%  
(D) 50%

Questions 16 – 18 refer to the following information.

Number of Poor in U.S., 1990 – 2010 (millions)

	Number of Poor				Total Population
	< 18	18 – 54	55 – 64	≥ 65	
1990	13.3	14.6	2.1	3.7	248.6
1995	14.4	16.5	2.2	3.3	263.7
2000	11.1	14.1	2.2	3.4	275.9
2005	12.3	18.0	2.7	3.6	293.1
2010	15.7	22.6	3.7	3.5	305.7

16. How many people in the United States were not poor in 2010?
- (A) 22.6 million  
(B) 48.5 million  
(C) 260.2 million  
(D) 305.7 million
17. Approximately what percentage of poor people in 1995 were 65 and older?
- (A) 15%  
(B) 9%  
(C) 6%  
(D) 1%





18. Which year represented in the table has the lowest poverty rate?
- (A) 1995  
(B) 2000  
(C) 2005  
(D) 2010
19. A tennis player needs to win 60% of her matches to qualify for a post-season tournament. She currently has 10 wins. If there are 30 matches in total, and the season is two-thirds over, what percentage of her remaining matches must she win in order to qualify for the post-season tournament?
- (A) 15%  
(B) 50%  
(C) 80%  
(D) 100%

20. What is the solution set of this system of equations?

$$\begin{aligned}y - x &= 3 \\ x^2 - 7y + 31 &= 0\end{aligned}$$

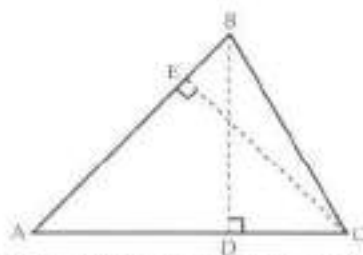
- (A)  $\{(2, 5), (5, 2)\}$   
(B)  $\{(2, 5), (5, 8)\}$   
(C)  $\{(5, 8), (8, 5)\}$   
(D)  $\{(8, 5), (8, 8)\}$

21. Which quadrants contain the solutions to this system of inequalities?

$$\begin{aligned}y - 2x &\leq -3 \\ 3y + x &\geq -4\end{aligned}$$

- (A) Quadrants I and IV  
(B) Quadrants II and III  
(C) Quadrants III and IV  
(D) Quadrants II, III, and IV

22



NOTE: Figure not drawn to scale

In  $\triangle ABC$  above,  $BD$  is the altitude to side  $AC$  and  $CE$  is the altitude to side  $AB$ . If  $BD = 7$ ,  $AB = 8$ , and  $CE = 9$ , what is the length of  $AC$ ?

- (A)  $5\frac{1}{7}$   
(B)  $6\frac{2}{9}$   
(C)  $7\frac{7}{8}$   
(D)  $10\frac{3}{7}$



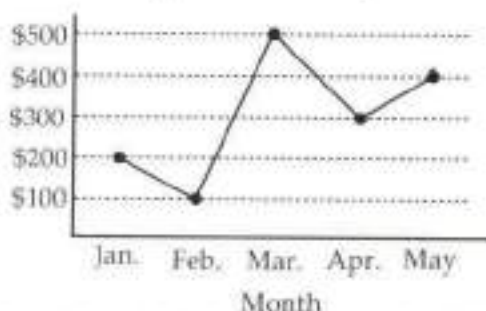


23. Connor wants to attend the town carnival. The price of admission to the carnival is \$4.50, and each ride costs an additional 79 cents. If he can spend at most \$16.00, which of the following inequalities can be used to represent the number of rides he can go on,  $r$ , and what is the maximum value of  $r$ ?
- (A)  $0.79 + 4.50r < 16.00$ ; 3 rides  
(B)  $0.79 + 4.50r \leq 16.00$ ; 4 rides  
(C)  $4.50 + 0.79r \leq 16.00$ ; 14 rides  
(D)  $4.50 + 0.79r \leq 16.00$ ; 15 rides
24. Some banks charge a fee on savings accounts that are left inactive for an extended period of time. The equation  $y = 5000(0.98)^x$  represents the value,  $y$ , of one account that was left inactive for a period of  $x$  years. What is the  $y$ -intercept of this equation and what does it represent?
- (A) 0.98; the percent of money in the account initially  
(B) 0.98; the percent of money in the account after  $x$  years  
(C) 5000; the amount of money in the account initially  
(D) 5000; the amount of money in the account after  $x$  years
25. Pat can inspect a case of watches in 5 hours. James can inspect the same case of watches in 3 hours. After inspecting a case of watches alone for one hour, Pat stops for lunch. After lunch, Pat and James work together to inspect the remaining watches. How long do Pat and James work together after lunch to complete the job?
- (A) 1 hour, 30 minutes  
(B) 1 hour, 45 minutes  
(C) 2 hours  
(D) 2 hours, 15 minutes
26. Ansel throws a basketball whose path can be modeled by the equation  $y = -4x^2 + 16x + 6$ , where  $x$  represents time and  $y$  represents the height of the basketball. Which of the following is the maximum height of the ball?
- (A) 18  
(B) 20  
(C) 22  
(D) 24





27. Checking Account Activity for Peter



According to the chart, what was the difference in Peter's account from the beginning of the 5-month period to the end of the 5-month period?

- (A) -\$200  
 (B) -\$100  
 (C) \$200  
 (D) \$300
28. Two companies produce equivalent e-readers at the same production cost. They sell the same number of units in each 6-month period at the current selling price of \$100. The first company plans to reduce its selling price by 5% at the end of each 6-month period, and the second company plans to reduce its price by 11% after each year. What will be the difference in their prices five years from now?
- (A) \$4.03  
 (B) \$6.07  
 (C) \$21.53  
 (D) \$30.13

29. An open box was formed from a square sheet of metal by cutting smaller squares with sides measuring 4 centimeters from each of the corners of the sheet and folding up the edges. The volume of the box was 576 cubic centimeters. What is the area, in square centimeters, of the original sheet?

- (A) 80  
 (B) 144  
 (C) 256  
 (D) 400

30. If  $\cos \frac{\pi}{3} = x - 1$ , then  $x =$

- (A)  $\frac{1}{2}$   
 (B)  $\frac{3}{2}$   
 (C)  $\frac{\pi}{3} + 1$   
 (D)  $x$  has two values.





**DIRECTIONS**

For questions 31 – 38, find the solution to the problem and enter your answer as demonstrated below.

1. Only the answer that is bubbled in on the answer sheet will be credited. The blank spaces above the bubbles are for you to record your answers for accuracy.
2. Only fill in one bubble in any given column.
3. None of the answers on this portion of the test are negative values.
4. If a problem appears to have more than one answer, only enter one answer. If the answer you enter is one of the correct solutions, you will receive full credit for that question.
5. If the correct answer can be expressed as a mixed number, it must be entered as a decimal or an improper fraction.
6. If the correct answer is a decimal that cannot fit into the grid space, you must fill the grid with enough digits to completely fill the space. The number can be rounded or simply shortened but must fill every blank space.

Write answer in boxes. →

Grid in result. {

Answer:  $\frac{5}{36}$       Answer: 4.5

5	/	3	6
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1	0	0	0
2	1	1	1
3	2	2	2
4	3	3	3
5	4	4	4
6	5	5	5
7	6	6	6
8	7	7	7
9	8	8	8
0	9	9	9

	4	.	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1	0	0	0
2	1	1	1
3	2	2	2
4	3	3	3
5	4	4	4
6	5	5	5
7	6	6	6
8	7	7	7
9	8	8	8
0	9	9	9

← Fraction line  
← Decimal point

Acceptable ways to grid  $\frac{1}{6}$  are:

	1	/	6
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1	0	0	0
2	1	1	1
3	2	2	2
4	3	3	3
5	4	4	4
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7	6	6	6
8	7	7	7
9	8	8	8
0	9	9	9

.	1	6	6
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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2	1	1	1
3	2	2	2
4	3	3	3
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8	7	7	7
9	8	8	8
0	9	9	9

.	1	6	7
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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2	1	1	1
3	2	2	2
4	3	3	3
5	4	4	4
6	5	5	5
7	6	6	6
8	7	7	7
9	8	8	8
0	9	9	9

Answer: 302 – either position is correct

	3	0	2
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1	0	0	0
2	1	1	1
3	2	2	2
4	3	3	3
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6	5	5	5
7	6	6	6
8	7	7	7
9	8	8	8
0	9	9	9

	3	0	2
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1	0	0	0
2	1	1	1
3	2	2	2
4	3	3	3
5	4	4	4
6	5	5	5
7	6	6	6
8	7	7	7
9	8	8	8
0	9	9	9

**NOTES**

Begin entering answers in any column that accommodates your answer. If you do not need a column do not enter anything in that column.







31. If  $f(x) = x^2 + 1$ , then  $f(f(4))$

ANSWER: \_\_\_\_\_

32. A cube has edges 3 units long. If  $P$  and  $Q$  are points on its surface, what is the maximum straight-line distance from  $P$  to  $Q$ ?

ANSWER: \_\_\_\_\_

33. Line  $l$  passes through the origin and is parallel to the line  $y = \frac{2}{3}x - 6$ . If line  $l$  intersects the line  $y = \frac{1}{2}x - 4$  at the point  $(x, y)$ , what is the value of the product  $xy$ ?

ANSWER: \_\_\_\_\_

34. If  $2\sqrt{x} - \sqrt{2x+1} - 1 = 0$ , then what is the value of  $x$ ?

ANSWER: \_\_\_\_\_

35. The probability that it will snow tomorrow is 23%, and the probability that it will snow the day after tomorrow is 20%. These probabilities are independent of each other. What is the probability that it will snow tomorrow but not the day after tomorrow?

ANSWER: \_\_\_\_\_





36. Peter found a battery-powered drill for 25% off the original price. At the checkout counter, the clerk enters the sale price, adds a 5% sales tax, and then tells Peter he owes \$189. What was the original (pre-sale) price of the drill, in dollars?

ANSWER: \_\_\_\_\_

Questions 37 and 38 refer to the following information below.

A shoe company produces batches of leather shoes and boots. Each batch is made from a starting material of 2000 square feet of leather. A pair of boots requires 10 square feet of leather to produce, and a pair of shoes requires 3 square feet.

37. **PART 1**

The company needs to produce a batch of exactly 500 pairs. How many pairs of boots are in this batch?

ANSWER: \_\_\_\_\_

38. **PART 2**

A consultant is brought in to assess the production process, and he suggest an adjustment based on market analysis. The demand for boots is on the rise, and a single pair can now be sold for \$300, whereas a pair of shoes sells for \$75. Assuming all other production costs are the same, how many pairs of boots should be produced in order to maximize profits?

ANSWER: \_\_\_\_\_



## Essay Test 6



50 MINUTES, Prompt-based essay

Turn to Section 5 of your answer sheet to answer the question in this section.

### DIRECTIONS

As you read the passage below, consider how Chloe Medosch uses

- evidence, such as facts or examples, to support claims.
- reasoning to develop ideas and to connect claims and evidence.
- stylistic or persuasive elements, such as word choice or appeals to emotion, to add power to the ideas expressed.

This passage is adapted from Chloe Medosch, "Out on a Limb: Dwindling Trees in Cities," published in 2015.

Of all the environmental resources we take for granted, large, older trees might be near the top of the list. Not only do we rely on trees for oxygen and wood products, but about 180 different animal species rely on the hollow-bearing features of these trees for shelter, roosting, and nesting. Unfortunately, rapid urbanization poses an enormous threat to the existence of these trees.

Large old trees take centuries to mature, and scientists are paying particular attention to the changes in wooded areas as urbanization spreads. The authors of a recent study published in *PLOS ONE* utilized a simulation model to determine the future of older trees in and around Canberra, Australia. In this urban area of Australia where the population is projected to double from 375,000 people by 2056, the authors found that dramatic changes to the terrestrial environment could occur.

The simulation model developed by the authors calculated the average number of trees in a given area using pre-defined rates of tree mortality and existing data for trees they had catalogued and measured. The data collection included the total number of trees, how fast new ones were growing, and how quickly existing ones were dying or being removed. By extrapolating from this data, they were able to assess tree population changes in the coming years.

Unfortunately, building for a growing human population means clearing out these older trees that may pose a safety threat or may simply be in the way. By projecting the current rate of decline for existing trees in the next 300 years, the researchers found that these trees die or are removed at a rate so rapid that it could lead to their eventual disappearance. To put that threat into numbers, it seems that the population of these hollow-bearing trees will decline by nearly 87% over the next 300 years. In a worst case scenario, we could lose all old, hollow-bearing trees within 115 years. That's a terrifying thought.

According to the authors' review of tree population changes, several policies may need to change to reverse the decline of these trees. Only with a combined management strategy, including planting more trees and forming



more hollow-bearing habitats, would the population of the trees increase over 250 years after a short period of decline. A decline in older, hollow-bearing trees, including some endangered Eucalyptus varieties, means a decline in shelter for the birds, bats, squirrels, and invertebrates that inhabit them.

Luckily, urbanization brings new innovation, and innovation inspires new solutions to important problems. Environmental consciousness in the public requires a discussion about improving tree management, community engagement, conservation strategies, and biodiversity offsets. For example, we now have the technology to give hollow-bearing features to trees in urban areas by using other hollow-structures or artificial nest boxes.

If large older trees are facing almost certain decline due to urbanization, we need to put forth significant efforts to develop conservation and management strategies to change that. With the research available today, we can develop strategies to protect the large trees in existence, improve regeneration for ones we lose, and develop plans to build structures for animals who are displaced. We are not the only living beings on Earth, and we need to take into consideration how we effect change in our environments.

Write an essay in which you explain how Chloe Medosch builds an argument to persuade her audience that urbanization is leading to a decline of older trees. In your essay, analyze how the author uses one or more of the features listed in the box above (or features of your own choice) to strengthen the logic and persuasiveness of her argument. Be sure that your analysis focuses on the most relevant features of the passage.

Your essay should not explain whether you agree with the author's claims, but rather explain how the author builds an argument to persuade her audience.

## SAT Practice Test 1: Answers &amp; Explanations

## Reading Test



1. (D)	6. (C)	11. (C)	16. (A)	21. (C)	26. (B)	31. (A)	36. (A)	41. (A)	46. (D)	51. (C)
2. (C)	7. (A)	12. (D)	17. (D)	22. (D)	27. (C)	32. (D)	37. (B)	42. (B)	47. (A)	52. (A)
3. (C)	8. (A)	13. (C)	18. (B)	23. (B)	28. (C)	33. (D)	38. (D)	43. (D)	48. (C)	
4. (B)	9. (C)	14. (B)	19. (B)	24. (D)	29. (A)	34. (A)	39. (C)	44. (B)	49. (C)	
5. (A)	10. (B)	15. (A)	20. (B)	25. (A)	30. (D)	35. (C)	40. (A)	45. (C)	50. (C)	

1) **⇒** D

The claim that the man handled Aunt Elizabeth skillfully suggests that the man has a level of experience in the countryside that the narrator does not, so (D) is the correct choice. (A) is incorrect because holding a hen in a “workmanlike manner” does not indicate harsh treatment. (B) is incorrect because no direct information is given about the man’s longtime profession. Finally, (C) is incorrect because the words “adroit” and “workmanlike” relate to ability, not to taste.

2) **⇒** C

The narrator speaks in general about the painfulness of the moment, and this can be taken to indicate the narrator’s embarrassment about having burst into the garden chasing a chicken. The narrator’s statement is about feeling foolish, and thus (C) is the answer. (A) is incorrect because the moments of which the narrator is speaking do not clarify the nature of the relationship between the narrator and the Irishman; the dynamic between the two is not what is being highlighted here. (B) is incorrect because the tone of the passage before and after the narrator’s statement is relatively light-hearted and humorous. Finally, (D) is incorrect because the narrator’s statement is not meant to introduce a general claim that hard work and effort are inevitably rewarded; the narrator’s efforts have ended in failure up to this point, and will culminate in a failure to successfully take the bird from the man.

3) **⇒** C

The statement, “An Irishman’s croquet-lawn is his castle” implies that a lawn is an important extension of personal living space for any Irishman who has one. As such, trespassers on the lawn would

not be welcome. Since the narrator is trespassing on the Irishman’s croquet-lawn, he feels that he has made a serious social mis-step, so (C) is the correct choice. (A) is incorrect because the tone of the narrator is humorously self-deprecatory, and does not imply criticism or mockery of others. (B) is incorrect because the narrator does not associate a croquet-lawn with literal wealth and royalty. Finally, (D) is incorrect because it is inconsistent with the information presented in the passage.

4) **⇒** B

As used in the passage, to “invite” something is to elicit a particular reaction or response, generally to an action, such as the narrator running out of the hedge. Choice (B), “provoking,” is correct because it highlights this action-response dynamic. (A) is incorrect because it is inconsistent with the usage in the passage. (C) is incorrect because “appealing a response” does not have clear meaning. Finally, (D) is incorrect because to summon a response would mean to urgently call for it or demand it, but the narrator’s actions are an accident, not a demand or a summons.

5) **⇒** A

Throughout the passage, the narrator describes Aunt Elizabeth using terms that normally describe a person’s mood, feelings, and behavior. He states that she is “resentful,” that she “raises her eyebrows,” and that she eyes the narrator “satirically.” The narrator attributes human qualities and characteristics to Aunt Elizabeth, so (A) is correct. (B) is incorrect because Aunt Elizabeth escapes, not because she is cleverer than the narrator, but because the narrator himself is so inexperienced at working with chickens. (C) is incorrect because while the narrator does describe

Aunt Elizabeth in terms normally reserved for people, the effect of this language is not to elicit sympathy for Aunt Elizabeth, but to make her behavior and “moods” clearer to the reader while adding humor to the passage. Finally, (D) is incorrect because the narrator’s descriptions of Aunt Elizabeth do not set up a clear and direct contrast with the narrator; descriptions are *not* of a clumsy narrator and a clever hen, but of a clumsy narrator and an angry hen.

6) **⇒** C

The most conspicuous example of the seemingly “human” characteristics of Aunt Elizabeth is when she “raised her eyebrows” at the narrator and “sniffed” at him. The hen is responding in a typically human fashion to the narrator, so (C) is correct. (A) is incorrect because the description of Aunt Elizabeth wanting to peck the man holding her does not indicate that she possesses human emotions so much as that she wants to get free of the man, which is natural for any animal being held against its will. The description in choice (B) serves to highlight the disheveled appearance and general incompetence of the narrator, but it does not indicate that Aunt Elizabeth possesses human characteristics. Finally, (D) is incorrect because the lines focus on the narrator, not Aunt Elizabeth.

7) **⇒** A

The narrator indicates that he is breathless when he claims, “I stood there, gasping.” Thus, it makes sense that he cannot speak well because of his breathlessness, making (A) correct. (B) is incorrect because the context of the narrator’s assertion at lines 56 - 59 does not suggest that he is worried about seeming pretentious, but rather that he feels foolish. (C) is incorrect because we cannot determine whether the narrator enjoys talking to strangers simply based on his hesitance to utter a five-syllable word. Finally, (D) is incorrect because the inability to articulate a long word is a humorous detail, not a means of skipping boring information.

8) **⇒** A

The narrator says that he is “only too well aware” of his disheveled appearance, and that his legs “felt as if they had ceased to belong to” him. We can infer that he is deeply embarrassed, so (A) is the correct choice. (B) is incorrect because there is no

indication that the narrator feels frightened by the other characters. (C) is incorrect because there is no indication that the narrator “presumes” or expects special treatment or privileges. He is, rather, apologetic for his blunder. (D) is incorrect because, although the narrator is embarrassed, he is not shy and reserved; he is willing to engage with the other characters and speak up to explain himself.

9) **⇒** C

The context in which the word “hitch” occurs suggests that the narrator had a problem taking hold of the hen, and that he “bungled” it. A “hitch” is a problem or interruption to a process. Thus, (C) is the correct answer. (A) is incorrect because a barrier prevents something from happening, and there is no indication that there was anything stopping the narrator from taking hold of the hen. (B) is incorrect because an interlude is an intervening period of time between two events, and there is no indication that there was one. Finally, (D) is incorrect because “catch” means a built-in problem or trap. There was no catch to the attempted handover of Aunt Elizabeth to the narrator; he simply bungled it by accident.

10) **⇒** B

The correct choice is (B) because the narrator is “hunting” Aunt Elizabeth by chasing her, and she is “outmaneuvering” him by running into hedges. (A) is incorrect because the narrator appears to dislike, not love, Aunt Elizabeth, imagining that she wants to peck him. (C) is incorrect because Aunt Elizabeth and the narrator are not actually opponents. Rather, the narrator is simply trying to capture her. Finally, (D) is incorrect because the narrator is not performing tricks for an audience.

11) **⇒** C

Aunt Elizabeth’s refusal to be caught hints at her stubbornness, or obstinacy, and the narrator characterizes her as possessing “baffled resentment.” Thus, choice (C) is correct. (A) is incorrect because the narrator’s descriptions of Aunt Elizabeth, such as when he says that “she slipped from my grasp like an eel,” indicate that she is exceptionally uncooperative. (B) can be eliminated because the narrator indicates that Aunt Elizabeth is fairly shrewd, as she eyes the narrator “satirically,” an action that requires a degree of intelligence. There is not evidence to support

choice (D), as Aunt Elizabeth's attitude toward the Irishman is not mentioned in the passage.

12) **➡ D**

In the opening paragraph, Douglass notes that African Americans do not enjoy the same rights and privileges as white Americans, and that it would be absurd to rejoice in the benefits of liberty when African Americans are enslaved. Thus, Douglass's question pinpoints the irony of his presence at the Fourth of July celebration: he is being asked to celebrate freedom and independence even though African Americans have no such freedom. Thus, (D) is the correct answer. (A) is incorrect because while Douglass's question may serve to catch the listeners' attention, his question has the deeper purpose just stated. (B) is incorrect because there is no indication that Douglas is singling out the event organizers. Finally, (C) will not work because Douglass is not setting an irreverent tone, as that would imply a disrespecting something others take seriously; he instead speaks with great seriousness.

13) **➡ C**

After Douglass points out the irony of taking part in a Fourth of July celebration, he mentions that there is a significant disparity "between us," white Americans in the audience and himself, an African American. This disparity refers to the different life experiences of white and black Americans. Thus, the sense of "disparity" refers to a gap or difference, and choice (C) is correct. (A) is incorrect because the speech does not focus on disputes he has with audience members; rather, it seems they tend to agree with him and need to be pressured into action. (B) is incorrect because Douglass means to highlight the different experiences of white and black Americans; "exception" does not make sense. Finally, (D) is incorrect because Douglass is not discussing shifts or changes that have occurred between white and black Americans, so the word "shift" does not make sense in the context of the sentence.

14) **➡ B**

Douglass's listing of the contrasts between black and white Americans emphasizes a series of stark and uncomfortable realities to his audience: the blessings of liberty belong only to a select group of citizens, and not to others who are "in fetters," or in other words, metaphorically and

sometimes literally in chains. Thus, (B) is correct, as the successive listing of each of the contrasts between black and white Americans accentuates the inequality in America and rises in emotional import. (A) is incorrect because the sentences do not provide explanatory details; Douglass is imploring the audience to think in a new way about what they already know. (C) is incorrect because human rights, not wealth, are the focus of Douglass's speech. Finally, (D) is incorrect because Douglass is not genuinely confused about why he was asked to speak. His "confusion" was meant as a rhetorical device to introduce the irony of him being called on to speak.

15) **➡ A**

In lines 4 - 6, Douglass asks the rhetorical question, "Are the great principles...embodied in the Declaration of Independence, extended to us?" This indicates that he expects his audience to be familiar with the "principles" he mentions in passing, so (A) is correct. (B) is incorrect because there is no reference to the actual "forefathers" of audience members. (C) is incorrect because the focus of the speech is not on Douglass himself and his accomplishments, but rather on the injustices of slavery in general. Finally, (D) is incorrect because Douglass does not presuppose that the audience knows what life is like for slaves; rather, he uses the speech to illustrate the violence they face.

16) **➡ A**

The correct answer is (A) because in Lines 2 - 7, Douglass speaks of "national independence" as well as the principles "of political freedom and natural justice" in the Declaration of Independence without further explanation. Thus, he clearly assumes the audience is familiar with the document. Answer choice (B) is incorrect because even though Douglass refers to the "disparity" in freedom and justice for white and black Americans, he does not mention the Declaration of Independence. (C) is incorrect because the sentence does not require understanding the Declaration of Independence in order to have meaning. Finally, (D) is incorrect because this rhetorical question does not clearly refer to the Declaration of Independence.

17) **➡ D**

The answer is (D) because Douglass implies in lines 30 - 32 that the wrongfulness of slavery is so obvious in a country that has declared individual

liberties that debating the question would be pointless. (A) is incorrect because Douglass implies that he does not think the question of slavery requires more knowledge or discussion. (B) is incorrect because Douglass does not think that the wrongfulness of slavery is complicated. Finally, (C) is incorrect because Douglass's point is that slavery's wrongfulness is self-evident; so as far as Douglass is concerned, it is not an argument at all.

18) **➡ B**

The best choice is (B), as it clearly reflects the information in the graph, which shows that the average black person lived for just over 20 years, while the average white person lived for approximately 40 years. (A) is incorrect because it is not supported by the graph, which does not contain information about infant mortality rates. (C) is incorrect because it states a fact about "most" slaves and slaveowners, while the graph depicts only average life expectancies. (D) is incorrect because it makes an assumption that seems reasonable, but it cannot be supported because the graph does not mention life expectancies for slaves or slave owners.

19) **➡ D**

Choice (D) is correct. The three clauses in the sentence, "Is it that...are mistaken" (lines 61 - 63) are separated by semi-colons, which means that they are consistent. Here, Douglass implies that if slavery is "not divine" and not established by God, then the "doctors of divinity" are mistaken. These statements make it clear that theologians of the day were in the habit of justifying slavery as a part of God's will. Choice (A), (B), and (C) are incorrect because they refer to topics not discussed in these lines.

20) **➡ B**

A "stern rebuke" is a forceful expression of disapproval. Only choice (B) captures this meaning. (A) is incorrect because a stern rebuke is not an angry outburst. It is more controlled and refers to a rebuke in which someone is criticized or condemned. (C) is incorrect because a stern rebuke is more forceful and directed than a solemn disapproval. Finally, (D) is incorrect because an exacting criticism does not suggest the same weight and passion as a stern rebuke.

21) **➡ C**

Choice (C) is correct because in lines 70 - 78, Douglass uses the powerful imagery of scorching fire and ear-splitting thunderblasts to emphasize the need for dramatic change. He wants to incite people to overcome complacency and work to end slavery. Choice (A) is incorrect because there is no indication that Douglass thinks civil war is imminent or desirable. (B) is incorrect because Douglass does not exhort people to civil disobedience. Finally, (D) is incorrect because though it is clear that Douglass is angry about slavery, his speech is not focused on his own anger, as revealed when he claims that "we need the storm." The use of "we" reveals that he wants to excite the audience, not express his own anger.

22) **➡ D**

Throughout the passage, the author states that different phenomena can influence the production of different dreams. The author mentions that a flickering lamp of a night nurse can produce dreams of fire, and that the light of the moon can produce feelings of love. This suggests that dreams are produced by identifiable causes, so (D) is correct. (A) is incorrect because the author does not indicate that dreams are necessarily metaphorical and poetical. Though they may involve these elements, the main thrust of the author's claims is that dreams are connected to external reality. (B) is incorrect because the author does not state that dreams are determined by culture or history. Finally, (C) is incorrect because the author is concerned with those aspects of dreams that are common across individuals, not unique to them.

23) **➡ B**

In line 7, the author uses the word "people" as a verb. (B) is closest in meaning, because to populate means to fill or be present in an area, which is an accurate way to describe the objects and people present in one's dreams. (A) is incorrect because the fact that objects and people are present in our dreams does not necessarily mean that they crowd, or overpopulate, them. (C) is incorrect because to individualize means to change something to fit someone's needs, which does not make sense in the sentence. Finally, (D) is incorrect because humanizing involves making something seem more humane and civilized, and there is no



indication that the author means to suggest that dreams need to become more humane.

24) **➡ D**

In paragraph 1 the author states that the observations of Maury and d'Hervey should be taken with caution, because they are from psychologists who are literally "half asleep." This suggests that the author is skeptical of their work. (D) is the correct choice. (A) is incorrect because the author does not plainly disagree with or criticize Maury and d'Hervey. He instead counsels caution when considering their claims. (B) is incorrect because, if the author had a generally positive outlook toward Maury's and d'Hervey's work, he would not advise being cautious toward their claims. Finally, (C) is incorrect because the author does not display a deep fascination with Maury's and d'Hervey's work, and he does not discuss it in great detail.

25) **➡ A**

The author says that once people are trained to keep their eyes closed and retain dreams, "one sees the figures and objects of the dream melt away little by little into phosphenes, identifying themselves with the colored spots that the eye really perceives when the lids are closed." In other words, we construct our dreams based on colors that our eyes discern when closed, so (A) is correct. (B) is incorrect because the muted hues and shining spots associated with an ocean dream were meant to be an example, not applicable to every dream. (C) is incorrect because the author mentions training only in order to understand dreams, not as a goal in itself. (D) is incorrect because it is overly general; the passage does not include discussion about why certain materials appear in our dreams beyond claims that the specific colors and lights that appear are from external stimuli.

26) **➡ B**

Choice (B) is correct because it states that dreams include "the colored spots that the eye really perceives" even in sleep, which is the paragraph's main contention. (A) is incorrect because lines 13 – 18 describe a procedure, not a contention or conclusion. Neither (C) nor (D) are the correct choices because lines 22 – 26 and 31 – 32 describe examples, not main points.

27) **➡ C**

The best choice is (C) because it fits most closely with the metaphorical meaning of "dust" in line 33. The "visual dust" the author mentions refers to colors that appear, like dust motes in the air or water particles in a mist. (A) is incorrect because it does not fit the context of the sentence. (B) and (D) are incorrect because neither "dross" nor "trickle" describes floating particles.

28) **➡ C**

In paragraph 4 (lines 50 – 70), the author describes two dreams that are set in places familiar to the dreamer, and that are set aflame due to the influence of an external light source. Thus, (C) is the answer. The answer cannot be (A) because the author contends that light contributes in an abstract way to dreams, but not directly; in other words, the men did not dream about the passing lamp. (B) is incorrect because the author is discussing specific examples, not making general statements about fire in dreams. (D) is incorrect because it distorts the author's proposal about dreams.

29) **➡ A**

Choice (A) provides direct support to the answer to the previous question, because in lines 42 – 44, the author writes that external light "is at the bottom of many of our dreams." (B), (C), and (D) all describe specific examples, so they are incorrect answer choices.

30) **➡ D**

Choice (D) is correct because it is the best summary of the descriptions in paragraph 4. (A) is incorrect because the night nurses' lanterns, not the night nurses themselves, affect the patients' dreams. (B) is incorrect because the passage does not say or even imply that the patients in the hospital are military veterans reliving real experiences in their dreams. (C) is incorrect because the author does not say or imply that the dreams are about actual experiences or real-world events.

31) **➡ A**

The author uses the adjective "curious" in the sense of "strange or odd." Thus, (A) is the answer because the purpose of pointing out something odd is often to convey a sense of interest or wonder. (B) is incorrect because there is no indication that the author is confused, merely that he is pointing out

something he regards to be an odd phenomenon. (C) is incorrect because there is no indication that the author feels disapproval. (D) is incorrect because the author is not using "curious" in the sense of "eager to learn," nor mentioning anything about the need for further thought.

32) **⇒** D

Paragraph 5 discusses the types of dreams evoked by moonlight. The author suggests that moonlight causes people to dream of young girls – "virginal apparitions"—and further suggests that such common dreams may be the root of ancient stories about a moon goddess. Thus, (D) is correct. (A) is incorrect because the author's topic is dreams, not myths. (B) is incorrect because the author mentions the fable in order to present a theory about the moon's influence on dreams, not to distinguish between levels of light. Finally, (C) is incorrect because, in mentioning the fable of Endymion, the author does not establish a connection between dreams and our deepest longings.

33) **⇒** D

The authors of Passage 1 and Passage 2 are largely unconcerned with the morality of the actions they advocate as long as state stability is maintained. Morality plays little or no role in either author's analysis. This in turn suggests that each author has a practical mentality and is concerned with performing the actions necessary to achieve desired ends. Thus, (D) is the correct answer. (A) is incorrect because neither author appears interested in starting war for its own sake. (B) is incorrect because Passage 1's author, Sun Tzu, supports rather than opposes war when necessary to maintain the state; and the author of Passage 2, Machiavelli, advises the new prince to take any action to secure power. (C) is incorrect because the authors of both passages are not necessarily allies of the leaders to whom they are writing; more importantly, both authors present general strategies for winning, not plans for a specific battle.

34) **⇒** A

The answer is (A) because Sun Tzu's short, imperative statements are not directed at any one particular person, situation, place, or time. They can be thought of as "axioms"—statements to be taken as true. Because they can apply to any competitive circumstance, they are impersonal in tone. (B)

is incorrect because the statements do not seem weak or unlikely due to a lack of explanation; just the opposite, they seem to be more obviously true, more axiomatic. (C) is incorrect because the writer remains mysterious; the reader has no idea about what his status or authority may be. (D) is not the best choice because while the axiomatic statements sound like stark truths and stern commands, the author emphasizes the importance of shrewdness, not necessarily emotional toughness.

35) **⇒** C

Choice (C) is correct because "pretend" is closest in meaning to the more antiquated term "feign." Sun Tzu's advice here is to pretend to be disorganized in order to trap an attacking army. (A) is not as close in meaning; although feigning likely involves exaggeration, it is more important to draw the connection between "feign" and "pretend." (B) and (D) are incorrect because Sun Tzu is advising neither the covering up of nor the "forging" of actual disorder, but the opposite: pretending to be disordered to appear vulnerable.

36) **⇒** A

The correct choice is (A). Machiavelli is describing his observation that powerful men often hold onto power by tricking others—circumventing or "going around" peoples' better judgment. Sun Tzu advises holding onto power by playing tricks on the enemy. He even writes that "All warfare is based on deception." Therefore, it is likely that he would be unsurprised and dispassionate about Machiavelli's advice. (B) is incorrect because Sun Tzu seems to have no qualms about deception. (C) is incorrect because it is reasonable to suspect that Sun Tzu would be completely satisfied with Machiavelli's contention, not with the hesitancy suggested by "faint praise." (D) is wrong because there is no indication that Sun Tzu would set limitations or conditions for tricking others.

37) **⇒** B

Choice (B) is correct because Sun Tzu's statement that "All warfare is based on deception," is consistent with Machiavelli's assertion that great men stay powerful by tricking others. (A) is incorrect because while it says that the "art of war" is important to the state, it does not specifically address the topic of deception. (C) and (D) are incorrect because they describe strategies in war,

but do not specifically discuss deception.

38) **⇒ D**

In the context of Sun Tzu's advice about ways to gain the advantage of surprise over the enemy, the statement about unfathomable plans—plans that no one can predict—suggests that the plans remain unpredictable even to one's own troops. Thus, (D) is the correct choice. (A) and (B) are incorrect because the juxtaposition of "keeping troops on the move" with "devising unfathomable plans" indicates that the topic is surprise, not the fitness of the troops. (C) is incorrect because "unfathomable" means "mysterious" and implies secrecy, the opposite of explaining one's strategies to the troops.

39) **⇒ C**

While "observe" can refer to seeing something happen, another meaning is to comply with something, as in "observe the rules." Because the context in which "observe" is used suggests the latter meaning, the correct choice is (C). (A) is incorrect because "to commemorate" an event means remembering it with a marker or ritual, which would not make sense in the context. (B) and (D) are incorrect because neither "pronounce" nor "notice" would make sense in the context of the passage.

40) **⇒ A**

Choice (A) is correct because Machiavelli notes that, in his experience, princes can fool people easily because "men are so simple, and so subject to present necessities." A paraphrase of the sentence is that people are ruled by what they need at the moment, or by solving immediate problems. (B) and (C) are incorrect because there is no indication in the passage that Machiavelli is saying that people cannot look outside of themselves or that they cannot see the "big picture." (D) is incorrect because Machiavelli clarifies that by "simple" he means short-sighted, not necessarily stupid or unsophisticated.

41) **⇒ A**

The correct choice is (A) because Sun Tzu's advice to "dissimulate," or pretend to feel or think differently than one actually does is similar to Machiavelli's instructive description in lines 59 – 68 of Alexander VI. Machiavelli says that Alexander "did nothing else but deceive men, nor

ever thought of doing otherwise," and that there was never anyone who "with greater oaths would affirm a thing, yet would observe it less..." (B), (C), and (D) are all incorrect because they do not reflect the meaning of "dissimulate," and also because the concepts they represent are not mentioned by Machiavelli.

42) **⇒ B**

Choice (B) is correct because in lines 63 – 67, Machiavelli is using Alexander VI as an example of someone who succeeded through dissimulation—pretending to think and feel differently than he did. (A) is incorrect because the statement in lines 43 – 46 is not specifically about Alexander. (C) and (D) are both incorrect because they do not directly address dissimulation and because they are not focused on Alexander.

43) **⇒ D**

Both authors are concerned with maintaining stable governments, and both authors discuss the deception and trickery they feel is required to do so. Therefore, the correct choice is (D). (A) is incorrect because neither author seems to think that people are fundamentally good; Machiavelli even states that they are bad. (B) is incorrect because neither author mentions future generations; they both seem concerned with their own. Finally, (C) is incorrect because in these excerpts, neither author addresses ways to inspire loyalty.

44) **⇒ B**

Choice (B) most accurately summarizes the passage. It mentions the main technology that led to the original hypothesis about Chicxulub (satellite technology), the process that led to the theory (deduction), and the conclusion (a geological event occurred at the site). Choices (A) and (C) are minor points in the passage. Choice (D) is incorrect because, as the passage points out in line 18, there is no longer a big hole at Chicxulub.

45) **⇒ C**

Generally, a "smoking gun" is a metaphor that refers to compelling evidence, as in a murder suspect holding a gun that is still smoking from being fired. Thus, (C) is the correct choice. (A) is incorrect because there is no indication in the passage that the crater is still steaming or "smoking" 65 million years after the impact. (B) is incorrect because the passage does not identify the

theory as “controversial.” (D) is incorrect because it is a misinterpretation of the idiom and is not consistent with the way the evidence is discussed in the passage.

46) **⇒** D

Choice (D) is correct because paragraph 2 provides the crater’s name, location, condition (buried under a kilometer of rocks), and importance as the suspected site of the asteroid event proposed by the Alvarez team. Thus, it introduces Chicxulub and its scientific significance. (A) is incorrect because it is a partial answer; paragraph 2 does explain how the crater disappeared (by being buried), but it also includes other important information as well. (B) is incorrect because the paragraph does not provide descriptions of earlier discoveries. (C) is incorrect because it is too broad to describe paragraph 2.

47) **⇒** A

In line 32, the “surface expression” of the buried crater is being compared to the rim of a blanket-covered bowl. One cannot see the bowl, just the shape, or “form,” of its rim where it pushes up the blanket. Thus, (A) is correct. Choice (B) does not make sense in the context of the sentence since faces are unrelated to the topic of the passage. (C) is incorrect because an iteration is a repetition of a motion or an action, which could not be applied sensibly to a blanket-covered bowl. (D) is incorrect because the blanket-covered bowl in question could not be called a narrative.

48) **⇒** C

Choice (C) is correct because, before the crater is compared to a blanket-covered bowl, the author says, “the impact crater has left subtle clues of its existence on the surface.” Thus, the blanket-covered bowl is an example of the “subtle clues” that helped scientists identify the crater. (A) is incorrect because the blanket mimics rocks and sediment, not ice. (B) is incorrect because the blanket-covered bowl models the geography of the the crater, not the object that formed it. (D) is incorrect because neither the professor nor the passage’s author recommends that readers create the model.

49) **⇒** C

Choice (C) is correct because the surface feature is later described (lines 49 – 50) as water sources

in a “perfect semi-circular structure” (i.e., an arc). Because the water is in “sink holes,” (is sunk into the ground), the structures could be thought of as natural wells. (A) is incorrect because there is no mention in the passage of connections among sink holes. (B) is incorrect because the term “necklace” refers to the “perfect arc,” not to jewel-like sparkling water; the water deep in the sink holes cannot be expected to sparkle in the sunlight. (D) is incorrect because a smooth ring of raised land does not fit the analogy of “a necklace of sink holes.”

50) **⇒** C

Choice (C) is correct; it describes the figurative “necklace” as cenotes (wells) occurring in a natural arc due to the asteroid’s impact. Choice (A) is incorrect because it does not describe the sinkholes, but rather part of the discovery process. (B) and (D) are incorrect because they refer to aspects of the research other than geological evidence.

51) **⇒** C

In lines 72 – 76, Pope states that satellite “maps of the region’s wetlands...identified zones of groundwater discharge that correlate with the crater’s structure.” Thus, satellite images of underground water flow (“groundwater discharge”) supported the Chicxulub hypothesis, making choice (C) correct. (A) is incorrect because celestial orbits are not mentioned in the passage. (B) is incorrect because the quantity of wetlands is not linked to the Chicxulub hypothesis. Choice (D) is incorrect because soil composition is not mentioned.

52) **⇒** A

Because the diagram illustrates that some natural event produced layers of “impact debris” and “iron asteroid particles,” we can infer that it supports the hypothesis that a large celestial object struck the Earth at the end of the Cretaceous period, making (A) correct. (B) is incorrect because the diagram makes no mention of new dinosaur fossil discoveries. (C) and (D) are incorrect because neither of these shortcomings are relevant enough to disprove or challenge the Chicxulub hypothesis.

## SAT Practice Test 1: Answers &amp; Explanations

## Writing and Language Test



1. (A)	5. (D)	9. (C)	13. (C)	17. (C)	21. (D)	25. (C)	29. (B)	33. (C)	37. (A)	41. (B)
2. (C)	6. (D)	10. (A)	14. (D)	18. (B)	22. (C)	26. (D)	30. (D)	34. (D)	38. (D)	42. (B)
3. (D)	7. (D)	11. (A)	15. (A)	19. (A)	23. (A)	27. (A)	31. (A)	35. (C)	39. (D)	43. (D)
4. (B)	8. (C)	12. (B)	16. (C)	20. (C)	24. (A)	28. (D)	32. (B)	36. (A)	40. (A)	44. (A)

1) **⇒** A

The sentence is discussing a "construction occupation." Carpentry is an occupation, so the correct answer must be (A). The other choices are incorrect because they equate "a carpenter" or "carpenters" to an occupation, which is illogical.

2) **⇒** C

The second sentence of the passage states, "carpenters participate in all phases of building construction," which means a carpenter must possess many skills. Using this information, we can infer that the most appropriate choice is (C) because "versatile" can mean "multipurpose," or possessing many skills. (A) is incorrect because a person, not an occupation, can be resourceful. (B) is inappropriate because describing something or someone as "handy" is too colloquial for a passage that otherwise maintains an academic and informative tone. (D) can be eliminated because "multifaceted" means layered or complex, which is not as accurate as choice (C).

3) **⇒** D

The clauses, "Some insulate office buildings," and "others install drywall or kitchen cabinets in homes," are both independent clauses; in other words, they could stand alone as complete sentences. If two independent clauses appear in the same sentence, they must be separated using a comma and a coordinating conjunction or a semicolon. (D) uses a semicolon to connect the two clauses, and is therefore the correct choice. (A) is incorrect because beginning a clause with "while" makes it a subordinate clause, which cannot be separated from an independent clause using a semicolon. We can eliminate choice (B) because an em dash cannot be used to separate two independent clauses, and (C) is incorrect because the conjunction "or" implies that only one of two choices can be true or selected, which is not the

case with the sentence at 3.

4) **⇒** B

The phrase "from building highways to framing doors" is a non-essential propositional phrase describing the types of construction that carpenters may undertake. Generally, non-essential phrases are separated from the rest of a sentence using a pair of commas, parentheses, or em dashes. The only choice that does so is choice (B), which separates the phrase from the rest of the sentence with commas. The other choices are incorrect because they do not separate the phrase properly.

5) **⇒** D

The transition word at 5 must accurately convey the relationship between the physically demanding work environments of carpenters and the high rates of injury and illness among carpenters. (D) is the correct choice because it clearly illustrates that the high rates of carpentry-related illness and injury result from the difficulty working conditions. (A) can be eliminated because the phrase "In fact" implies that the claim that follows it might be surprising based on previous information, which is not the case here. (B) is incorrect because "However" indicates contrast, which does not fit the context, and (C) is wrong because "Ultimately" generally signifies that what follows concludes or summarizes a main idea of a passage.

6) **⇒** D

The graph reveals that the median number of days that truck drivers and carpenters spend recuperating from injuries or illnesses is 8 days per year, more days than any other profession listed in the table. The only choice that accurately conveys this information is (D). Because the y-axis of the graph displays number of days, not how much more likely someone in a certain profession is to become sick or injured, (A) is incorrect. (B) can be

eliminated because truck drivers miss as many days as carpenters due to injury or illness, so the claim that carpenters miss “more workdays...than any other profession” is inaccurate. (C) is incorrect because it takes the focus of the passage away from carpenters by discussing cooks and cashiers instead.

7) **➡ D**

Because the author wants to explain what type of diploma most carpenters earn (high school diplomas), and because “diplomas” must be plural to correspond with the plural subject of the sentence, “carpenters,” the correct choice is (D). (A) is incorrect because it is singular; “a... diploma” does not agree in number with the plural noun “carpenters.” (B) and (C) are both incorrect because they do not provide a sufficient amount of information; there are many types of diplomas, so the correct choice must explain what type of diploma most carpenters earn before attending trade school.

8) **➡ C**

Choice (C) is the clearest and most concise option because it is phrased using the active voice, and it conveys the idea that the carpenter is the one who finishes the apprenticeship. (A) is incorrect because it is unnecessarily wordy. (B) can be eliminated because it relies on the passive voice (“an apprenticeship is finished by the carpenter”) to convey an idea that can easily be explained using the active voice (“the carpenter finishes an apprenticeship”). (D) is incorrect because it does not make clear who finishes the apprenticeship.

9) **➡ C**

The focus of paragraph 4 is that carpenters can advance their careers by becoming independent contractors or general construction supervisors. The only choice that focuses on carpenters advancing their careers is (C), making it the most appropriate answer. Other choices do not focus on opportunities for career advancement.

10) **➡ A**

The subject of the sentence is the Bureau of Labor Statistics, which is a singular noun. The nearest verb in the paragraph (predicts) is in the present tense and refers to the BLS. Thus, we can conclude that the correct form of the verb is present tense, third-person singular (projects), making (A) the correct choice. (B) is incorrect because “project” does not correspond with third-person singular

nouns. (C) and (D) can be eliminated because they are in incorrect tenses.

11) **➡ A**

To determine the correct answer, we must determine the subject of the sentence. We can reasonably infer that the subject of the previous sentence (The Bureau of Labor Statistics) is the subject of the sentence at 11. Because “The Bureau” is singular, “it” is the appropriate pronoun, making (A) the correct choice. (B) and (D) are incorrect because they contain plural pronouns, which cannot accurately refer to “The Bureau,” and (C) is incorrect because “this” is a demonstrative pronoun that serves to “point” to a particular preceding noun or concept, which is inaccurate here.

12) **➡ A**

Celestial bodies such as the Sun and Moon appear to humans in regular cycles of days and nights. Thus, their motions appear to be cyclical, making (A) the correct choice. (B) is incorrect because cynical means skeptical or distrustful. (C) can be eliminated because seismic relates to earthquakes or, more generally, vibrations of the earth’s surface, and (D) is inappropriate because sinister refers to something disturbing or evil.

13) **➡ C**

Of the choices at 13, (C) is the most concise. It does not contain any redundancies or ambiguous pronouns and is therefore the correct answer. (A) is incorrect because “everyday life” is assumed to be “normal,” making choice (A) redundant. We can eliminate (B) because the sentence describes “ancient civilizations,” which logically cannot describe “your life.” (D) is incorrect because the phrase “how people normally lived” is a less concise way of saying “daily life.”

14) **➡ D**

A “harbinger” is a sign or indication of things to come. If religious authorities used astronomical event as harbingers, we can infer that they interpreted visible astronomical events in order to make predictions. Thus, (D) is the correct choice. The other choices do not make sense in the context of the sentence.

15) **➡ A**

The phrase “and the most puzzling” provides nonessential information, which must be set apart from the rest of the sentence using a pair of

commas, em dashes, or parentheses. The correct choice is (A) because it is the only choice that uses a pair of the aforementioned punctuation to separate the interjection from the rest of the sentence. (B) and (D) fail to punctuate the end of the interjection, and (C) incorrectly uses a semicolon, which should only be used to separate two independent clauses.

16) **➡ C**

Generally, using the active voice (placing the subject before the action it performs) conveys information more effectively than using the passive voice (placing the subject after the verb or omitting the subject altogether). Choice (A) can be eliminated because it does not say who recovered artifacts (omitting the subject). (B) and (D) are incorrect because saying that something was found *and* recovered is redundant. (C) is the correct answer because it uses the active voice, and it is concise.

17) **➡ C**

Sentence 5 indicates that the fragments of the recovered device were too corroded to be deciphered. It naturally would follow from this that the device remained an "archeological curiosity" for a half century. Because the information in sentence 5 sets up the context for the information in sentence 3, (C) is the answer. (A) is incorrect because the sentence as it is now placed breaks up the logical flow about where the device was found and what it was named. (B) is incorrect because it breaks up the chronological order from discovery, to a half-century of being a mystery, to becoming understood with x-ray technology. Finally, (D) is incorrect because the information in sentence 6 logically comes after the information in sentence 3; sentence 6 indicates why researchers can now "decode" the device.

18) **➡ B**

This question requires one to determine the relationship between the first two clauses of the paragraph. The second clause elaborates on the information of the first clause by describing what specific features remained unclear. Thus, we can eliminate (A) because "whereas" implies contrast, not elaboration. The use of a colon in choice (B) shows that the second clause defines, describes, or elaborates on the first clause, making (B) the correct choice. A comma cannot be used to combine two independent clauses in a single

sentence unless the comma is followed by a coordinating conjunction, making (C) incorrect. (D) can be eliminated because the second clause is an elaboration on, not a contrast to, the first clause.

19) **➡ A**

Sentence 1 of paragraph 3 describes the unclear inscriptions and obscure inner working of the mechanism uncovered in the 1970s, and sentence 2 jumps to the year 2006, when more was discovered about the mysterious mechanism. Thus, we can infer that the added sentence should be placed after sentence 1 because it explains that "researchers chose to ignore the device" for decades until more information about it could be gathered in 2006.

20) **➡ C**

The underlined portion at 20 modifies the adjective "intricate." Adjectives must be modified, or described, using an adverb. Most adverbs are easily identifiable because they end in "-ly." Thus, (C) is the correct answer because it contains the adverb "incredibly," which makes sense both grammatically and when placed in the context of the sentence. All other choices contain an adjective rather than an adverb, making them grammatically incorrect.

21) **➡ D**

The verb that precedes the underlined portion at 21 is the past tense verb "was," and the verb that comes immediately after the underlined portion at 21 is the past tense verb "accommodated." Moreover, using the simple past tense makes sense in the context of the sentence. The Antikythera Mechanism is no longer fully intact, so the author must be referring to how the mechanism looked when it was intact in the past. Using these clues, we can infer that the correct answer is (D). Choices (A), (B), and (C) are incorrect because they each break the simple past tense pattern established by "was" and "accommodated."

22) **➡ C**

The correct choice is (C) because it uses the correct relative pronoun (which) to add additional information about the seven hands. (A) is incorrect because two independent clauses connected by a comma must include a conjunction, such as "and." (B) is incorrect because semicolons can only connect independent clauses, and "marking" begins a phrase. (D) is incorrect because using the

restrictive pronoun “that” might confuse readers. If the seven hands are “the ones that marked,” the reader is left wondering if there were additional hands that marked other things.

23) **⇒** A

The correct answer is (A) because to underscore is to highlight or emphasize. Thus, underscore makes sense in context because sinister (evil-sounding) strings would logically serve to highlight a villain’s speech. (B) and (C) are both incorrect because undermine and undercut both mean to weaken, which is the opposite of the intended meaning. To understand is to comprehend or recognize, which does not make sense in context, so (D) is incorrect.

24) **⇒** A

The information provided in the second sentence elaborates on the information in the first sentence, so the relationship is one of cause and effect. (A) nicely illustrates this cause-effect relationship by using “so.” (B) is incorrect because “however” indicates a contrast or conflict with the information that was previously given, which is not the case here. (C) is incorrect because it is a less direct way of saying what (A) says succinctly. (D) is incorrect for the same reason: it uses too many words to indicate a relationship of logical consequence.

25) **⇒** C

The pronoun at 25 refers to the subject of the sentence, “an audience.” Although an audience is made up of many individuals, the word “audience” itself is singular. Thus, the singular pronoun “it” is the most appropriate pronoun, making (C) the correct answer. (A) is incorrect because “they” is plural whereas “an audience” is singular. (B) can be eliminated because “a person” cannot accurately stand in for an audience (a group of people), and (D) is incorrect because “someone” refers to a particular individual whereas an audience is a group of people.

26) **⇒** D

The underlined portion at 26 gives Richard Wagner’s title (German composer), which should not be followed by a comma. The title serves as an adjective, which should not be separated from the noun it precedes and modifies. Likewise, a possessive noun (Wagner’s) should not be separated from the noun it describes (*The Ring Cycle*) with a comma, making (D) the only appropriate choice. Other choices use one or more

commas to inappropriately separate Richard Wagner from his title or his work.

27) **⇒** A

The phrase “Composed over the course of 26 years” does not require any additional information to be comprehensible or grammatically correct, so (A) is the most concise, and therefore correct, answer. Other choices add unnecessary participles to the phrase, making the phrase more convoluted and wordy.

28) **⇒** D

The correct answer should accurately convey the relationship between the plot and the three generations in which it takes place. (D) is the best choice because the verb “to span” suggests that something begins and ends within a certain period of time. Thus, to claim that the plot *spans* three generations is the most appropriate way of saying, “the plot of *takes place* over three generations.” (A) is incorrect because logically, a plot can include events over three generations, but it cannot “include” the generations themselves. (B) is incorrect because “to traverse” means to cross or travel, which is not close in meaning to “take place.” (C) can be eliminated because “enclose” connotes confining something, which is illogical when discussing plots.

29) **⇒** B

The correct choice is (B) because it serves as an appositive that summarizes the same information as all the other choices using fewer words and without redundancies. (A) contains a redundancy, as ruler and leader mean the same thing. (C) and (D) both unnecessarily turn the appositive phrase “ruler of the gods” into a relative clause, making the choices needlessly wordy.

30) **⇒** D

Choice (A) is incorrect because the clause “many of them have leitmotifs” is an independent clause, so it cannot be separated from the preceding independent clause by just a comma. The correct answer must be a relative pronoun: which, who, or whom. “Which” is used to refer to things, and “who” and “whom” refer to people. Since the pronoun refers to “a huge cast of characters” (people), we can infer that the answer must be (C) or (D). The pronoun follows the preposition “of,” so the pronoun must be the object of a preposition. Thus, the answer must be (D) because “whom” is the objective case form of “who.”



31) **⇒ A**

Choice (A) is correct because it prepares for the claim that Wotan's leitmotif changes based on how he is feeling. (B) is true based on the information in the passage, but it can be eliminated because it is too general to clearly relate to the rest of the paragraph. (C) is incorrect because the rest of the paragraph discusses Wotan's leitmotif, not the relationship between minor characters and leitmotifs. (D) can be eliminated because the paragraph discusses the relationship between characters' emotions and their leitmotifs, but it does not mention instrumentation.

32) **⇒ B**

This question requires you to recognize the relationship between the ideas that "leitmotifs provide musical cues" and that they "add emotional weight to" the opera. Both ideas focus on the ways leitmotifs help an audience understand the opera, with the second idea simply adding to the discussion. Thus, (B) is the most appropriate answer. Although the two sentences discuss the same topic, the second idea is not a consequence or result of the first idea, so (A) is incorrect. (C) can be eliminated because the two ideas do not contrast with or contradict each other, making "Conversely" inappropriate. (D) is incorrect because the second idea, that leitmotifs "add emotional weight to" the opera, should not come as a surprise or cause confusion based on the first idea, as implied by the adverb "Quizzically."

33) **⇒ C**

As written, the paragraph inappropriately concludes by offering specific information about the use of leitmotifs in action and adventure films, information that demands further elaboration. (B) is incorrect because, like (A), it includes specific information that requires elaboration, making it an inappropriate conclusion. (C) is correct because it supports the information in the first part of the sentence—that leitmotifs have survived for well over a century. (C) provides a statement that succinctly summarizes the paragraph as well as the entire passage. Finally, (D) is incorrect because, like (A) and (B), it does not include information that conveys the general significance of leitmotifs as stated in the first part of the sentence.

34) **⇒ D**

Choice (A) is incorrect because a semicolon separates two independent clauses, and the phrase

"their shape" is not an independent clause, making the use of a semicolon grammatically incorrect. (B) is incorrect because ending the statement with an exclamation point breaks the tone of the passage, which is one of academic neutrality. (C) is incorrect because parentheses are generally used to set aside nonessential interjections; because the phrase "their shape" adds relevant and essential information to the sentence, it should not be set aside in parentheses. The correct choice is (D) because the em dash can separate a description (a common feature) from what it describes (their shape).

35) **⇒ C**

The paragraph notes that although no two heavenly bodies are alike, they all share the same shape. The information in the sentence elaborates on the information provided in sentence 3, and should therefore go after it. (C) is the correct choice. (A) is incorrect because sentence 1 only states that the universe has produced a large number of stars and planets. This information is not logically connected to the added sentence. Likewise, (B) only includes a statement that there are hundreds of billions of stars and planets in the Milky Way. At this point, the paragraph has not yet mentioned anything about the spherical shape of stars and planets. Finally, (D) is incorrect because sentence 4 naturally concludes the information presented in the paragraph, and the sentence under consideration should occur before the end of the paragraph.

36) **⇒ A**

The correct choice will convey the idea that gravity pulls particles toward a nebula. The verb closest in meaning to "pull toward" is "draw," because one meaning of to draw something is to pull it in a specific direction. (B) is incorrect because to captivate is to interest, which, in the context of nebulae formation, is unrelated to "pull toward." To evoke is to bring something to mind, which cannot be applied to nebulae, making (C) incorrect. Although to lure someone or something means to attract or draw, luring is a conscious act performed by an individual. Because nebulae cannot consciously do anything, choice (D) is incorrect.

37) **⇒ A**

All the choices mean approximately the same thing: to group together. However, only (A) is

accurate based on the context in which the word is used. Inanimate objects (particles in this case) can "cluster" because clustering is not necessarily a conscious action. The other choices are incorrect because they describe conscious acts.

38) **➡ D**

Choice (D) is correct because one-syllable comparative modifiers such as "fast" take "-er" and "-est" endings. They do not use "more." Choice (A) is incorrect because it uses both "more" and an "-er" ending, which is redundant. (B) is incorrect because "rapid," a two-syllable word, does not have an "-er" form. The correct form is "more rapidly." (C) is incorrect because, like (A), it places "more" with "fast."

*NOTE: the modifier "faster" may be used as an adjective or an adverb. However, most adverbs will have an "-ly" ending.*

39) **➡ D**

Choice (D) is correct because the present tense is appropriate to describe an ongoing process. There are also present-tense verbs before and after question 39, meaning the present tense is used consistently in the paragraph. (A) is incorrect because it is in the present perfect tense, which breaks the pattern established by the surrounding verbs "continues" and "becomes." (B) can be eliminated because "acquiring" is not a verb at all: words ending in "-ing" function as adjectives or nouns, depending on context. (C) is incorrect because "acquired" is in the past tense, which is inconsistent with the present-tense verbs "continues" and "becomes."

40) **➡ A**

The underlined portion at 40 is showing possession, or ownership, over the phrase "gravitational field." Thus, the correct choice is (A) because "its" is the possessive form of the pronoun "it." (B) is incorrect because "it's" is a contracted form of "it is." (C) can be eliminated because, much like the possessive pronouns "his" or "hers," the possessive pronoun "its" does not need an apostrophe. And (D) is incorrect because "it is" does not make sense in the context of the sentence.

41) **➡ B**

Choice (B) is correct because it is both concise and grammatically correct. We can eliminate (A) because the inclusion of the participle "being" muddies the meaning of the sentence while making it less concise. (C) is incorrect because the

use of the reflexive pronoun "itself" adds nothing of value to the sentence and implies a conscious act. Choice (D) makes the second clause of the sentence into an independent clause, which makes the sentence grammatically incorrect; a comma alone cannot separate two independent clauses.

42) **➡ B**

Choice (A) can be eliminated; although it is grammatically correct, it uses unnecessarily convoluted phrasing to get its point across. Phrases such as "acquire a sufficient amount of mass" and "the process of fusion" can be made less wordy without any loss of meaning. (B) is correct because it conveys the same information as (A) using fewer words. (C) is incorrect because it moves the subject of the clause (gas giants) to the middle of the sentence, muddying the meaning of the sentence. Like (A), (D) is incorrect because of wordiness.

43) **➡ D**

The information in the second clause elaborates on the information on the first clause. Choices (A), (B), and (C) are incorrect because they include words that imply that the second clause is an effect of or a contrast to the previous clause, which is incorrect. Only choice (D) appropriately separates the two clauses by using a semicolon, which suggests that the two ideas are closely related without explicitly illustrating the nature of the relationship.

44) **➡ A**

The last paragraph discusses of the role of gravity in the formation of spheres, with the last sentence explaining why only some celestial objects are spherical. Thus, it makes sense that the final sentence will elaborate on this concept, so (A) is the correct answer. (B) is incorrect because it introduces a topic that is unrelated to the discussion of gravity, the main focus of the paragraph. (C) is incorrect because it introduces a law of gravity that would require further elaboration. Finally, (D) is incorrect because it abruptly transitions to a general claim about our knowledge of gravity whereas the paragraph is focused on how gravity shapes planets into spheres, and why comets and asteroids are exceptions to this rule.

## Math Test



## No Calculator Portion

1. (D)	7. (A)	13. (A)	18. $\frac{7}{4}$
2. (B)	8. (D)	14. (A)	
3. (A)	9. (D)	15. (C)	19. 10
4. (D)	10. (D)	16. 2	20. 2
5. (B)	11. (B)	17. 16	
6. (C)	12. (C)		



## Calculator Portion

1. (C)	7. (B)	13. (D)	19. (B)	25. (C)	31. 3	36. $\frac{1}{6}$
2. (A)	8. (D)	14. (A)	20. (A)	26. (C)	32. 16.7	
3. (C)	9. (C)	15. (A)	21. (A)	27. (D)	33. 1.25	37. 133
4. (C)	10. (C)	16. (D)	22. (B)	28. (A)		38. 90.9
5. (A)	11. (C)	17. (A)	23. (C)	29. (D)	34. $0.2$ or $\frac{1}{5}$	
6. (A)	12. (A)	18. (C)	24. (D)	30. (C)	35. 115	

## No Calculator Portion

 1) **⇒** D

Jenny's earnings can be modeled as a linear function, dependent on hourly wage, time worked, and tips. Hourly wage is set at \$8 per hour, and tips are not dependent on hours worked; the independent variable is hours worked. This relationship is modeled as the equation  $65 = (8)t + t$ .

 2) **⇒** B

To solve the system of equations for  $x$ , multiply the second equation by 10:

$$10(x + y) = 10(60)$$

$$10x + 10y = 600$$

Subtracting this equation from the first equation gives the following equation:  $5x = 100$

The amount of time,  $x$ , spent running is 20 minutes.

 3) **⇒** A

Taking the square of both sides of the equation gives:

$$(\sqrt{13-x})^2 = (x-1)^2 \rightarrow 13-x = x^2-2x+1$$

Move all terms to one side of the equation, setting them equal to zero:  $x^2-x-12=0$

$$\text{Factor: } (x-4)(x+3)=0$$

$$x=4, -3$$

Testing these solutions in the original expression

shows that  $x = -3$  is not a viable solution.

 4) **⇒** D

The answer choices describe the number of baseballs that can be purchased. Solve the inequality:

$$185 + 4b < 1000 \rightarrow 4b < 815 \rightarrow b < 203.75$$

The inequality states that the number of baseballs that can be purchased is 203.75. Since baseballs cannot be purchased in parts, the maximum number of baseballs that can be purchased is 203. The only choice consistent with this result is (D).

 5) **⇒** B

The line  $y = 2$  is a horizontal line, and line  $x = 2$  is a vertical line, so they are perpendicular to each other.

 6) **⇒** C

Moving  $y$  to the other side of the first equation gives:

$$x^2 - 1 = -y \rightarrow -1(1 - x^2) = -1(y) \rightarrow 1 - x^2 = y$$

Similarly, the second equation gives:  $y = x + 1$   
Set these two equations equal to each other and solve:

$$1 - x^2 = x + 1 \rightarrow x^2 + x = 0 \rightarrow x(x + 1) = 0$$

$$x = 0, -1$$

$$x = 0, y = 1; x = -1, y = 0.$$

The only choice that includes both of these  $x$  values as solutions is (C).

 7) **⇒** A

The range of a set is the difference between the smallest and largest values. Since no two values of the set are the same, removing the smallest value

of the set will alter the difference between the smallest and largest values.

- 8) **⇒ D**  
 The sale price is the original price minus 17% of the original price; 17% can also be written, in decimal form, as  $0.17m$ . The final price is modeled in choice (D).
- 9) **⇒ D**  
 Determine the intercepts by setting the function equal to zero:  
 $(-x + 3)(x - 5) = 0$   
 $x = 3, 5$   
 If the function is written in the form  $f(x) = ax^2 + bx + c$ ,  $a$  is a negative number. This indicates that the parabola opens downward.
- 10) **⇒ D**  
 The respective lengths of the pieces can be written as follows:  
 1st piece:  $x$   
 2nd piece:  $x + 5$   
 3rd piece:  $2(x + 5)$   
 $x + (x + 5) + 2(x + 5) = 79$
- 11) **⇒ B**  
 The horizontal components of the heavy lines sum to  $y$  and the vertical components of the same line sum to  $x$ . The total length is the sum of  $x$  and  $y$ .
- 12) **⇒ C**  
 The annual increase is 4.9%, so the amount at the end of each year can be determined by multiplying the previous year's production by a factor of 1.049. This factor must be raised to an exponent equal to the number of years of increase.
- 13) **⇒ A**  
 The range of the function can be expressed in the following inequality:  
 $13 \leq x^2 + 4 \leq 29$   
 $9 \leq x^2 \leq 25$   
 Since we are only looking for positive numbers in the domain, we take the square root of all values in the inequality but consider only positive roots:  
 $3 \leq x \leq 5$
- 14) **⇒ A**  
 To determine the region bounded by the system of inequalities, graph the two inequalities as lines. For ease of graphing, convert the inequalities to

equations in slope-intercept form:

$$y = 2x - 3$$

$$x = \frac{1}{3}y - \frac{4}{3}$$

Examine the inequalities to determine if the regions are below or above the lines. The first inequality opens to the right, so the region is below the line; the second opens to the left, so the region is above the line. The region bounded by the system is restricted to quadrants I and IV.

- 15) **⇒ C**  
 To simplify this expression, begin by rationalizing the denominator:

$$\frac{2}{5+i} \cdot \frac{(5-i)}{(5-i)} = \frac{2(5-i)}{25-i^2}$$

Making use of the identity  $i^2 = -1$ :

$$\frac{2(5-i)}{25-(-1)} = \frac{2(5-i)}{26}$$

$$= \frac{5-i}{13}$$

- 16) **⇒ 2**

Since  $h(1) = -\frac{2}{3}$ ,

$$h(2) = \frac{3\left(-\frac{2}{3}\right) + 4}{3} = \frac{2}{3},$$

and

$$h(3) = \frac{3\left(\frac{2}{3}\right) + 4}{3} = \frac{6}{3} = 2$$

- 17) **⇒ 16**

Factor the second equation:

$$x^2 + 3xy + 2y^2 = 40$$

$$(x + y)(x + 2y) = 40$$

According to the first equation, we can substitute 5 for  $(x + y)$ .

$$5(x + 2y) = 40$$

$$x + 2y = 8$$

Multiply both sides of the equation by two:

$$2x + 4y = 16$$

- 18) **⇒  $\frac{7}{4}$**

Set the two equations equal to each other and solve:

$$11x + 3x^2 = 11x^2 - 3x$$

$$14x - 8x^2 = 0 \rightarrow x(14 - 8x) = 0$$

$$x = 0 \text{ and } (14 - 8x) = 0$$

Since  $x > 0$ ,  $x$  cannot be equal to zero. To find the

second solution:

$$14 - 8x = 0 \rightarrow 8x = 14$$

$$x = \frac{14}{8} = \frac{7}{4}$$

- 19) **⇒** 10

Simplify the expression:

$$\frac{x-3}{2} = \frac{1}{x-4}$$

$$(x-3)(x-4) = 2$$

$$x^2 - 7x + 12 = 2$$

$$x^2 - 7x + 10 = 0$$

Factor and solve:

$$(x-5)(x-2) = 0$$

$$x = 2, 5$$

The product of the two solutions is 10.

- 20) **⇒** 2

$$\begin{array}{r} x^3 - 5x^2 + 3x + 1 \\ x+2 \overline{) x^3 - 3x^2 - 7x^2 + 7x + 2} \\ \underline{-(x^3 + 2x^2)} \phantom{+ 2} \\ -5x^2 - 7x^2 \phantom{+ 2} \\ \underline{-(-5x^2 - 10x^2)} \phantom{+ 2} \\ 3x^2 + 7x \phantom{+ 2} \\ \underline{-(3x^2 + 6x)} \phantom{+ 2} \\ x + 2 \phantom{+ 2} \\ \underline{-(x + 2)} \\ 0 \end{array}$$

$$B = -5$$

$$C = 3$$

$$|B + C| = |-5 + 3|$$

$$= |-2| = 2$$

### Calculator Portion

- 1) **⇒** C

Market Support is 22% of the budget, and Engineering is 18%. The combined amount is 40% of the total budget:

$$(0.4)(60,000,000) = 24,000,000$$

- 2) **⇒** A

To apply a ratio, note that oxygen content falls

4% (from 18% to 14%) as elevation increases 2500 feet (from 2000 feet to 4500 feet). The variable  $x$  is the change in oxygen content per 1000 feet of elevation:

$$\frac{4}{2500} = \frac{x}{1000}$$

$$x = \frac{4000}{2500}$$

$$x = 1.6$$

The oxygen content falls 1.6% per 1000 feet of elevation.

- 3) **⇒** C

Solve the inequality:

$$3x - 5 > 5x - 9$$

$$4 > 2x$$

$$x < 2$$

- 4) **⇒** C

Set the variable  $x$  as the number of nickels in the jar, and  $y$  as the number of dimes. There are 1,130 coins total, valued at \$100:

$$x + y = 1130 \rightarrow x = 1130 - y$$

$$0.05x + 0.1y = 100$$

Use substitution to solve for  $y$ :

$$0.05(1130 - y) + 0.1y = 100$$

$$56.5 - 0.05y + 0.1y = 100$$

$$0.05y = 43.5$$

$$y = 870$$

There are 870 dimes in the jar.

- 5) **⇒** A

Examine Roman numeral I. If  $x$  and  $y$  are equal,  $\frac{3x}{y}$  is reduced to 3, which is a prime integer. There exist, however, values of  $x$  and  $y$  which are not equal to each other that will produce a prime integer greater than 2; for example, the values  $x = 14$ ,  $y = 6$  also satisfy the requirement. Roman numeral I is not always true, thus choices (B) and (D) are eliminated. Roman numeral II is not always true, as demonstrated above. Thus, the correct choice is (A).

- 6) **⇒** A

On her way to Florida, Cynthia spends  $1.45x$  dollars to dock her boat in North Carolina and

2.50x dollars to dock her boat in New Jersey. She pays \$300 per night to dock for three nights in Massachusetts, a total of \$900. To model total docking fees, the amount spent in North Carolina and New Jersey are doubled to account for the trip back to Florida:

$$2(1.45x) + 2(2.50x) + 900$$

$$2x(1.45 + 2.50) + 900$$

- 7) **➡ B**

The slope-intercept form of a line is  $y = mx + b$ . To calculate slope:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{(-1) - (-2)}{3 - (-5)}$$

$$m = \frac{1}{8}$$

To find the  $y$ -intercept, substitute  $x$  and  $y$  values of the point  $(-5, -2)$ :

$$y = \frac{1}{8}x + b$$

$$-2 = \frac{1}{8}(-5) + b$$

$$b = \frac{11}{8}$$

- 8) **➡ D**

Roast beef + Chicken divan + Linguine primavera = 36  
 Linguine primavera = 36 - Roast beef - Chicken divan  
 L.P. = 36 - (0.25)(36) - 17  
 L.P. = 36 - 9 - 17 = 10

- 9) **➡ C**

The following is a directly proportional relationship (also called "direct variation"), where  $x$  and  $y$  are variables and  $k$  is a constant:

Direct Variation:  $y = kx$ ,  $k = \frac{y}{x}$  ( $k$  is a constant.)

The following is an inversely proportional relationship (also called "inverse variation"), where  $x$  and  $y$  are variables and  $k$  is a constant:

Inverse Variation:  $xy = k$ ,  $y = \frac{k}{x}$  ( $k$  is a constant.)

Since  $k = \frac{(w)}{(y)} = \frac{(0.2)}{(0.5)} \neq \frac{(0.6)}{(1)}$ ,  $w$  and  $y$  are not

directly proportional and (A) is incorrect.

Since  $k = wz$ ;  $(0.2)(10) \neq (0.6)(30)$   $w$  and  $z$  are not inversely proportional, and (B) is incorrect.

Since  $k = xy$ ;  $6(0.5) = 3(1) = 3$ ,  $x$  and  $y$  are inversely proportional. Therefore, (C) is correct.

- 10) **➡ C**

Let the variable  $x$  be the original price of the shoes. The sale price is 30% off the original price, or 70% of the original price. The 5% sales tax is applied to the sale price:

$$(0.7x)(1.05) = 58.50$$

$$x = \frac{58.50}{(0.7)(1.05)}$$

$$x = 80$$

- 11) **➡ C**

There are 126 applicants, 9 successful applicants, and 117 non-successful applicants. The ratio of successful to unsuccessful applicants is:

$$\frac{\text{successful}}{\text{unsuccessful}} = \frac{9}{117} = \frac{1}{13}$$

- 12) **➡ A**

$P$  percent of 250 is 75; let  $p$  percent be represented by the variable  $p$ :

$$p(250) = 75$$

$$p = 0.3, \text{ or } 30\%$$

To find 75% of  $p$ :

$$(0.75)p = (0.75)(30) = 22.5$$

- 13) **➡ D**

Let the variable  $x$  represent the student's scores on the first and second exams. The sum of all scores divided by the number of scores is the average score, 93:

$$\frac{x + x + 94 + 85 + 90}{5} = 93$$

$$\frac{2x + 269}{5} = 93$$

$$2x = 196$$

$$x = 98$$

- 14) **➡ A**

Logan runs  $x$  miles per day, 6 days per week. To determine how many weeks he runs, note that he takes off a full week every three months:

$$\text{Weeks off} = 12 \text{ months} \times \frac{1 \text{ week}}{3 \text{ months}} = \frac{12}{3}$$

With 52 weeks in a year, the number of weeks that Logan runs is:

$$\text{Week on} = 52 - \frac{12}{3}$$

To model the total number of miles for the year, multiply the number of weeks on by six (running days per week) and miles per day ( $x$ ):

$$\left(52 - \frac{12}{3}\right)(6)x$$

- 15)
- ➡ A**

To find  $a$ , replace  $x$  with 1 and set the function equal to 2:

$$2 = a(1-2)^2 + 15$$

$$2 = a + 15$$

$$a = -13$$

- 16)
- ➡ D**

This question can be solved by graphing the line on the coordinate plane and comparing it to the positions of the two points. Algebraically, it can be solved by substituting the  $x$ -values into the equation of the line and comparing the  $y$ -values of points on the line to the  $y$ -values of the points given. Begin with the point (1, 2), which has  $x$ -coordinate 1:

$$3(1) + 4y = 7 \rightarrow 4y = 4 \rightarrow y = 1$$

At  $x = 1$ , the point on the line is (1, 1). The point (1, 2) is above the line.

The second point is (-1, 1). Substituting  $x = -1$  into the equation of the line:

$$3(-1) + 4y = 7 \rightarrow 4y = 10 \rightarrow y = \frac{10}{4} = \frac{5}{2}$$

At  $x = -1$ , the point on the line is (-1, 2.5). The point (-1, 1) is below the line.

- 17)
- ➡ A**

$$f(x) = 3x + 2$$

$$f(a+b) = 3(a+b) + 2$$

$$f(a+b) = 3a + 3b + 2$$

- 18)
- ➡ C**

The period 1990–1991 decreases 100 lessons. The period 1992–1993 decreases 150 lessons. Thus, the answer is (C).

- 19)
- ➡ B**

By year, the number of children taking swim lessons is: 200 in 1990, 100 in 1991, 400 in 1992, 250 in 1993, 350 in 1994, 550 in 1995. To find the average per year:

$$\frac{200 + 100 + 400 + 250 + 350 + 550}{6} = 308.3$$

This is closest to choice (B).

- 20)
- ➡ A**

The distance between two points on the coordinate plane is:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

The distance between the points (-3, 7) and (6, -5) is:

$$d = \sqrt{(6 - (-3))^2 + (-5 - 7)^2}$$

$$d = \sqrt{81 + 144} \rightarrow d = \sqrt{225} \rightarrow d = 15$$

- 21)
- ➡ A**

$$\text{If } k = -5, f(2+k) = f(-3) = 0.$$

$$\text{Since } f(2+k) = f(2-k) = 0, f(2 - (-5)) = f(7) = 0.$$

- 22)
- ➡ B**

The nightly rate is \$79.50 plus 7.2% of that rate.

Including tax, the nightly rate is written as  $(79.50)(1.072)$  dollars. Including the one-time fee, the cost of staying  $x$  nights is:  $(79.50)(1.072)x + 10.00$

In cents, the cost can be written as

$$1.072(7950x) + 1000$$

- 23)
- ➡ C**

The vehicles will meet when their combined distance equals the distance between the cities, 305 miles.

Set  $t$  as the time, in hours, that has passed since 2:00 pm; the distance traveled by the car is  $65t + 65$ , with the additional 65 miles accounting for the one hour head-start. The distance traveled by the truck is simply its speed, 55 miles per hour, multiplied by  $t$ . These distances sum to 305 miles:

$$(65t + 65) + 55t = 305$$

$$120t = 240$$

$$t = 2$$

The two cars pass each other two hours after 2:00 pm, at 4:00 pm.

- 24)
- ➡ D**

To determine the additional amount certain coworkers must pay as a result of other coworkers not contributing to the lunch, we require expressions for the amount paid if all coworkers contributed and the actual amount contributed only by those coworkers that participated. The first expression, the amount expected if all coworkers contributed, is the total cost divided by the total number of coworkers:  $\frac{b}{a}$

The actual amount paid is equivalent to the expression:  $\frac{b}{a-c}$

The difference between the expressions is the

additional amount that must be contributed by the coworkers that participated:

$$\frac{b}{a-c} - \frac{b}{a} = \frac{ba - b(a-c)}{a(a-c)}$$

$$= \frac{ba - ba + bc}{a(a-c)} = \frac{bc}{a(a-c)}$$

- 25) **⇒** C

The selling price is the cost price marked up 30%. Let the cost price be  $x$ :

$$(1.3)x = 39$$

$$x = 30$$

The employee price is 40% off, or 60% of the cost price:

$$\text{Employee price} = (30)(0.6) = 18$$

- 26) **⇒** C

$$\text{Average score} = \frac{\text{Sum of all scores}}{\text{Number of students}}$$

$$\text{Average score} = \frac{2(0) + 4(10) + 13(20) + 6(30)}{25} = \frac{480}{25}$$

$$= 19.2$$

- 27) **⇒** D

If the company uses Process A for seven days, the output is:

$$A(7) = 7^2 + 14 = 63 \text{ tons}$$

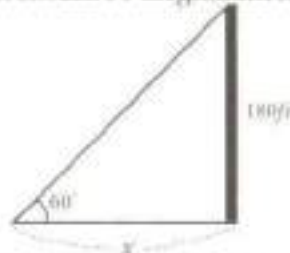
If the company uses Process B for seven days, the output is:

$$B(7) = 10(7) = 70 \text{ tons}$$

Maximum output is achieved with Process B and is 70 tons.

- 28) **⇒** A

The question should be diagrammed:



Note: Figure not drawn to scale.

The thick black line to the right represents the lighthouse, and  $x$  is the distance from the observer to the lighthouse. To calculate the distance to the lighthouse, use the trigonometric

identity:

$$\tan 60^\circ = \frac{\text{opposite side}}{\text{adjacent side}}$$

$$\tan 60^\circ = \frac{180}{x}$$

$$x = \frac{180}{\tan 60^\circ}$$

$$x = 104$$

- 29) **⇒** D

Rationalize the denominator:  $\frac{2i}{1+i} \cdot \frac{(1-i)}{(1-i)} = \frac{2i-2i^2}{1-i^2}$

Taking  $i^2 = -1$ ,

$$\frac{2i-2(-1)}{1-(-1)} = \frac{2i+2}{2} = i+1$$

- 30) **⇒** C

By looking at the 30-60-90 triangle,  $\sin 30^\circ = \frac{1}{2}$ .

Based on the unit circle, the function  $\sin \theta = y$ .

The angle between  $\frac{\pi}{2}$  and  $\frac{3\pi}{2}$  that corresponds to a point on the unit circle with  $y$ -value equal to  $\frac{1}{2}$  is  $30^\circ$  above the  $x$ -axis in quadrant II, or  $150^\circ$ . In radian measure, then,  $x = \frac{5\pi}{6}$ . Therefore,  $\frac{x}{2} = \frac{5\pi}{12}$ .

- 31) **⇒** 3

Convert the equation into the slope-intercept form,  $y = mx + b$ :

$$9x - 3y = 10 \rightarrow 3y = 9x - 10$$

$$y = 3x - \frac{10}{3}$$

The slope,  $m$ , of the line is 3.

- 32) **⇒** 16.7

Let  $x$  be the number of hours worked as a model, and  $y$  be the number of hours worked as a chef. Angel's total hours are 25:  $x + y = 25$

He works for \$50 per hour as a model and \$12.50 per hour as a chef, and makes a total of \$625 for the week:

$$50x + 12.5y = 625$$

Multiply both sides of the first equation by 50 and subtract the second equation from the multiplied form of the first equation:



$$\begin{array}{r} 50x + 50y = 1250 \\ -50x + 12.5y = 625 \\ \hline 37.5y = 625 \end{array}$$

$$\text{Solve for } y: y = \frac{625}{37.5} = 16.7$$

33)  $\Rightarrow$  1.25

Let  $b$  be the price of one candy bar and  $c$  be the price of one bag of chips.

$$2b + 2c = 4$$

$$3b + 2c = 4.75$$

Subtracting the first equation from the second gives:  
 $b = 0.75$

According to the first equation, the cost of one candy bar, in dollars, is

$$c = 2 - b$$

$$c = 1.25$$

34)  $\Rightarrow$  0.2 or  $\frac{1}{5}$

One way to answer this question is to count the number of two-digit numbers divisible by five and divide by the total number of two-digit numbers. We can also calculate the numbers divisible by five by noting that there are twenty such numbers between 1 and 100. Excluding the numbers 5 and 100, which are not included in the set, leaves 18 two-digit numbers divisible by five. As there are 90 two digit numbers in the set, the probability of picking a number divisible by 5 at random is:

$$P = \frac{18}{90} = \frac{1}{5}$$

35)  $\Rightarrow$  115

Aaron is able to complete one-eighth of the job in a single day, and Ben is able to complete one-twelfth of the job in a single day. Let  $x$  be the time in days it takes the two men, working together, to complete the job:

$$\frac{1}{8}x + \frac{1}{12}x = 1$$

$$\frac{5}{24}x = 1$$

$$x = \frac{24}{5}$$

To calculate the number of hours:

$$\frac{24}{5} \text{ days} \times \frac{24 \text{ hours}}{1 \text{ day}} = 115.2 \text{ hours}$$

Rounded to the nearest hour: 115 hours.

36)  $\Rightarrow$   $\frac{1}{6}$

The volume of a general cylinder is:  $V = bh$  where  $b$  is the area of the base of the cylinder. The

volume of a general cone is:  $V = \frac{1}{3}bh$

where  $b$  is the area of the base of the cone. A pyramid is a type of general cone that has a

polygonal base. The area of the base of this cylinder is the same as the area of the base of the

cone. The cylinder has a height twice the height of the pyramid:  $h_c = 2h_p$

The ratio of the volume of the pyramid to the volume of the cylinder is:

$$\frac{\text{Volume of pyramid}}{\text{Volume of cylinder}} = \frac{\frac{1}{3}bh_p}{bh_c} = \frac{\frac{1}{3}bh_p}{2bh_p} = \frac{1}{6}$$

37)  $\Rightarrow$  133

Two hours of marketing bring in five orders at \$30 each, for every two hours of marketing, Karen bills \$150. If  $x$  is the number of marketing hours needed to bill \$10,000, then

$$x = 2 \cdot \left( \frac{10,000}{150} \right)$$

$$x = 133.3$$

Rounded to the nearest hour: 133

38)  $\Rightarrow$  90.9

Each hour worked by the assistant costs \$15 in wages and \$25 to fill orders (five orders at \$5 each). Each hour worked by the assistant brings in \$150 in billings (five orders at \$30 each). The profit to the business per hour is:

$$\text{Profit by hour} = 150 - (15 + 25) = 110$$

To bill \$10,000 in a month:

$$\text{Hours worked} = \frac{10,000}{110} = 90.9$$

## Essay Test

### Sample Response 1: Score 1/1/2

*In this passage the author writes about the unfairness of the personality test. Also how people trying to answer the tests might say one thing because they think that the employers want them to, such as unique or orderly, or might say the other thing for the same reason. An example the author gives is "Imagine the thought processes of the nervous test-takers." Also if the candidates prefer juggling or volleyball.*

*I can tell that the author has strong opinions about these test because she uses word such as "highly unscientific" and "not terribly reliable." She states that some questions can be fun, for example magazines and social media questions that try and figure out the personality of the reader. The author is trying to state that the test can't determine the performance at a job or whether your good or bad. You could answer a question one way depending on your mood, or your culture. The author says that the tests are like a sorting hat. One hat can't tell you how your personality or how well you can work it all depends on the person and who he/she wants to be.*

#### Evaluation

##### Reading: 1

The response indicates that the student absorbed the main idea and some details of the text. The student does a good job of selecting quotes to demonstrate the author's "strong opinions." However, overall the student must work on demonstrating and understanding the author's claims and supporting details.

##### Analysis: 1

The student is on the right track when her or she ties together two examples of diction, "highly unscientific" and "not terribly reliable," and connects these to the author's "strong opinions." The student needs to keep moving toward analysis of the author's strategies, rather than simply summarizing the information or adding personal opinion.

##### Writing: 2

The writing includes clear and coherent topic sentences and a variety of sentence structures. The student's organization of ideas will likely become clearer when he or she includes more analysis. The student can raise his or her writing score by learning more vocabulary to sum up and discuss texts. Finally, the student should budget a few minutes at the end of the test session to check for sentence fragments and spelling errors.

### Sample Response 2: Score 4/4/4

*In "Misusing Personality Tests," Susanna Heckman makes a case against the use of personality assessments in hiring. She includes facts but mainly appeals to the reader's emotions and ethical standards. She does so by using rhetorical devices such as allusion, parody, and irony, to express her concerns that the tests are random and unfair.*

*Throughout the essay, the author identifies the human need to "sort and label" personalities. The allusion to the Sorting Hat in Harry Potter sets up an image that helps orient the reader to the idea of sorting and labeling people, since many people are familiar with the books and movies, and know that the hat put students into one of four "houses," which was like a family. But the comfortable idea of going into a roomful of people who are basically like you is then juxtaposed with the idea that personality tests claim to "pin down ... personality traits, laying them out for inspection like a butterfly in a glass case." That image is not so comfortable, because it makes the reader feel vulnerable. The simile appeals to the reader's emotions by putting in a little fear of the personality assessments.*

*Once establishing an emotional conflict for the reader, Ms. Heckman questions the concept of personality tests for serious purposes. She uses parody when she compares the supposedly scientific personality assessments to the kinds of fun quizzes that are online and in magazines, adding exclamation points for fake excitement. She also points out that even people who do not believe in astrology most*

likely know their own Zodiac “sign,” which shows that they have paid attention to the system of sorting people at some point in their lives. The author draws on common, everyday experiences that most people do not take seriously in order to persuade readers that they should not take the personality assessments seriously, either.

The author also appeals to ethos when she talks about how “baffling” the personality assessments can be. She speculates about the reasoning that people may go through as they try to answer the strange questions, first offering a long line of reasoning and then saying, “or vice-versa.” This juxtaposition shows how confusing and subjective the questions can be, which makes the reader feel a sense of injustice. This attitude only grows when the author points out that the assessments try to determine how honest someone is but ask questions that are impossible to answer honestly. This perception of unfairness persuades the reader to agree with the author when she concludes that the test interpretations may be “highly unscientific.”

After planting the idea in the reader’s mind that personality tests as offered now are not useful, the author points to “psychological research” to explain why any self-reported assessment will always have limitations. This knowledge increases the reader’s identification with the author when she says that it is “perplexing” that HR departments are using them. The author has waited to the end of the passage to report how public and private funds are supporting the personality-assessment industry. The author has already persuaded the reader on a personal level, but now the significance of the issue becomes clear. The reader may now agree with the author that the tests are not only useless and unfair, but in addition, a wasteful expense.

### Evaluation

#### Reading: 4

The response demonstrates that the student has an excellent understanding of the passage. The student uses quotations and paraphrases throughout, discussing what the author is claiming and how it connects to other information. For example the student writes in paragraph 3 that “Once establishing an emotional conflict for the reader, Ms. Heckman questions the concept of personality tests for serious purposes.”

#### Analysis: 4

The response comprises an insightful analysis of the passage. The student includes in-depth discussions of strategies employed by the author (“allusion, parody, and irony”) and describes how they ultimately persuade by appealing to the reader’s emotions and sense of fairness. The student also points that the author waits until the conclusion to mention the personality-assessment industry, and speculates that this strategy enhances the reader’s concern by lifting it from the personal to the public sphere. Overall, the student accomplished a thorough analysis.

#### Writing: 4

The student makes good use of transitional phrases to express connections between ideas fluidly (i.e., “This perception of unfairness persuades the reader to agree with the author when she concludes that...”). The response is well organized: the student discusses the strategies outlined in paragraph 1 in the body.

# SAT Practice Test 2: Answers & Explanations

## Reading Test



1. (D)	6. (C)	11. (D)	16. (C)	21. (B)	26. (D)	31. (D)	36. (B)	41. (D)	46. (A)	51. (D)
2. (B)	7. (C)	12. (D)	17. (B)	22. (D)	27. (B)	32. (A)	37. (D)	42. (B)	47. (C)	52. (D)
3. (C)	8. (A)	13. (A)	18. (A)	23. (C)	28. (B)	33. (B)	38. (A)	43. (B)	48. (A)	
4. (B)	9. (B)	14. (A)	19. (C)	24. (A)	29. (C)	34. (C)	39. (B)	44. (D)	49. (A)	
5. (D)	10. (B)	15. (C)	20. (B)	25. (C)	30. (A)	35. (D)	40. (B)	45. (A)	50. (A)	

1) **⇒** D

The word “operation” refers to the process of dipping the brush in the whitewash and painting the fence, which Tom repeats over and over, so (D) is correct. Choice (A), “venture,” does not refer to a process; it is a risky adventure or journey. Choice (B), “maneuver,” refers to a carefully executed series of movements; the word implies a level of skill that does not fit the context of painting the fence as well as “operation” and “process” do. Choice (C) is incorrect because Tom is not giving a performance for anyone by painting the fence; he is simply going about his work for the day.

2) **⇒** B

The author speaks of the “far-reaching continent” of fence that Tom is required to paint. The author also speaks of life being “hollow” and a “burden” for Tom. These are exaggerations meant to convey Tom’s child-like discouragement at having to paint such a large fence. (B) is correct because “hyperbole” refers to exaggerated speech or writing. (A) is incorrect because there is no evidence that Tom was tricked into painting the fence. In fact, the passage later reveals that Tom tricks another into painting the fence for him. (C) is incorrect because, although it is true that the job is simple and that Tom is negative, the answer choice implies a note of judgment; the author, in contrast, simply conveys Tom’s childish feelings, creating ironic humor as a result. (D) is incorrect because it is *too* hyperbolic; Tom’s attitude does not extend to thinking of himself as a hero.

3) **⇒** C

In lines 8–9, the author writes that life seems “hollow” to Tom and existence a “burden.” These

terms are meant to convey the depth of Tom’s discouragement at having to paint the fence by using hyperbole. Thus, (C) is correct. Choice (A) is incorrect because it does not establish Tom’s mood, instead making a general comment on the day appearing “bright” and “fresh.” Choice (B) is incorrect because it simply explains that Tom appeared with a brush and a bucket of whitewash, which does not convey Tom’s attitude toward painting the fence. Finally, while (D) does convey a slight sense of discouragement and weariness in Tom, the statement does not convey the depth of Tom’s discouragement.

4) **⇒** B

Paragraph 2 starts out by discussing Tom’s sorrow at having to paint the fence. Yet the paragraph transitions to a moment of “magnificent inspiration” that encourages Tom and brightens his mood. Thus, choice (B) is correct. (A) is incorrect because the paragraph does not mention Tom’s generosity, only that he has a plan that cheers him up. (C) is incorrect because paragraph 2 does not discuss Tom’s background or intelligence. (D) is incorrect because the paragraph describes Tom’s feelings but does not justify them.

5) **⇒** D

The statement in lines 37–39 indicates that Tom is fascinated with his painting task. Yet the reader understands that Tom is pretending: the reader knows that Tom does not want to paint the fence and that he was suddenly struck by an idea. Thus, (D) is correct. (A) and (B) are incorrect because one can infer that Tom’s motivation is neither artistic expression nor making a good impression on one of his peers. (C) is incorrect because the reader knows that moments before, Tom was

unenthusiastic about the task, and there is no indication that he has changed his mind.

- 6) **➡ C**  
Choice (C) is correct because Tom interests Ben by saying, "Does a boy get a chance to whitewash a fence every day?" (lines 61 – 62), implying that it is a rare opportunity. (A) is incorrect because Tom does not mention any other activities; rather, he pretends to focus all attention on whitewashing. (B) is incorrect because it is Ben who offers Tom an apple, not the other way around. (D) is incorrect because Tom does not mention swimming.
- 7) **➡ C**  
The correct choice is (C) because Tom speaks of Aunt Polly as an authority figure who is "awful particular," and that painting the fence "has got to be done very careful." He implies that Aunt Polly has privileged him by asking him to take on a task that only "one boy in a thousand, maybe two thousand," could do. (A) is incorrect because Tom does not blame Aunt Polly for depriving him of play time; he instead speaks of her with what appears to be reverence. (B) is incorrect because, while Tom pretends to be diligent for the sake of his ruse, he never suggests that Aunt Polly is lazy. (D) is incorrect because the opposite is true; Tom implies that Aunt Polly would not want Ben to help.
- 8) **➡ A**  
Tom's despondence changes when he has the idea to manipulate Ben into painting the fence for him. Thus, Tom is similar to a con man who wants to deceive Ben into thinking that whitewashing the fence is enjoyable and requires the talents of an expert, so (A) is correct. (B) is incorrect because a patron hires an artist to produce art, but in this case neither boy is paying the other to create anything for him; rather, Ben is "paying" Tom for the privilege of doing the work. (C) is incorrect because neither boy has authority over the other, and neither boy disapproves of the other. (D) is incorrect because Tom is not trying to find or catch Ben, and vice versa. Tom's principal aim is to get Ben to take over his chore.
- 9) **➡ B**  
Lines 97 – 99 discuss "the late steamer" and "the retired artist." Ben was *recently* "personating (impersonating) a steamboat," and the reader can

understand that Tom was pretending to be an artist, so (B) is correct. (A) and (C) are incorrect because neither refers to a past condition that ended. (D) is incorrect because it does not make sense to speak of "the late steamer" as deceased, since Ben is actively working on the fence.

- 10) **➡ B**  
Choice (B) is correct because the passage indicates that Ben is being playful when impersonating a steamboat, revealing that "his heart was light" as he committed to his impersonation. On the other hand, Tom's impersonation of an artist is designed to interest Ben in painting the fence through manipulation. (A) is incorrect because there is little indication that Ben's impersonation of a steamboat evinces any skill while Tom's impersonation of an artist is apparently convincing. (C) is incorrect because, while Ben's impersonation of a steamboat may be harmless, saying that Tom is hurting Ben by impersonating an artist is not entirely true. (D) is incorrect because there is no indication in the passage that Ben's impersonation offends Tom, and Tom is not offering artificial compliments to Ben.
- 11) **➡ B**  
Choice (B) is correct because to say that the public viewed the queen with "dazzled imagination" is to say that the public was not facing reality; the British people were choosing to believe a fantasy. Such a statement is a criticism of public opinion. (A) is incorrect because the author expresses subtle criticism, not admiration, throughout the passage. (C) is incorrect because the phrase "dazzled imagination" reflects criticism of the public's views, not outrage toward the Queen. (D) is incorrect because the phrase refers to public opinion, not specifically to public celebrations.
- 12) **➡ D**  
The answer is (D) because the author indicates that Queen Victoria's subjects seemed to picture her as approaching "regions of divinity;" in other words, she transcended humanity and became god-like. (A) is incorrect because the passage does not indicate that the queen was pressured by anyone. (B) is incorrect because the author claims that the public largely ignored the Queen's deficiencies, not that she overcome them. (C) is incorrect because there is no indication that

Victoria tried to suppress criticism.

- 13) **➡ A**  
The correct choice is (A) because lines 1 – 5 say that the public thought of Victoria as soaring toward “the regions of divinity,” or coming close to being a god. (B), (C), and (D) are incorrect because none of these choices suggest that Victoria was regarded as divine or god-like.
- 14) **➡ A**  
Choice (A) is correct because a “creed” is a set of beliefs; therefore, a “dominant creed” would be something that most people believe. Imperialism requires the assumption that one’s country should expand and is entitled to take over other areas. (B) is incorrect because the passage is not discussing religious institutions or worship ceremonies. (C) is incorrect because the phrase refers to beliefs regarding the right to take over certain territories, not about how people around the globe felt about the queen. Finally, (D) is incorrect because the author does not assert that English people were forced to swear to anything.
- 15) **➡ C**  
Choice (C) is correct because an irony is something that is deliberately contrary to what one would expect. Usually, when people are “enamoured” of a place, they seek out friendships to respectfully learn and understand different ways of doing things. But the author implies that by employing Indian servants, the Queen symbolically placed herself above India’s culture. (A), (B), and (D) are incorrect because there is no indication that any are true in the passage.
- 16) **➡ C**  
The answer is (C) because lines 31 – 32 indicates that public support for imperialism gave *her* office a new significance. In other words, the feeling was not necessarily about Victoria herself. The claim is that because the British public needed to justify its own feeling of entitlement, it suddenly felt that the British monarch (whoever held the top position) was important. (A), (B), and (D) are incorrect because none of the words make sense in the context of line 30.
- 17) **➡ B**  
In lines 35 – 39, the author uses imagery: British politics is like a building (structure) in which

everything is practical. But in the metaphor, there is one corner of the “building” inhabited by superstition rather than by common sense, representing the public’s irrational and mystical beliefs related to the monarchy. Thus, the answer is (B). (A) is incorrect because government branches are not mentioned; (C) is incorrect because religion is not the focus of the passage; and (D) is incorrect because the author uses the “corner” as a metaphor for limited irrationality, not a shift in public opinion.

- 18) **➡ A**  
Choice (A) is correct because to give someone “scope” to do something is to give him or her freedom to do it. Choice (B), “limits,” is another common meaning of scope, which does not make sense in this context. (C) and (D) are also other meanings of “scope” that do not make sense in the context of line 40.
- 19) **➡ C**  
According to the graph, British-controlled lands increased from around 8 million square miles to around 12 million from the middle of the 19th century to the end. Thus, the answer is (C) because the author implies that the country was expanding its reach during the later years of Victoria’s reign. (A) and (B) are incorrect because the graph does not indicate specific regions or nations that were added to the Empire. (D) is incorrect because the graph does not depict information about British policies.
- 20) **➡ D**  
The correct choice is (D). In paragraph 3 (lines 35 – 63), the author argues that the British public needed to believe in its own “mysterious destiny” to rule others, and the monarchy became the symbol of that belief system. (A) is incorrect because there is no indication that Victoria served with “transparency.” (B) is incorrect because Victoria’s title as “Empress of India” is barely mentioned in the passage. (C) is incorrect because the author does not describe Victoria as acting humbly or having a sense of humility. Rather, she has an “imposing certitude” that there was nothing about her that needed changing.
- 21) **➡ B**  
The answer is (B) because lines 55 – 58 support

the claim that Victoria owed her popularity to her subjects' need to justify imperialism with a symbol. (A) is incorrect because lines 24 – 25 discuss Victoria's own learning, but not public opinion. (C) and (D) are incorrect because they speculate about a possible view of Victoria at the time, but do not directly support the claim that she was popular because she was a necessary symbol for imperialism.

22) **➡ D**

Darwin states at the beginning of the paragraph that he uses the term "struggle for existence" in a "large and metaphorical sense," then sets that against the example of the "two canine animals," such as wolves or dogs, fighting for food when there is a dearth (shortage) of it. His point is that the struggle for existence extends beyond the out-and-out fight to eat between two animals. Thus, the answer is (D). Choices (A), (B), and (C) are incorrect because they do not describe the author's basic contrast in the paragraph.

23) **➡ C**

The correct choice is (C) because in line 2, the author explains in what sense he is using a term—that is, what *meaning* he intends. Choices (A), (B), and (D) are incorrect because the author is not discussing the feeling, wisdom, or perception of what he intends, but rather, the meaning.

24) **➡ A**

Choice (A) is correct because Darwin is painting a new world-view for readers of his era in which nature is not gentle, and large-scale "destruction" is normal. (B) is incorrect because, although Darwin does make the claim that such understanding is ultimately impossible, it is not the passage's main focus. (C) is incorrect because, while Darwin does mention dependence among organisms, it is, again, not his main topic. (D) is incorrect because Darwin does not mention anything about human reproduction levels.

25) **➡ C**

Choice (C) is correct because lines 40 – 45 support the claim that all organisms struggle to survive because more are produced than can survive. (A) is incorrect because it is a specific example, not a statement that summarizes the main point of the passage. (B) is incorrect because, again, it is

only one example of an organism's competitive challenge. (D) is incorrect because it refers to a theory that helps explain the point; it is not in and of itself a central claim.

26) **➡ D**

Choice (D) is correct because the graph depicts the "principle of geometric increase" in population that Darwin mentions in lines 37 – 38, as well as the way that a population inevitably exceeds its food supply such that "no country could support" it. Choices (A), (B), and (C) are incorrect because they describe aspects of the struggle for existence but only relate to the graph indirectly.

27) **➡ B**

The correct choice is (B). In lines 45 – 49, after Darwin makes his main claim about the struggle for existence, he explains that he has been describing Malthus's population theory, but in relation to animals and plants. (A) is incorrect because Darwin is using, not rejecting, Malthus's theory. (C) is incorrect because Darwin does not provide evidence or reasoning to support Malthus; he assumes the reader already accepts Malthus's conclusions. (D) is incorrect because Darwin is not discussing artificial food production.

28) **➡ B**

Choice (B) is correct because in line 48, Darwin mentions that plants and animals must rely on a natural food supply, presumably as opposed to humans, who have an "artificial" food supply in the sense that we can grow crops and raise animals; in other words, we can *cultivate* food. (A) and (C) are incorrect because Darwin clearly is not referring to fake or imitation food, but simply to food that is not wild. (D) is incorrect because there is no indication that Darwin considers cultivating food to be dishonest.

29) **➡ C**

The correct choice is (C). In paragraph 3, Darwin says that it is good to try to understand why some species or individuals have advantages, but to keep in mind that it will be impossible to completely succeed, because of limitations in our perceptions. He is most like a teacher encouraging his students to persist in a difficult task. (A) is incorrect because Darwin does not propose any policies in the passage. (B) is incorrect because Darwin is not simplifying concepts but

commenting on them. (D) is incorrect because Darwin does not promote any action except research and study.

30) **➡ A**

Choice (A) is correct because Darwin points out that when we try to comprehend all of the connections (“mutual relations”) between an organism and its environment, we will inevitably fail, and that we should be aware of that, even though it is difficult to accept. (B) is incorrect because Darwin does not advocate respect or protection for organisms or habitats in the passage. (C) is incorrect because Darwin does not claim that humans are part of these relationships. Finally, (D) is incorrect because Darwin does not explicitly advocate more study.

31) **➡ D**

In paragraph 1, Darwin defines several senses of the term “Struggle for Existence.” In paragraph 2 he explains why this struggle takes place: the high reproduction rate of species. He sums up these ideas in the last paragraph and adds some commentary about how to approach the study of organisms. Thus, the passage as a whole has a Definition—Explanation—Commentary structure, and choice (D) is correct. (A) is incorrect because the author is not presenting a thesis in paragraph 1, but is instead defining and giving examples of a term. Likewise, paragraph 3 does not provide any consequences of the discussion in the previous two paragraphs. (B) is incorrect because none of the information in paragraph 1 is stated in the form of a question. Finally, (C) is incorrect because the second paragraph is not in the form of a counterargument—the author does not argue against anything he stated in the first paragraph.

32) **➡ A**

The correct choice is (A) because in line 4, Henry says that after so many failed attempts, it would be useless (“vain”) to “indulge in fond hopes (wishful thinking) of peace and reconciliation.” (B) is incorrect because Henry is not arguing for a standoff with the British, but for war. (C) is incorrect because Henry’s point is not that the British may be ready to negotiate, but that the time for negotiating with the British has passed. (D) is incorrect because Henry is not speaking

specifically about the state of Virginia, but about the colonies as a whole.

33) **➡ B**

Choice (B) is correct because, in lines 5 – 7, Henry describes hopes for peace as being “in vain,” or futile. (A) is incorrect because lines 4 – 5 merely provide the context for Henry’s claim about wishful thinking. (C) and (D) are incorrect because they are both part of Henry’s exhortations to the assembly to go to war, and they do not speak clearly and directly to the idea that peace is impossible under the present circumstances.

34) **➡ C**

Henry uses the phrase “the glorious object of our contest” to refer to the objective, or *goal*, of American independence. Thus, choice (C) is correct. Choice (A) is incorrect because a recipient is someone who receives something, and Henry is not talking about a “recipient” of the aim or goal of independence, but the goal itself. (B) is incorrect because an “item” is a thing, which does not make sense in the context of the sentence. (D) is also incorrect: although the colonies are protesting their treatment by the British, their protests are meant to achieve a specific *goal*—independence.

35) **➡ D**

The answer is (D). In line 26, Henry warns that if colonists do not fight, they will end up “in submission and slavery,” and he adds the metaphor “our chains are forged!” to imply that the British have prepared oppressive laws and policies for the colonies, presumably to prevent further rebellion. (A) is incorrect because Henry is speaking metaphorically about political oppression, not about making weapons to fight the British. (B) is incorrect because Henry does not use the metaphor of the chains to imply that people are doomed; rather, he is using it to warn about what could happen if colonists try to avoid war. (C) is incorrect because the threat of the chains is not addressing actual slavery, but rather a metaphor for political oppression.

36) **➡ B**

In lines 42 – 50, Tecumseh warns that Native Americans must unite or they all will be “driven from” their native country, or *forcibly detached* and “blown away” like leaves blown from trees



in autumn. Thus, (B) is correct. Since Tecumseh is only speaking metaphorically, and not literally, about autumn leaves being “blown by wind,” (A) is incorrect. (C) is incorrect because it articulates a more general consideration than what Tecumseh is speaking about. Finally, (D) is incorrect because Tecumseh is not discussing self-restraint; he is instead trying to provoke action.

37) **➡ D**

Choice (D) is correct because Tecumseh speaks of the need for the different Native American tribes to unite and collectively face the danger that is upon them. (A) is incorrect because it encompasses part of Tecumseh’s message, but not its overall focus on uniting forces. (B) is incorrect, because while Tecumseh does state that whites “kick and strike” them as they do African Americans (lines 79 – 80), Tecumseh does not imply that Native American tribes should unite with African Americans. Finally, (C) is incorrect because Tecumseh’s focus is on the tribes’ need to unite and see themselves as one group; he is not discussing how to preserve unique tribal cultures.

38) **➡ A**

(A) is the correct choice because in lines 55 – 57, Tecumseh clearly states his fear that the very survival of native tribes is at stake, and that their only hope is to combine forces to fight. (B) is incorrect because it is more of a general warning to the audience than an articulation of his overall message. (C) is incorrect because Tecumseh states that the tribes’ lands are fast disappearing to support a call to arms; it is not in itself what he mainly suggests. Choice (D) contains a rhetorical question that Tecumseh is using to motivate Native Americans to unite, so it is not a direct message.

39) **➡ B**

Usually “want” is used as a verb that is similar in meaning to “desire.” The noun form of “want” refers to a lack of something, as in a “need.” Tecumseh is saying here that the Native American tribes had neither riches nor wants—they were not rich but they did not lack anything that they needed. Only choice (B)—“privations”—means the same thing as “want” in this context. (A) is

incorrect because having a “wish” is having a desire for something, while having a “want” is having an unmet need. (C) is incorrect because an “interest” is a desire to know something or learn something. This is conceptually different from a want. Finally, (D) is incorrect because an “objective” is an aim or goal, not quite the same as an unmet need.

40) **➡ D**

The correct choice is (D). The two passages differ in that Henry warns about political oppression while Tecumseh warns of being evicted and scattered—a “complete loss of communities.” (A) is incorrect: although Tecumseh accuses the Choctaws and Chickasaws of having “false security and delusive hopes” of peace, he does not explicitly describe peaceful yet ultimately ineffective protests. (B) is incorrect because neither writer predicts victory; only that war is inevitable. (C) is incorrect because both men, not just Tecumseh, state that war has begun or been ongoing.

41) **➡ D**

Choice (D) is correct. In Passage 1, Henry speaks metaphorically of the colonists’ chains being forged, but the colonists are not in danger of being literally enslaved. This fact distinguishes Henry’s argument from Tecumseh’s argument in Passage 2, because Tecumseh warns of literal slavery if the Native American tribes do not unite to face the whites. (A) is incorrect because neither Henry nor Tecumseh describe their own experiences in battle. (B) is incorrect because Tecumseh expresses his willingness to die for his cause, asking rhetorically whether tribes should wait for slavery, or die fighting against it. Similarly, (C) is incorrect because both men speak of the need for unity: Henry exhorts his audience to join others to the north by saying “Our brethren are already in the field!” while Tecumseh also calls for tribes to combine forces.

42) **➡ B**

Choice (B) is the correct answer because both speakers ask questions that are intended to motivate their audiences to risk their lives in battle. Henry asks, “Is life so dear, or peace so sweet, as to be purchased at the price of chains and slavery?” Tecumseh warns of slavery and asks,

"Shall we wait for that moment, or shall we die fighting before submitting to such ignominy?" (A) is incorrect because neither passage uses "facts and figures." (C) is incorrect because neither passage mentions heroes. Finally, (D) is incorrect because both passages speak of the plight that their audiences face, and not specifically about the suffering of any one individual.

43) **⇒** B

Paragraphs 1 and 2 discuss the roles of computational scientists and the role of Brookhaven in managing the vast quantities of data from the collision experiments that physics researchers around the world sort through. In paragraphs 10 and 12, the author discusses the task of analyzing the enormous amount of data generated by particle colliders. Thus, (B) is correct. (A) is incorrect because the author does not speak about benefits and costs of experimentation. (C) is incorrect because the author shifts throughout the article from discussing the work of teams in the United States to discussing the work of teams in Europe. There are no places in the article where the focus is exclusively on the United States, and then exclusively on Europe. Finally, (D) is incorrect because although the passage briefly mentions current ideas about the genesis of the universe, there is no mention of past theories.

44) **⇒** D

A "landmark" finding is one that is so significant that it marks a change or a turning point in thinking. Thus, (D) is the correct choice because only the term "seminal" conveys a similar significance; "seminal" refers to new, influential ideas. Choice (A), "geographic," is incorrect because "landmark" is not being used in a literal sense to refer to a structure or natural feature. (B) is incorrect because "visible" does not make sense in the context. In addition, (C) is incorrect because it adds a subjective evaluation of the findings and therefore is not a precise substitute.

45) **⇒** A

Choice (A) is correct because the author quotes Ernst as saying that all of the individuals involved were committed to solving problems with the work, regardless of the time of day or night. This suggests that workers felt both collaborative and pressed for time. (B) is incorrect because although

the atmosphere may have been stressful, to say that it was "frantic" is too strong; there is also no indication that it was competitive. (C) is incorrect because there is no evidence that the scientists involved were frustrated. The fact that problems were tackled head-on whenever they arose speaks to their dedication, not to frustration or aggression. Finally, (D) is incorrect because the quotes refer to the professional working atmosphere at the facility, not to the emotional atmosphere.

46) **⇒** A

The extraordinary factors described in the work indicate the magnitude of the experiments. Thus, (A) is correct. (B) is incorrect because it conflicts with the author's positive tone toward the experiments being conducted, and there is no evidence that the author thinks the experimental procedures are wasteful. Likewise, (C) is incorrect because the author does not use jargon or references to concepts that might undermine the reader's self-confidence, and instead takes a neutral, explanatory tone. Finally, (D) is incorrect because at no point in paragraph 4 or in the passage as a whole does the author encourage the reader to get involved in the experiments.

47) **⇒** C

The author mentions that the RHIC allows collision experiments to free quarks from gluons, which last occurred 100 millionths of a second after the Big Bang—the explosion that created the universe. Taken in conjunction with the claim that both the RHIC and LHC are "time machines," this suggests that both of these experiments allow physicists to better understand the Big Bang. Thus, (C) is correct. (A) is incorrect because no mention is made in the passage about challenges to traditional notions of time and space. (B) is incorrect because the passage does not anywhere mention science-fiction. (D) is incorrect because the passage explicitly states that colliders provide information about how the universe began, not about what might occur in the future.

48) **⇒** A

Choice (A) is correct because in lines 30–34, the author explicitly states that research from the colliders provides information about the Big Bang. (B) does not directly support the connection

between the research and the Big Bang, but rather provides a brief description of an apparent discovery from the research. (C) and (D) both provide information about the research process, but do not support the concept that the colliders are "time machines" because they give us a glimpse of the Big Bang.

49)  A

Lines 27 – 28 mentions that the RHIC smashes gold ions at speeds close to the speed of light; line 43 mentions that the LHC smashes protons into each other. Thus, (A) is the correct answer. (B), (C), and (D) are incorrect because they are not mentioned as colliding particles.

50)  A

The phrase "needle in a haystack" is meant to convey the difficulty of finding something that is hidden among countless similar things. Thus, (A) is correct. (B) is incorrect because the passage nowhere mentions the mathematical impossibility of finding what the experimenters are looking for. Similarly, (C) is incorrect because the author does not use the image of the needle in the haystack to convey an idea about collaboration, but rather about the task itself. (D) is incorrect because the passage never discusses the size of the Higgs boson relative to an atom or ion.

51)  D

In lines 73 – 75, the author states that even if the colliders create a Higgs boson, it would "instantly" decay into particles that are "detectable." Similarly, lines 62 – 63 state that the search for "particles and states of matter that don't exist in today's world" is challenging. These statements strongly suggest that the Higgs boson can only be detected indirectly, so (D) is correct. (A) is incorrect because the passage nowhere states that the Higgs boson does not exist, or that scientists suspect that it does not exist. Likewise, (B) is incorrect because there is no indication that the search for the Higgs has generated controversy. Finally, (C) is incorrect because the passage offers no claim or evidence that the existence of the Higgs boson has been suspected since ancient times.

52)  D

The correct choice is (D), because lines 62 – 66

point out that the Higgs boson is a particle that does not exist today, and that it must be made by the colliders. The implication is that the Higgs boson can only be detected through indirect evidence. (A) is incorrect because it describes the researchers' excitement, not the method for identifying the Higgs boson. (B) is incorrect because it focuses on the possible results of particle collision experiments, but does not specify whether the results would be obtained directly or indirectly. (C) does focus on the Higgs boson discovery, but it is incorrect because it describes the significance of finding the particle, not the method used to find it.

## Writing and Language Test



1. (C)	5. (B)	9. (A)	13. (H)	17. (D)	21. (D)	25. (B)	29. (J)	33. (A)	37. (C)	41. (A)
2. (B)	6. (B)	10. (B)	14. (C)	18. (A)	22. (A)	26. (D)	30. (D)	34. (D)	38. (D)	42. (C)
3. (D)	7. (D)	11. (D)	15. (A)	19. (D)	23. (B)	27. (A)	31. (B)	35. (A)	39. (B)	43. (D)
4. (C)	8. (A)	12. (B)	16. (C)	20. (A)	24. (C)	28. (A)	32. (A)	36. (C)	40. (B)	44. (B)

1) **⇒** C

The sentence is talking in general about what audiologists do and what equipment they use. Since it is reasonable to assume patients' is possessive, answer choice (C) is correct. (B) is incorrect because it does not contain an apostrophe to indicate possession. (D) is incorrect because although "a" is appropriate to indicate singular possession, the apostrophe is missing, as in (A).

2) **⇒** B

"Underscore" is not appropriate because to underscore something means to highlight and emphasize it. It does not make sense to say that audiologists are highlighting the disease in question. Rather, they are trying to determine what disease is causing the symptoms in the patient. Thus, (A) is incorrect. (B) is correct because it refers to the disease that "lies under" the symptoms that the audiologist can see. (C) is incorrect because the disease is not "undermining," or negating, anything, it is *causing* the symptoms the patient manifests. Finally, (D) is incorrect because it would not make sense to say that the cause is "undergoing," or experiencing, something.

3) **⇒** D

When writing a sentence with multiple phrases, it is always best to make sure the phrases have the same structure for the sake of clarity. Since the author speaks of "cleaning" wax and "fitting" hearing aids, the next phrase should include the "-ing" form of "fit" as well, as in "fitting patients with cochlear implants to improve hearing." Thus, choice (D) is correct. (A) and (B) are incorrect because they deviate from the structure established by the other phrases in the list. Finally, (C) is incorrect because it is missing a verb to describe what the audiologist does, which is *fit* cochlear implants to patients.

4) **⇒** C

As written, the transition word "additionally" adds wordiness and confusion, so (A) is incorrect. (C) is correct because it consists of two independent clauses separated by a semicolon. (B) and (D) are incorrect because they do not convey the idea that cochlear implants are placed under the skin *for the purpose of* delivering electrical impulses to the auditory nerve.

5) **⇒** B

The sentence starts with the phrase "For instance," suggesting that it includes information that elaborates on a point made in the previous sentence. Since sentence 1 includes a general statement about audiologists working to relieve symptoms of vertigo, and since the information in the sentence offers more specific details about treating "disorientation," (B) is the correct answer. For the same reason, (A) is incorrect; the sentence is not appropriate as an opening sentence, but instead is designed to clarify previously stated information. (C) and (D) are incorrect because the added sentence does not elaborate on types of patients or workplaces.

6) **⇒** B

Only choice (B) mentions "a graduate program," which is a logical referent for one of "these programs" in the following sentence. Hence, (B) is the correct answer. (A) is incorrect because it includes a personal detail not appropriate to the neutral tone of the passage. (C) is incorrect because it is out of place between two sentences that discuss the educational process of becoming an audiologist. (D) is incorrect because tuition costs are not otherwise mentioned.

7) **⇒** D

The subject of the verb "include" is "coursework," which is a singular noun. Thus, it must take a

singular verb. Since "include" as written cannot refer to third-person singular nouns, (A) is incorrect. (D) is correct because it places "include" in the third-person singular form to reflect the noun "coursework." (B) is incorrect because it places the sentence in the future tense when the sentence is describing coursework that graduate programs in audiology presently include. (C) likewise will not work because the past tense is not appropriate for this sentence; there is no indication that these were requirements which applied in the past, but which no longer apply.

- 8) **➡ A**  
The graph shows that audiologist profession is expected to grow by approximately 35 percent from 2012 to 2022. The speech-language pathologist profession is expected to grow by about 20 percent, and the field of chiropractic profession are expected to grow by 15 percent. Thus, pathologists and chiropractors will see a combined 35 percent growth in their fields by 2022, the same amount of growth as the field of audiology. Therefore, (A) is the correct choice. (B) is incorrect because the graph presents a profession's growth, not the average amount of money earned in a profession. (C) is incorrect because the graph shows that the physical therapy profession is growing faster than the audiology profession. And (D) is incorrect because the graph shows the percentage of growth in a field, not the number of individuals entering the field at any given time.
- 9) **➡ A**  
The sentence as written is acceptable because it is clear from the preceding sentence that "the occupational field" refers to the occupation of audiologists. Thus, (A) is correct. (B) and (C) are incorrect because (B) is worded awkwardly and (C) is phrased informally. Finally, (D) is incorrect because it adds confusion: it is unclear whether the job or the job field is "small."
- 10) **➡ B**  
The sentence is incorrect as written because it expresses two different thoughts, one of which follows from the other, and a comma is needed to indicate a natural pause or break between these two thoughts. Thus, (A) is incorrect. (B) is correct because the clauses to either side of the word "so" are independent clauses, and a comma plus a conjunction ("so" in this case) can connect two

independent clauses. (C) and (D) are incorrect because they do not follow the pattern described above.

- 11) **➡ D**  
In sentence 4, "also" is a key that the sentence should follow a sentence that mentions a reason for the growth of audiology. Sentence 5 most clearly does this. Additionally, sentence 4 is a supporting detail about infants rather than the aging population, so placing it after sentence 5 improves the paragraph's organization. For these reasons, (D) is correct while (A), (B), and (C) are incorrect.
- 12) **➡ B**  
The recognition that chemistry is a legitimate science occurred in the past. "Has been" indicates that the first recognition of chemistry as a science began in the past and is still occurring in the present, which is incorrect. Thus, (A) is incorrect and (B) is correct. Both (C) and (D) are incorrect because they use plural pronouns ("they") to refer to "chemistry," a singular noun. Like (A), (D) also incorrectly employs the present-perfect tense to imply that the recognition of chemistry is ongoing.
- 13) **➡ B**  
Parallel phrasing is important for clarity. Since the sentence speaks of "the fermentation of sugar into wine," it is best to keep the phrase structure consistent and make "heated" into a noun, as in "the heating of ashes and animal fat into soap." Thus, answer choice (B) is correct. (A), (C), and (D) are incorrect because they follow different patterns.
- 14) **➡ C**  
Since only "and" is required to complete the list of similar nouns, choice (C) is correct. (A) and (B) are incorrect because they add "also" and "too," both of which are redundant to "and." Finally, (D) is incorrect because it is already understood that elements are being listed and that phosphorus itself is an element. The clarification that (D) provides is unnecessary.
- 15) **➡ A**  
Here the word "constitute" most closely means "form" or "make up," which makes sense in the context of the sentence because carbon compounds make up living organisms. Thus, choice (A) is correct. Choice (B), "establish," is incorrect

because “establish” means to set something up, and the word “constitute” is not being used to suggest that carbon compounds “set up” living organisms. Choice (C), “embody,” is incorrect because “embody” means to give expression to something, like a quality, trait, or characteristic, and it would not make sense to say that living organisms “embody” carbon compounds in the same way that a person embodies a trait. Finally, “initiate” means to start something, and it is unclear what it would mean to say that carbon compounds “initiate” living organisms. Carbon compounds do not start organisms so much as they form them, so choice (D) is incorrect.

16) **⇒** C

The focus of the paragraph containing 16 is the distinguishing properties of carbon. Based on the paragraph, carbon possesses several properties that set it apart, or make it *unique*, from other elements. Thus, (C) is the most appropriate choice. Because the properties are clearly outlined throughout the paragraph, we can infer that they are not puzzling, eliminating (A). The paragraph never suggests that the unique properties of carbon make carbon superior to other elements, so choice (B), “exceptional,” is incorrect. Finally, the author does not imply that the properties of carbon are odd, so (D) can be eliminated.

17) **⇒** D

Choice (A) is incorrect because the use of “them” at the underlined portion is unclear, as readers cannot determine to what, exactly, “them” refers. While it is not strictly necessary to write “other carbon atoms” out fully, it is necessary to specify that carbon atoms bond with other carbon atoms. Only choice (D) accomplishes this, because “one another” can refer to nothing else but other carbon atoms. Choice (B), “it,” is incorrect because the sentence is talking about other carbon atoms in the plural, and “it” is a singular pronoun. Finally, (C) is incorrect because “the others” is ambiguous.

18) **⇒** A

The subject to which the verb “to allow” refers is the singular noun “ability,” making (A) the correct choice because “allows” agrees with a third-person singular subject. (B) is incorrect because “allow” cannot refer to a third-person singular noun. (C) can be eliminated because “allowing” is a participle or gerund (depending on context), so substituting “allowing” into the sentence makes

the sentence a fragment. (D) is incorrect because the sentence is not in the past tense.

19) **⇒** D

Choice (D) is correct because it is concise. It is not necessary to state that carbon compounds support life “here on Earth,” since it is understood that, insofar as we know, life only exists on Earth. Thus, (A) is incorrect. (B) is incorrect because “organisms” are understood to be alive, making the phrase redundant. (C) is incorrect because it is not necessary to add the detail “such as plants and animals,” because we can presume that the “life” mentioned in the sentence includes plants and animals.

20) **⇒** A

The third paragraph focuses on carbon’s ability to bond with other carbon atoms to form long “chains,” which can incorporate a variety of different elements and support life on Earth. The fourth paragraph marks a transition from a discussion of these long and complex “chains” to a discussion of simpler carbon compounds, like those composed of carbon and hydrogen. A sentence that transitions from complex carbon compounds to simpler ones would be most fitting, making choice (A) correct. (B), (C), and (D) are incorrect because they do not convey a shift from complex to simple carbon compounds.

21) **⇒** D

The sentence includes two independent clauses, which must be connected with either a comma plus an appropriate coordinating conjunction or with a semicolon. (A) is incorrect because a comma alone cannot join two independent clauses in the same sentence. (B) can be eliminated because it is generally unnecessary to include a conjunction after a colon; the relationship between the clauses to either side of a colon should be self-evident. (C) is incorrect because the term “but” is used to indicate a contrast between two ideas, yet the sentence containing the underlined portion contains elaboration. (D) is correct because the semicolon grammatically combines the two independent clauses.

22) **⇒** A

The phrase “diverse and abundant” concisely conveys the idea that there are a wide variety of different applications and uses for carbon compounds. Thus, (A) is correct. (B) is incorrect because it is not clear what it would mean to say

that the uses for carbon compounds are “subtle,” even though they are numerous. In addition, (C) is incorrect because the idea that the uses for carbon compounds are “rare” express an idea that is the opposite of what the author is expressing, namely that the practical applications of carbon compounds are great in number. Also, it is not clear what it would mean to say that the practical applications of carbon compounds are “mysterious.” Finally, (D) is incorrect because “common and specialized” is an oxymoron; generally, if a choice contradicts itself (as is the case here) it can be eliminated.

23) **➡ B**

Choice (B) is correct because it speculates about something that would have happened given that something else happened—prehistoric people settled in certain areas that they called home. (A) and (D) are incorrect because they are in the present tense, and the sentence talks about the past, not the present. (C) is incorrect because it is in the future tense, and this is incorrect since the author is talking about the actions of prehistoric peoples.

24) **➡ C**

The terms “old-fashioned” and “outdated” describe things that are not only old, but irrelevant in the sense that they have been supplanted by something better and more modern. Yet the implicit judgment that modern societies are somehow “better” than the traditional societies being described is absent in this discussion. Thus, (A) and (B) are incorrect. A more precise term would contrast the societies in question with modern societies without judgment. (C) most effectively accomplishes this. (D) is incorrect because it would require elaboration to claim that the societies in question are the first societies formed on Earth.

25) **➡ B**

As written, the sentence sounds as if Diamond is himself in remote areas of Papua New Guinea when writing. Instead, the author of the passage wishes to convey the idea that Diamond, wherever he is, is writing about societies located in remote regions of Papua New Guinea, not that Diamond himself is located there. Thus, (A) is incorrect. (B) effectively revises the sentence to reflect the author’s intentions, and shifts the focus onto the people located in remote areas of Papua New Guinea. (C) is incorrect because it sounds like only the groups in Papua New Guinea rarely

travel; it is also in the passive voice, which is generally less clear and concise than the active voice. (D) is incorrect due to its awkward and confusing syntax.

26) **➡ D**

The first sentence of the paragraph indicates that modern and traditional border-crossing checks are similar. (A) is incorrect because it wrongly conveys a cause-effect relationship between modern and traditional societies, when a comparison is what is called for. (B) is likewise incorrect because the word “yet” sets up a contrast between modern and traditional societies whereas the passage is emphasizing a similarity. (C) is likewise ineffective because the word “if” introduces a condition into the sentence, when none is needed or implied by the sentences as written. Only (D) effectively conveys the parallels between modern and traditional societies’ border crossing procedures by beginning the second clause with the adverb “similarly.”

27) **➡ A**

As written, the colon serves to introduce information that will clarify and expand upon the information presented in the first part of the sentence. This is one of the functions of the colon, and so (A) is correct. Because it lacks any punctuation, (B) does not set apart the information in the second part of the sentence, which creates confusion. (C) is incorrect because the semicolon can only separate two clauses that can stand alone as sentences. For the same reason, (D) is incorrect: the clause beginning with “to admit” does not form a complete sentence.

28) **➡ A**

Choice (A) is correct because the sentence provides information that clarifies why a particular practice is prevalent in both modern and traditional societies. Thus, it should go after a sentence that mentions the practice, which sentence 1 does. It would not be appropriate to place the sentence after sentence 2 because doing so would break up the continuity between sentences 2 and 3. Likewise, (C) and (D) are incorrect because they represent an illogical flow of ideas.

29) **➡ D**

The underlined sentence discusses the difficulty of obtaining a visa, which is not relevant to the discussion at hand. The point of the paragraph

is to discuss the reasons why visas are in place to begin with. The focus of the paragraph is on “visas” in traditional societies, and modern visas are discussed to provide a parallel with practices of traditional societies. Thus, (D) is correct. The practicalities of acquiring a visa are not part of the primary discussion, so (A) is incorrect. (B) is incorrect because the sentence does not emphasize the importance of visas, but rather the difficulty of getting them. (C) is incorrect because the sentence does not “undermine” traditional visas’ importance, but it does direct the focus away from them.

30) **➡ D**

The phrase “both  $x$  and  $y$ ” demonstrates that something is true of  $x$  and  $y$ . Because “both” is always followed by “and,” (D) must be the correct choice. Other choices incorrectly pair “both” with a different conjunction or transition word, which changes the meaning of the sentence and forms a nonexistent grammatical construction.

31) **➡ B**

Choice (B) is the most appropriate answer because it provides a transition that explains that the *Schengen* is an example of a free-travel region in modern society, best linking the first sentence to the rest of the paragraph. Although (A) conveys the same information, the lack of a transition means it contributes less to the cohesion of the paragraph as a whole. (C) can be eliminated because the transition “For this reason” establishes an inaccurate relationship between the first and second sentences of the paragraph. (D) is incorrect because deleting the underlined portion would remove the only mention of the *Schengen* area, rendering the rest of the paragraph incomprehensible. It also creates a fragment with the remaining information.

32) **➡ A**

Choice (A) is correct because the following sentence provides an example of water resources in the desert, describing a type of place where resources are “scarce.” (B), (C), and (D) do not have the same connotation of “insufficient.”

33) **➡ A**

Since the subject of the sentence is “tribe,” which is a singular noun, the pronoun describing “tribe” must also be singular, and so “it” is appropriate as written. (A) is the answer. Both (B) and (D) are

incorrect because each uses “their” to describe a singular entity—the tribe. In addition, (D) lacks a comma where a natural pause occurs in the sentence. This is also the reason that (C) is incorrect: the participial phrase beginning with “knowing” should be separated by commas from the rest of the sentence.

34) **➡ D**

The word “but” introduces a contrast between what some critics think and what others think. Given this, (D) is the correct choice because it maintains parallel structure with the first part of the sentence, namely subject-verb-object. (A) is incorrect because it is unclear whether “they” refers to the buildings or the critics. (B) is incorrect because it uses the passive voice in a roundabout way and fails to mention who is praising Gaudi’s buildings. (C) is incorrect because it does not answer the question: “Legitimate according to whom?”

35) **➡ A**

The previous sentence introduces information that includes both criticism and praise of Gaudi’s work. The sentence at 35 highlights the fact that there is much positive regard for Gaudi’s work, and that several of his creations have been recognized by the United Nations. Thus, the underlined sentence conveys the significance of Gaudi’s work and should be kept, making (A) correct. (B) is incorrect because the information does not chiefly clarify anything else in the passage, but offers an affirmation of a previously stated view. (C) is incorrect primarily because no explanation for the United Nations’ action is needed. The statement merely indicates that the United Nations recognizes the importance of Gaudi’s work, which is a testament to its value. (D) is also incorrect because the sentence does not blur the focus on Gaudi’s buildings, but provides evidence of their special qualities.

36) **➡ C**

Choice (C) is correct because sentence 3 provides needed context for understanding why and how Gaudi was able to spend time in his childhood observing the natural world around him and the work of his father. It is also for this reason that (A) is incorrect. (B) is incorrect because the information about Gaudi’s birth is logically prior to his childhood, and the passage is organized to provide information about Gaudi’s life in roughly



chronological order. (D) is likewise incorrect because sentence 3 mentions information about his poor health, which precedes his recovery, and since, again, the paragraph is in chronological order, this information should be mentioned before sentence 4.

- 37) **➡ C**  
Based on the context of the sentence, Barcelona was going through something of an economic boom by the time Gaudí arrived. Since this boom was not something that was completed before Gaudí's arrival, but was ongoing when Gaudí arrived, (C) is the correct choice. (A) is incorrect because it implies that the process had been completed before Gaudí's arrival, which is not the intention of the sentence. (B) is incorrect because it makes it sound as if Barcelona is undergoing an economic upturn in the present, which is not the intended meaning. (D) makes Barcelona's revival either conditional upon some unstated fact or happen at some point after Gaudí arrived, which is not the intention of the sentence.
- 38) **➡ D**  
The sentence mentions one isolated project designed by Gaudí—a display cabinet. Considered within the context of the whole paragraph, this information does not fit well with the emphasis on the opportunities provided to Gaudí by his wealthy patrons. Thus, (D) is the correct choice. (A) is incorrect because the sentence mentions one fact about Gaudí that exists in isolation from the central focus of the paragraph. (B) is incorrect because there is no evidence that the design of the display cabinet was the reason that Gaudí became an architect. (C) is also incorrect because the paragraph does not focus on how fast Gaudí became a renowned architect, but on the fact that Gaudí had many opportunities in Barcelona to develop his ideas.
- 39) **➡ B**  
As written, the sentence is missing a subject; it is not clear who is employing ruled shapes. This is called a dangling modifier. Therefore, (A) is incorrect and (B) is correct because it includes the subject "he." (C) is incorrect because it is not the structures that "employed" and "achieved," but the architect. (D) is incorrect because it is a convoluted use of the passive voice.
- 40) **➡ B**  
The author is discussing Gaudí's *main* gift. Yet

as written, it refers to a belief, and not the idea of centrality. Thus, (A) is incorrect. The correct spelling of the term is "principal," so choice (B) is correct. (C) is incorrect because "princely" describes someone with prince-like qualities and therefore has nothing to do with the topic of the sentence. (D), "principled," suggests someone who acts based on moral principles, and this is not the intended meaning in this case.

- 41) **➡ A**  
The sentence as written appropriately uses the term "but" to indicate a contrast with something said previously. Although Gaudí's style incorporates elements of baroque and gothic architecture, it is ultimately not easy to classify. Thus, the sentence is correct as written and (A) is the answer. (B) and (C) are both long-winded and informal ways of rewriting the clause that confuse more than clarify. (D) mentions Modernism as though the term and its significance have already been discussed, which is not the case.
- 42) **➡ C**  
The subject of the phrase is "chimneys," which is plural. Thus, a plural verb, "adorn," is needed, and choice (C) is correct. Since (A), (B), and (D) use the third-person singular form of the verb, they are incorrect.
- 43) **➡ D**  
Choice (D) is correct because it is the most concise choice that maintains appropriate punctuation. (A) is grammatically correct, but "contemporary" and "now" are redundant to "Today." (B) is incorrect for the same reason—"now" is redundant. (C) is incorrect because a colon indicates that an explanation or an explanation of the previous information is to follow, which is not the case here.
- 44) **➡ B**  
As written, the sentence contains awkward phrasing and unnecessary wordiness, so (A) is incorrect. (B) is the best answer because it conveys its point clearly and concisely. (C) changes the sentence's basic meaning by making it sound as if Gaudí purposefully "formed" the Art Nouveau movement and sponsored Dalí and Miro, which is not the intended connotation. Finally, (D) is incorrect because it is wordy and its meaning is imprecise.

## Math Test



## No Calculator Portion

1. Ⓐ 7. Ⓓ 13. Ⓓ 19. 4  
 2. Ⓓ 8. Ⓓ 14. Ⓐ 20. 29  
 3. Ⓐ 9. Ⓒ 15. Ⓓ  
 4. Ⓓ 10. Ⓐ 16. 15  
 5. Ⓓ 11. Ⓑ 17. 16  
 6. Ⓒ 12. Ⓐ 18. 120



## Calculator Portion

1. Ⓐ 7. Ⓓ 13. Ⓒ 19. Ⓓ 25. Ⓑ 31. 550 36. 3  
 2. Ⓒ 8. Ⓓ 14. Ⓒ 20. Ⓓ 26. Ⓓ 32.  $\frac{5}{3}$  37. 0.38  
 3. Ⓒ 9. Ⓑ 15. Ⓑ 21. Ⓑ 27. Ⓓ 38. 0.43  
 4. Ⓓ 10. Ⓑ 16. Ⓑ 22. Ⓒ 28. Ⓑ 33. 26  
 5. Ⓑ 11. Ⓐ 17. Ⓒ 23. Ⓓ 29. Ⓑ 34. 1,024  
 6. Ⓐ 12. Ⓑ 18. Ⓑ 24. Ⓓ 30. Ⓐ 35. 3,400

## No Calculator Portion

- 1)
- ⇒**
- A

James drives 30 miles a day, so the daily cost of rental is:

$$\text{Daily cost} = 19.95 + (30 - 20)(0.4)$$

$$\text{Daily cost} = 23.95$$

The cost of the rental as a function of days rented is:  $f(x) = (23.95)x$

- 2)
- ⇒**
- D

The money earned mowing lawns less the cost of the mower must be equal to or greater \$800:

$$15l - 250 \geq 800$$

$$15l \geq 1050$$

$$l \geq 70$$

- 3)
- ⇒**
- A

$$\text{Travel time} = \frac{125 \text{ miles}}{60 \text{ miles per hour}} + \frac{30 \text{ miles}}{45 \text{ miles per hour}}$$

$$\text{Travel time} = 2\frac{1}{12} \text{ hours} + \frac{2}{3} \text{ hours} = 2\frac{3}{4} \text{ hours}$$

- 4)
- ⇒**
- D

The second line is equivalent to the first line multiplied by a factor of 2; a simple transformation shows that they are the same line:

$$2(3x + 2y) = 2(-1)$$

$$6x + 4y = -2$$

- 5)
- ⇒**
- D

The monthly cost can be modeled as a function

of minutes of talk time ( $0.1m$ ) with the monthly fee ( $2$ ) as the constant:  $C(m) = 0.1m + 2$

- 6)
- ⇒**
- C

$$(x + 2y)^2 + (x - y)^2 = 2ax + 5y^2$$

$$(x^2 + 4xy + 4y^2) + (x^2 - 2xy + y^2) = 2ax + 5y^2$$

$$2x^2 + 2xy + 5y^2 = 2ax + 5y^2$$

$$a = \frac{2x^2 + 2xy}{2x}$$

$$a = x + y$$

- 7)
- ⇒**
- D

Let the smaller of the two numbers be  $a$ . The larger of the two numbers is then  $a + 3$ .

$$q = a + (a + 3)$$

$$q = 2a + 3$$

$$a = \frac{q - 3}{2}$$

- 8)
- ⇒**
- B

The radius of the sphere can be determined from the formula for surface area:

$$4\pi r^2 = 36\pi$$

$$r^2 = 9$$

$$r = 3$$

The volume of the sphere is:

$$V = \frac{4}{3}\pi r^3$$

$$V = \frac{4}{3}\pi(3)^3$$

$$V = 36\pi \text{ cm}^3$$

9) **⇒** C

A radius perpendicular to a chord bisects the chord, therefore  $KM = ML = 6$ . If we consider the right triangle  $OLMO$ , with the hypotenuse of the triangle equivalent to the radius of the circle:

$$\overline{OM} + \overline{ML} = \overline{OL}$$

$$6^2 + 6^2 = r^2$$

$$72 = r^2$$

The area of the circle is  $72\pi$

10) **⇒** A

The second equation is equivalent to the line  $x = y$ . Eliminate answer choice (B), which does not contain this line. The second line can be written as  $y = -x + 4$ , which has a negative slope. Of the remaining choices, only (A) has a line with negative slope.

11) **⇒** B

$$\text{Area of small triangle} = \frac{x^2}{2}$$

$$\text{Area of large triangle} = \frac{y^2}{2}$$

$$\text{Area of rectangle} = xy$$

The sum of these areas is the area of the shaded region:

$$\text{Area of shaded region} = \frac{x^2}{2} + \frac{y^2}{2} + xy$$

$$= \frac{x^2 + y^2 + 2xy}{2} = \frac{(x+y)^2}{2}$$

12) **⇒** A

One fourth of the volume of the bottle constitutes three fourths of the volume of the glass ( $V_g$ ):

$$\frac{1}{4}(1.5L) = \frac{3}{4}V_g$$

$$V_g = \frac{4}{3} \cdot \frac{1}{4}(1.5L)$$

$$V_g = 0.5L$$

13) **⇒** D

$$\frac{a}{b} + \frac{a+2}{3b} = \frac{1}{4} \rightarrow \left(\frac{3}{3}\right)\left(\frac{a}{b}\right) + \frac{a+2}{3b} = \frac{1}{4}$$

$$\frac{3a+a+2}{3b} = \frac{1}{4} \rightarrow 4a+2 = \frac{3b}{4}$$

$$a = \frac{3b-8}{16}$$

14) **⇒** A

$$\text{Time driving } A \rightarrow B = \frac{180\text{km}}{60\text{km/hr}} = 3\text{hrs}$$

$$\text{Time driving } B \rightarrow A = \frac{180\text{km}}{90\text{km/hr}} = 2\text{hrs}$$

$$\text{Average speed} = \frac{\text{Total distance}}{\text{Total time}}$$

$$\text{Average speed} = \frac{360\text{km}}{5\text{hr}} = 72\text{ km/hr}$$

15) **⇒** D

$$\frac{a^2 + 2ab + b^2}{a^2 - b^2} = 2(a+b)$$

$$\frac{(a+b)^2}{(a-b)(a+b)} = 2(a+b)$$

$$(a-b) = \frac{1}{2}$$

16) **⇒** 15

$$x^2 + 7x - 33 = 11$$

$$x^2 + 7x - 44 = 0$$

$$(x+11)(x-4) = 0$$

Since  $x > 0$ ,

$$x = 4$$

Therefore,  $x + 11 = 15$ .

17) **⇒** 16

Eight men build one-twelfth of a house in one day. One man builds one-eighth of one-twelfth of a house in one day:

Work done by one man in one day

$$= \left(\frac{1}{8}\right)\left(\frac{1}{12}\right) = \frac{1}{96} \text{ of a house}$$

In one day, six men can build  $\frac{6}{96}$ , or  $\frac{1}{16}$  of

a house. Six men take 16 days to build a house.

18) **⇒** 120

The formula for the area of a parallelogram is:  
 $A = bh$

The base of the parallelogram is the length of  $\overline{QU}$ , which is 10. The height of the parallelogram is the length of  $\overline{RS}$ . The right triangle  $\triangle RSU$  is a 5-12-13 right triangle, with  $\overline{RS} = 12$ . The area of the parallelogram is:  $A = (10)(12) = 120$

19) **⇒** 4

$$2x^2 + 5x - 25 = 0$$

$$(2x - 5)(x + 5) = 0$$

$$x = \frac{5}{2}, -5$$

As  $p < q$ ,  $p = -5$  and  $q = \frac{5}{2}$ .

$$\frac{p^2}{q^2} = \frac{(-5)^2}{\left(\frac{5}{2}\right)^2} = 4$$

20) **➡** 29

If  $f(n-1) = f(3)$ , then  $n$  must equal 4.

For  $n = 4$ ,  $f(n-1) = f(3) = 13 + 4(4) = 29$ .

### Calculator Portion

1) **➡** A

15% of the cookie pieces are wrapped, and 85% of the pieces are not wrapped. Since only 80% of the pieces are oatmeal, it is possible that none of oatmeal pieces are wrapped.

2) **➡** C

Ellen's account balance increases by a constant amount each month, so the slope of the line that represents her balance is a straight line with positive slope. Her single withdrawal is visible as region of the function with negative slope.

3) **➡** C

Account Balance

= Initial Deposit + Additional Deposits - Withdrawals

$$\text{Account balance} = 1000 + 8(200) - 350 = 2250$$

4) **➡** D

If  $x = 1$ , the price is \$4.00.

Only choice (D) meets this requirement:

$$\text{If } x = 1, \text{ then } 0.5x + 3.5 = 4$$

5) **➡** B

The increase in price is \$600,000. The percentage increase is:

$$\% \text{ increase} = \frac{\text{amount increase}}{\text{initial amount}} \times 100\%$$

$$\% \text{ increase} = \frac{600,000}{2,000,000} \times 100\% = 30\%$$

6) **➡** A

There are two red marbles and six marbles total. The probability of selecting one red marble from the bag is  $\frac{2}{6}$ , which simplifies to  $\frac{1}{3}$ .

After one red marble has been selected, there is one red marble in the bag and five marbles total.

The probability of selecting a second red marble is  $\frac{1}{5}$ . The probability of both events happening together is the product of their individual

probabilities:

$$\frac{1}{3} \cdot \frac{1}{5} = \frac{1}{15}$$

7) **➡** D

The median will only be affected if the number of values or sequence of values is changed. If the largest number is increased, it remains the largest number and does not affect the sequence of the other numbers in increasing value, so it does not affect the median.

8) **➡** D

Calculate the  $x$ -intercept by setting  $y = 0$ :

$$0 = 2x - 5$$

$$x = \frac{5}{2}$$

The line in choice (D) has the same  $x$ -intercept. Verify this by setting  $y = 0$ :

$$0 = -\frac{2}{3}x + \frac{5}{3} \rightarrow \frac{2}{3}x = \frac{5}{3} \rightarrow x = \frac{5}{2}$$

9) **➡** B

One tablet contains 500mg of Rhudopsinol, of which 40% is absorbed into the bloodstream, that is,  $(0.4)(500\text{mg})$ .

The half-life of the drug is two hours, so the number of half-lives in  $t$  hours is  $\frac{t}{2}$ .

The amount of Rhudopsinol in the bloodstream after  $t$  hours is:  $f(t) = (0.4)(500)(0.5)^{\frac{t}{2}}$

10) **➡** B

Let  $x$  be the number of fish tacos they purchase, and  $y$  be the number of beef or chicken tacos. On Tuesdays, all tacos are 50% off; fish tacos are \$1.25 and beef and chicken tacos are \$0.75.

$$x + y = 16$$

$$(1.25)x + (0.75)y \leq 15$$

Combine the two equations by substitution:

$$(1.25)x + (0.75)(16 - x) \leq 15$$

$$1.25x + 12 - 0.75x \leq 15$$

$$x \leq 6$$

Paris and Genevieve buy 6 fish tacos at \$1.25 each:  
*Most spent on fish tacos* =  $(6)(1.25) = \$7.50$

11) **➡ A**

Let  $x$  be milliliters of acetic acid solution, and  $y$  be milliliters of sodium bicarbonate solution.

$$\text{Amount of acetic acid} = 0.25x$$

$$\text{Amount of sodium bicarbonate} = 0.55y$$

$$x + y = 120$$

The final solution has equal parts acetic acid and sodium bicarbonate:

$$0.25x = 0.55y$$

$$y = \frac{0.25}{0.55}x = \frac{5}{11}x$$

Substitute this equation into the equation above:

$$x + \frac{5}{11}x = 120$$

$$\frac{16}{11}x = 120$$

$$x = 82.5, \text{ and } y = 37.5$$

12) **➡ B**

$$\text{Average harvest} = \frac{\text{Total harvest}}{\text{Number of farms}}$$

$$\text{Average harvest} = \frac{600 + 400 + 200 + 300 + 400 + 500}{6}$$

$$= 400$$

13) **➡ C**

Let  $x$  be the number of wins before the streak. The number of losses is  $\frac{x}{3}$ . After the streak:

$$\frac{x+6}{3} = \frac{5}{1}$$

$$x+6 = \frac{5x}{3}$$

$$3x+18 = 5x$$

$$x = 9$$

14) **➡ C**

At 100psi, 3 of 50 samples broke. Let  $x$  be the number of samples that break in a group of samples:

$$\frac{x}{10,000} = \frac{3}{50}$$

$$x = 600$$

15) **➡ B**

Margin of Error = Critical Value  $\times$  Standard Error  
 Margin of Error =  $(0.06)(1.96) = 0.12$

16) **➡ B**

Choices (A) and (B) are polynomials of order three, but only choice (B) has three distinct roots, or solutions, making it the only choice that will cross the  $x$ -intercept 3 times.

17) **➡ C**

According to the bar graph, the first year in which the number of apples doubled from the previous year was 1998.

18) **➡ B**

Two angles must be equal in an isosceles triangle. If  $x = 50^\circ$ , then  $y = 180^\circ - 40^\circ - 50^\circ = 90^\circ$ , which is not possible for an isosceles triangle.

19) **➡ D**

Let  $x$  be the amount of flour needed for the adjusted recipe:

$$\frac{p}{q} = \frac{p+2}{x}$$

$$x = \frac{(p+2)q}{p}$$

20) **➡ D**

The expression  $|x+3|$  is greater than or equal to zero for all values of  $x$ . Therefore,  $f(x) \geq -7$ .

21) **➡ B**

At  $t = 6$ , the cord is fully extended. The cliff is 122 meters high, and the cord is 72 meters long, so when the cord is fully extended, the jumper is 50 meters from the ground. Substituting  $t = 6$  in the answer choices, only choice (B) produces the correct value:

$$f(t) = 2(6)^2 + 24(6) + 122 = 50$$

22) **⇒** C

$$x = \frac{2k}{x} + 2 \rightarrow x - \frac{2k}{x} = 2 \rightarrow \left(\frac{x}{x}\right)x - \frac{2k}{x} = 2$$

$$\rightarrow \frac{x^2 - 2k}{x} = 2 \rightarrow x^2 - 2x - 2k = 0$$

Use the quadratic formula:

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-2k)}}{2}$$

$$= \frac{2 \pm \sqrt{4 + 8k}}{2} = 1 \pm \sqrt{1 + 2k}$$

23) **⇒** D

$$\frac{2}{x} + \frac{x+2}{x(x-2)} = \frac{4}{x(x-2)}$$

$$\frac{2}{x} = \frac{4 - (x+2)}{x(x-2)}$$

$$\frac{2}{x} = \frac{2-x}{x(x-2)} \rightarrow \frac{2}{x} = \frac{-(x-2)}{x(x-2)}$$

$$\frac{2}{x} = -\frac{1}{x}$$

There is no real number for which this equation is true.

24) **⇒** D

$$f(x) = \frac{x^2 + 2x + 1}{x+1}$$

$$f(i) = \frac{i^2 + 2i + 1}{i+1}$$

$$= \frac{-1 + 2i + 1}{i+1}$$

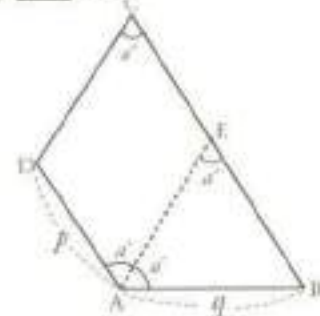
$$= \frac{2i}{i+1}$$

Rationalize the denominator:

$$f(i) = \frac{2i}{i+1} \cdot \frac{(1-i)}{(1-i)}$$

$$= \frac{2i - 2i^2}{1 - i^2} \rightarrow \frac{2(i - (-1))}{1 - (-1)} = \frac{2(i+1)}{2}$$

$$= i + 1$$

25) **⇒** B

$\triangle AEB$  is an isosceles triangle, and the length of  $\overline{EB} = q$ . The quadrilateral formed by the bisector,  $\overline{ADCE}$ , is a parallelogram, so the length of  $\overline{CE} = p$ . The length of  $\overline{CB}$  is:

$$\overline{CB} = \overline{CE} + \overline{EB} = p + q$$

26) **⇒** DFor  $y = 8$ ,

$$x^2 - 8 = 0 \rightarrow x^2 = 8$$

$$\sqrt{x^2} = \pm\sqrt{8} = \pm 2\sqrt{2}$$

The distance between the points

$$(2\sqrt{2}, 8) \text{ and } (-2\sqrt{2}, 8) \text{ is } 4\sqrt{2}.$$

27) **⇒** D

A horizontal translation of a function  $f(x)$  by  $a$  units is the new function  $f(x-a)$ . A reflection of the function  $f(x)$  across the  $y$ -axis is the transformation  $-f(x)$ . If the function  $f(x)$  is translated three units to the right and reflected across the  $y$ -axis, the function produced is  $-f(x-3)$ .

28) **⇒** B

This is a complex word problem to be approached step-by-step. To set up the equation, note that the initial share is  $\frac{60}{x}$  cookies per camper. Eight returned their share, which were distributed two each to the remaining campers:

$$8\left(\frac{60}{x}\right) = 2(x-8)$$

$$\frac{480}{x} = 2x - 16$$

$$2x^2 - 16x - 480 = 0$$

$$2(x^2 - 8x - 240) = 0$$

$$2(x-20)(x+12) = 0 \rightarrow x = 20, -12$$

There are 20 campers in total.

29) **⇒** B

The number of voters 18 to 25 is:

$$\text{Voters} = (0.15)(51,000) = 7650$$

Let  $x$  be the number of new voters added to this group:

$$\frac{7650 + x}{51,000 + x} = 0.2$$

$$7650 + x = 10,200 + 0.2x$$

$$0.8x = 2250$$

$$x = 3188$$

30) **⇒** A

The question tells us that  $x < 90^\circ$ . From the ratio of the sides of a 30-60-90 right triangle, we confirm that  $\cos 60^\circ = \frac{1}{2}$ . To convert this angle to radians:

$$60^\circ \left( \frac{\pi}{180^\circ} \right) = \frac{\pi}{3} \text{ radians. Therefore, } \frac{\pi}{2} - 2x = \frac{\pi}{3}$$

$$\frac{\pi}{6} - 2x \rightarrow x = \frac{\pi}{12}$$

31) **⇒** 550

Let  $x$  be the number of adult tickets and  $y$  be the number of children's tickets:

$$x + y = 750$$

$$15x + 2y = 4100$$

Substitute the second equation into the first:

$$15(750 - y) + 2y = 4100$$

$$11250 - 15y + 2y = 4100$$

$$13y = 7150$$

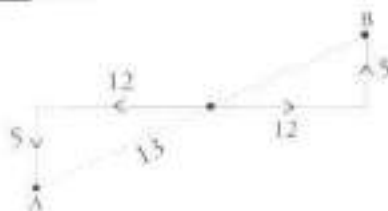
$$y = 550$$

32) **⇒**  $\frac{5}{3}$ 

Force and length are inversely related. Let  $x$  be the force needed to break a board 6 feet long:

$$(5 \text{ lb})(2 \text{ ft}) = x(6 \text{ ft}) \rightarrow x = \frac{5 \text{ lb} \cdot 2 \text{ ft}}{6 \text{ ft}}$$

$$x = \frac{5 \text{ lb}}{3}$$

33) **⇒** 26

The path taken by each student marks a 5-12-13 right triangle. Since they walk parallel paths, the distance between them is 26 feet.

34) **⇒** 1,024

The number of 20 minute periods is:

$$\text{Number of periods} = \frac{3 \text{ hours } 20 \text{ minutes}}{20 \text{ minutes}} = 10$$

As the population doubles once per period, the factor of increase is:

$$\text{Factor of increase} = 2^{10} = 1024$$

35) **⇒** 3,400

The number of hardcover books is:

$$(18,000)(0.3) = 5400$$

There are 6800 nonfiction books, of which 4800 are paperback, and 2000 are hardcover. The remaining hardcover books must be fiction:

$$\text{Hardcover fiction} = 5400 - 2000 = 3400$$

36) **⇒** 3

$$p(x) = f\left(-\frac{x}{2}\right) + 5 \rightarrow p(-4) = f\left(-\frac{-4}{2}\right) + 5$$

$$\rightarrow p(-4) = f(2) + 5 \rightarrow f(2) = 2^2 - 6$$

$$p(-4) = (2^2 - 6) + 5 = 3$$

37) **⇒** 0.38

The average price of natural gas from 2012 to 2014 is:

$$\frac{10.69 + 10.30 + 10.97}{3} = \$10.65 / 1000 \text{ ft}^3$$

Convert to dollars per cubic meter:

$$\text{Price} = \frac{\$10.65}{1000 \text{ ft}^3} \cdot \frac{\text{ft}^3}{(0.305 \text{ meter})^3} = \frac{\$10.65}{(1000)(0.305^3) \text{ meter}^3}$$

$$= \$0.38$$

38) **⇒** 0.43

Let  $x$  be the price of gasoline in 2015:

$$\frac{12.76}{99.54} = \frac{x}{3.37}$$

$$x = 0.43$$

## Essay Test

### Sample Response: Score 1/2/2

*Extraterrestrials depiction has become a huge concept not only with children, but with directors, editors, and adults. In the passage of Gerdisch he claims that the depiction towards extraterrestrial are poorly and vaguely done. Through the use of rhetorical devices and diction he expresses a desire to change science fiction idea and image towards these aliens, by using examples of movies the audience could relate to.*

*Questioning has been a part of science and Gerdisch in passage questions about this exotic beings. The use of this element in his passage such as "What might these exotic being, intelligent or not, look like?" In our world today who really knows if we have evidence of such things, Gerdisch asks this question to bring his audience into a focus to drive their mind into common image of an alien, which could most likely be wrong depiction. However, its what the people see through the media.*

*Another use of a rhetorical device in his passage is his question "So why sacrifice the idea that humans are unique for the reassurance and familiarity of an anthropomorphic extraterrestrial." Through Gerdisch questioning he brings his audience to another term in their focus to imagine these aliens and understand the concept of how entertainment and media have build this images upon the screen so human like that science fiction can no longer prove extraterrestrial evidence. But may also raise the question that is the government hiding evidence? Is the poorly depicted images, so human-like, just to make us, humans, not afraid and feel comfortable, as Gerdisch states through his questioning.*

### Evaluation

#### Reading: 1

The response shows that the student could best improve his or her score by re-reading the source text. The student says that the author "claims that the depiction towards extraterrestrial are poorly and vaguely done," which is not exactly the same as the author's main argument that science fiction writers make extraterrestrials too human-like. Further, the student does not show that he or she understands the point of the quotation in the response's third paragraph.

#### Analysis: 2

The student demonstrates some understanding of the analytical task. The response might have earned a higher score by focusing on larger strategies. The student points out that the author uses rhetorical questions to focus the reader's attention on particular ideas, which is a good insight; but then the student struggles to explain why this is persuasive. The student only briefly mentions the use of examples, a strategy that the author uses throughout the text, and which may have been easier to discuss.

#### Writing: 2

The student does a good job of organizing ideas, with a visible and coherent structure. However, the response is difficult to understand at times because sentences become confusing. In all, the student could benefit from taking time after writing each paragraph to re-read his or her own work and quickly adjust phrasing to express ideas more clearly.

### Sample Response: Score 4/4/4

*The author of "Earthbound Imagination" presents a progressive, well-supported, and nuanced argument in favor of greater boldness in the depiction of extra-terrestrial lifeforms in science fiction. In this essay, the author—Mr. Gerdisch—draws from natural science, psychology, and popular culture to critique the tendency of science-fiction books and movies to portray extra-terrestrial life as "slightly-different-humans", essentially mirrors of ourselves in physical form and "cultural practices." Whereas such representations may be effective for certain purposes, Mr. Gerdisch argues that such they have been overrepresented in science-fiction, and that these representations fail to accomplish one of science-fiction's central functions, to "cause people to question their preconceptions, not reinforce them."*

*Mr. Gerdisch begins by posing questions—an effective rhetorical technique for generating interest in a topic that many readers have probably overlooked. The questions he poses are of a general character, the type of questions we have all pondered: considering the immensity of the universe, and the likelihood of extra-terrestrial life, "what might these exotic beings... look like? How might they behave?" Once the questions have been raised, Mr. Gerdisch is in a position to introduce his complaint: rather than embrace the opportunity to stretch our imaginations, science-fiction has tended to depict these hypothetical beings as disguised versions of*



ourselves.

*Although he is critical of them, the author provides explanations for these practices. By doing so, he clarifies the issue. He demonstrates an in-depth understanding of the phenomenon he is attempting to change, which strengthens his analysis. Rather than simply criticizing the practice, he expresses empathy with the motivations that have created it. He demonstrates his understanding over the course of an extended example—the enormously successful movie Star Wars. His choice of movie is all-the-more effective in that it is widely known and loved. The aliens of Star Wars are representative of the central problem—its aliens mostly look like humans. Earlier in the paragraph, he suggests one of the motivations for such a treatment. Science fiction, he writes, is often an instrument for exploring “social, political, or religious issues” that actually exist in human societies. In other words, science-fiction is often used to create alternate versions of human reality. A variation on this motivation is presented through the character of Chewbacca, a specific example of a humanoid alien from Star Wars. According to the author, science-fiction creates anthropomorphic extra-terrestrials in order to make them more accessible and thus more popular.*

*For Mr. Gerdisch, these justifications are not enough. He argues that the purpose of science-fiction is the treatment of “big, important questions about where we came from and where we are going,” and that simple humanoid representations of aliens waste an important opportunity. His essay ends by presenting examples of works that have challenged our conventional notions, such as Kubrick’s “2001: A Space Odyssey” and the original Star Trek series. His concluding paragraph notes the importance of science-fiction on a real human advance—space travel—to once again inspire his readers to seek more in their books and movies than “small green men with large heads”.*

*Throughout the essay, Mr. Gerdisch utilizes a conversational tone to convince readers of his position. He expresses disappointment with the phrase “that’s a shame”, and empathy with the phrases “don’t get me wrong” and “fair enough”. He leads the reader to his side through the effective use of a rhetorical question in paragraph five. The strength of the essay, however, is its strong line of reasoning. It presents a balanced treatment of the question of extra-terrestrial life-forms in science-fiction, explaining underlying tendencies, and calling for a shift, rather than an overturning, of the status quo.*

### Evaluation

#### Reading: 4

Throughout the response, the student makes use of quotations and paraphrases to show thorough understanding of the text. The response describes

how the author’s central claims connect to supporting details (i.e., “A variation on this motivation is presented through the character of Chewbacca...”) The response interprets the author’s intent even regarding small phrases (i.e., “that’s a shame.”)

#### Analysis: 4

The response outlines several of the author’s persuasive strategies and explains them insightfully. For example, the student points out the reason that the author explains the very practices with which he disagrees: this strategy “brings clarity” and “lends credence to the issue.” The student chooses support from the text strategically, providing an excellent overall evaluation, concluding that the essay’s strength is its “strong line of reasoning.”

#### Writing: 4

The student demonstrates great command of the language, using sophisticated vocabulary and a highly effective progression of ideas. Sentence structures and lengths are varied, creating statements that smoothly explain difficult ideas (i.e., extraterrestrials in books and movies are “essentially mirrors of ourselves”) and catch the reader’s attention (i.e., “For Mr. Gerdisch, these justifications do not suffice.”)

## Reading Test



1. (C)	6. (D)	11. (B)	16. (B)	21. (B)	26. (A)	31. (B)	36. (C)	41. (A)	46. (C)	51. (C)
2. (A)	7. (B)	12. (D)	17. (C)	22. (B)	27. (B)	32. (D)	37. (C)	42. (C)	47. (B)	52. (B)
3. (A)	8. (D)	13. (B)	18. (C)	23. (B)	28. (A)	33. (B)	38. (D)	43. (A)	48. (B)	
4. (B)	9. (A)	14. (A)	19. (A)	24. (C)	29. (B)	34. (A)	39. (A)	44. (C)	49. (A)	
5. (C)	10. (D)	15. (D)	20. (D)	25. (D)	30. (A)	35. (H)	40. (B)	45. (A)	50. (A)	

1) **⇒ C**

The answer is (C) because throughout the passage, Dubois describes what it feels like to live outside the dominant culture—a “world” that he cannot enter. He speaks of himself as a “Negro” existing “behind a veil” that separates him from this world of white privilege. (A) is incorrect because the “other world” is one that Dubois defines as peopled by those who *do* consider him to be a problem. (B) is incorrect because the narrator is referring to people who exclude him, not to people who want to understand American culture. (D) is incorrect because the “other world” is people who emphasize, rather than disregard, perceived differences, cultural as well as ethnic.

2) **⇒ A**

Choice (A) is correct because the passage implies that the “unasked question,” which we learn is, “How does it feel to be a problem?” is being asked of him in one way or another by “curious or compassionate” white people who do not think of themselves as “a problem.” (B) is incorrect because the narrator is not using the device in conversation; instead, the “unasked question” is implicit in the questions asked of him by whites. (C) is incorrect because throughout the passage, the narrator assumes that readers understand that he is not talking about an experience that is unique to himself, but rather is experienced from childhood by him and by “other black boys.” (D) is likewise incorrect because Dubois does not mention the intellectual concerns of other writers and orators; the “unasked question” instead refers to the implication from acquaintances that he is a social problem rather than an individual.

3) **⇒ A**

The correct answer is (A) because “framing”

is used to refer to the best way of stating or *presenting* some information, i.e. what exactly to say and which words to use to have one’s meaning understood. (B) is incorrect because the speaker’s problem is expressing, not setting up or answering, the question. Choice (C) is incorrect because the question is not about trying out a phrase, as in writing a first draft, but rather in carefully expressing it. Choice (D) is incorrect because the question is not about where in a conversation to mention something, as in where to place it, but rather how best to express it.

4) **⇒ B**

The correct answer is (B) because in paragraph 2 the narrator is recounting how, during a “rollicking boyhood,” a “shadow swept across me.” (A) is incorrect because the narrator is recounting the dawn of a painful realization, not feelings of nostalgia. (C) is incorrect because the personal experiences recounted in the second paragraph do not emphasize the importance of the “unasked question” so much as they elaborate on it by describing the narrator’s first experience of exclusion and its effect on his attitudes. (D) is incorrect because paragraph 2 does not discuss work ethics.

5) **⇒ C**

Choice (C) is correct because the phrase functions as a claim that Dubois was not different from his white classmates, but rather the same in “life and love and longing.” (A) is incorrect because the reader can infer that the narrator’s classmates are white, and that he is made to feel different from them because he is black. (B) is incorrect because Dubois is not pointing out similarities between any cultures, but between himself and his classmates. (D) is incorrect: by using his own experiences as a black child, Dubois indicates the

subtle instruction that informs black children that they are viewed as “different.”

6) **➡ D**

Choice (D) is correct because in paragraph 3, Dubois uses the “blue sky” to symbolize equal opportunity to succeed; it was a “region” in which he could feel successful as he played and competed with his white classmates. But in paragraph 4, he suggests that such a bright feeling is nearly impossible for black adults to attain because they are trapped by barriers from which they cannot escape. (A) is incorrect because the “blue sky” is a positive image, but not one to be celebrated in itself. (B) is incorrect because the “blue sky” is not spoken of as a means to accomplish something (i.e. as a tool). (C) is incorrect because the “blue sky” is never merely a distraction or a nuisance.

7) **➡ B**

Choice (B) is correct because in paragraph 3, the narrator describes coping with prejudice by adopting a disdainful attitude toward his white classmates, holding them and others on the other side of the “veil” in “common contempt.” In paragraph 4, he has realized that he will not have the same opportunities that they will, and defiantly decides to out-compete them in some way. (A), (C) and (D) are inaccurate descriptions of the narrator’s emotions.

8) **➡ D**

Choice (D) is correct because the word occurs in the midst of a sentence about how some African American boys coped with discrimination; some respond with a “bitter cry” against God for making them an “other” in their own country. Thus, Dubois is using “bitter” in the sense of “aggrieved,” or anger at being wronged. Choice (A), “sharp,” is incorrect because it does not convey the emotional meaning of “bitter.” (B) is incorrect because “churlish” implies “mean,” which does not convey the author’s intended meaning. (C) is incorrect because “petulant” conveys a sense of childishness or a bad mood, which does not fit the serious context of the sentence.

9) **➡ A**

The answer is (A) because the narrator indicates that the veil symbolizes racism; it symbolizes the divide between being like others and being

identified as “different.” Black people’s “double-consciousness” stems from the “peculiar sensation” of always seeing oneself as different through the eyes of others. (B) is incorrect because, although Dubois describes his own changing attitudes as he matures, there is no mention of different generations’ views on racism. (C) and (D) are incorrect because, for the narrator, the veil symbolizes general racist views, not specific consequences of those views.

10) **➡ D**

Choice (D) is correct because it provides specific evidence to support the narrator’s connection of the veil—a symbol of the racism experienced by black Americans—to the sense of “twoness” felt by blacks. (A) is incorrect because it does not address the symbolism of the veil or the “double-consciousness.” (B) is incorrect because it does not directly address issues of identity. (C) is incorrect because the “seventh son” is an allusion to folklore in which a seventh son may possess special powers (in this case, second-sight). However, the connection between the veil and a “double-consciousness” is not clear and direct, as it is in (D).

11) **➡ B**

Choice (B) is correct because paragraph 1 depicts admiration for a baseball player’s signing bonus. Next, the author contrasts that admiration with the comment that no one needs that much money. This establishes the two opposing viewpoints in the passage. (A) is incorrect because the purpose of the paragraphs is not to introduce the author but to introduce an argument. (C) is incorrect because the author mentions the athlete’s large signing bonus but does not at this point attempt to describe an image of the wealthy. (D) is incorrect because, although the author’s son may be demonstrating the influence of the media, that is not mentioned as a focus of the paragraphs.

12) **➡ D**

The best answer is (D), because the author alludes to the Revolutionary War (“a war against the British”), which challenged the assumption that it is the birthright of royalty—kings, queens, and nobles—to make the rules and own the land. The author is implying that such an assumption is echoed in the belief that some people deserve to have enough money to build modern-day

"palaces," such as the celebrity whose home included "a royal ballroom." (A) is not the best answer, because the author's focus is not on the ethics of a particular house or type of house, but on the overall attitude about deserving excessive wealth. (B) is not the answer because the author does not make or imply sweeping statements about the Revolutionary War itself. (C) is incorrect because the mention of celebrities in paragraph 3 is designed to serve as a springboard for the questions the author subsequently asks, and not to open a discussion of celebrities as such.

13) **➡ B**

The graph indicates that tax rates increased for the nation's top earners in 2013. This is consistent with the author's statement about improving income inequality, so (B) is the correct choice. (A) and (D) are incorrect because they highlight the author's opinion with rhetorical devices rather than discussing tax rates. (C) is incorrect because the graph does not display information about the polarization of wealth in the United States.

14) **➡ A**

The graph shows that under the 2013 tax law, the tax rate of people with incomes in the top 1 percent should return to approximately where it was in 1979. (B) is incorrect because the tax rate of the top 1 percent fell in similar fashion as other tax rates during the decade, but it was not itself the *same* as rates for other income groups. Choice (C) is incorrect because tax rates for the wealthiest 1 percent consistently remained below 40 percent. (D) is incorrect because the graph does not illustrate the distribution of wealth in the United States.

15) **➡ D**

Choice (D) is correct because the images of working families who struggle financially immediately precedes the information that nearly half of Americans are considered low-income or poor. (A) is incorrect because the author does not describe how hard people work. (B) is incorrect because the description of the neighborhood serves as a rhetorical device to compare with other neighborhoods; the author's purpose is not to inform the reader more completely about a "way of life." (C) is incorrect because the author does not mention how she formed her opinion.

16) **➡ B**

Choice (B) is correct because the author explicitly states that wealthy Americans generally do not socialize with individuals who are not wealthy. She states that instead, wealthy Americans tend to "meet people like themselves." (A) is incorrect because there is no evidence that the author believes that wealthy Americans actively thwart the upward mobility of those less well-off. (C) is incorrect because, while the passage says that wealthy Americans are "swaddled" in their own neighborhoods, there is no suggestion that wealthy Americans never leave. (D) is incorrect because the author does not discuss the fate of the middle class in America.

17) **➡ C**

Choice (C) is correct because it implies that affluent people mainly befriend other affluent people. (A) is incorrect because the author's discussion of the poverty rate for children is a separate and distinct point from the discussion of the insulated social life of wealthy Americans. Choice (B) is incorrect because it primarily speaks about assumptions about "normal" life, not specifically how the assumptions form. Choice (D) mentions an economic fact—that middle-income Americans' incomes have fallen. But again, this factual evidence does not pertain to affluent people's social and emotional bonds.

18) **➡ C**

The answer is (C) because, as used here, a "dynamic" is a change that requires explanation. The author uses it to refer to an economic phenomenon—the falling incomes of the middle class—that the author admits is "not simple." (A) is incorrect because "motility" refers to the ability to move, which would not make sense in the context. (B) is incorrect because the author is not merely referring to an interaction, but a measurable change. (D) is incorrect because the author is not describing an upsurge, or increase in wealth, but an actual decrease in income for middle-class Americans.

19) **➡ A**

The author agrees with the counter-argument that many wealthy Americans have given enormous sums of money to charity. Thus, choice (A) is correct. (B) is incorrect because the author does not say that she made any false assumptions. (C) is

- incorrect because the author does not present any statistics about fighting disease, medical research, or public education. Rather, these are mentioned as areas in which wealthy donors contribute. (D) is incorrect because the author does not concede that wealthy donors are usually right about aid programs—in contrast, she complains that the wealthy have excessive influence in setting public priorities.
- 20) **D**  
 Something that is “undue” is unearned or unjustified. In this paragraph the author is implying that wealthy Americans should not have excessive influence in setting societal priorities. Choice (A) is incorrect because “needless” means unnecessary. The author is not saying that Bill Gates’ influence is unnecessary, but unjustified. Answer choice (B), “exorbitant,” would not make sense in the context because it primarily refers to prices that are very high. (C) is incorrect because the author does not make the case that wealthy donors do not want influence.
- 21) **B**  
 The answer is (B) because the film depicts an exaggerated dystopian scenario that serves as a segue into a discussion of wealth inequality and life expectancy in the United States. (A) is incorrect because the author does not imply that the country’s circumstances are even worse than in the film, as falling is to stumbling. (C) is incorrect because the author does not argue that the film might become reality. (D) is incorrect because the author does not indicate that there are multiple concerns relevant to both the film and today’s American society. The author’s use of the film is to dramatize the single fact that life expectancy is tied to income level.
- 22) **D**  
 Choice (D) is correct because Einstein uses the notion of a “structure” with “staircases” as a metaphor for describing the process of building proofs, one based upon another, that comprise Euclidean geometry. He assumes that the experience is shared with readers. (A) is incorrect, because once Einstein uses the metaphor of a staircase in the first paragraph, he does not use it subsequently. (B) is incorrect because it misinterprets the architectural metaphor as representing an actual relationship between geometry and architecture. (C) is incorrect because the notion that geometry must
- be studied with diligence is separate and distinct from the discussion of geometry as a “structure.”
- 23) **B**  
 Choice (B) is correct because the phrase “perhaps more respect than love” is meant to suggest that readers would remember geometry as something they respected, but not something they enjoyed. (A) is incorrect because “reverence” implies warm feelings, while “more respect than love” implies the opposite. (C) is incorrect because a nostalgic memory would be a generally positive one, the opposite of what Einstein implies. (D) is incorrect because the phrase “more respect than love” refers to readers’ attitudes toward geometry, not toward their teachers.
- 24) **C**  
 Choice (C) is correct because Einstein says that the ideas’ apparent correspondence to objects in nature is “undoubtedly the exclusive cause of the genesis of those ideas.” (A) is incorrect because Einstein does not say that the geometrical principles under discussion are “indisputable;” rather, he is preparing to dispute them. (B) is incorrect because Einstein made no mention of how simple or clear these concepts are. Similarly, (D) is incorrect because the author does not discuss the concepts in terms of cultures.
- 25) **D**  
 Choice (D) is correct because “more or less definite ideas” means that the ideas are nearly, or *approximately*, definite. (A) is incorrect because “concretely definite” is redundant, and the phrase does not fit conceptually in the passage, which challenges the certainty of the concepts. (B) is incorrect because Einstein is not discussing concepts quantitatively, i.e., with numbers. (C) is incorrect because it is not clear what it would mean to say that an idea is “unreliably definite.”
- 26) **A**  
 Choice (A) is correct. In paragraph 2, Einstein says that “the concept ‘true’ does not tally with the assertions of pure geometry” because geometry is not based on real objects that people experience in their lives, but only on the logical connections of certain ideas. (B) is incorrect because Einstein’s point is that it is impossible to prove the definition of “straight line,” not that the definition itself needs to change. (C) sounds like the answer, but on closer examination, Einstein is saying that

the definition of a straight line *does* support the geometric axioms that come from it, which does not make it problematic. (D) is incorrect because the definition of a straight line is not problematic because it is connected to other ideas in geometry, but because it is unverifiable.

27) **⇒** B

A "course" is a way of proceeding, or in this case, the usual practices in geometry of considering propositions to be "true." Thus, (B) is the answer. (A) is incorrect because a "class" is a category or classification, and it would not make sense to say that geometry should refrain from such a class. (C) is incorrect because "itinerary" typically refers to a planned route of a journey, and the author is not talking about a journey in this sentence. (D) incorrectly implies that geometry is just beginning to engage in the practices, as in "heading in that direction."

28) **⇒** A

Choice (A) is correct because in paragraph 3, Einstein discusses how humans habitually think of points on a rigid object as representing a straight line, even if one of the points is farther away and even seems to "coincide" with the others and appear to be one point. For example, looking at the end of a string of beads, one might see only one bead. In paragraph 4, Einstein says that such real-world experiences can form the basis for legitimate questions about the "truth" of geometric propositions, interpreted as physics problems. (B) is incorrect because Einstein does not provide an opinion in the passage about whether geometry and physics are both important in an educational curriculum; rather, he describes a new perspective on geometry itself. (C) is incorrect because Einstein says only that geometric principles are limited in their truth, not that they are fiction. (D) is not the answer because Einstein is not drawing a contrast between generalizations and experiments.

29) **⇒** B

The answer is (B) because Einstein points out that, when physicists examine the fundamental truth of geometric propositions, even the notion of "real things" is based on "rather incomplete experiences." In other words, humans have a limited understanding of the phenomena around them. (A) is incorrect because Einstein does not

call geometry an "artificial" system of knowledge. (C) is incorrect because Einstein does not mention measurement. (D) is incorrect because Einstein does not say that geometrical propositions are untrue, but that the theory of relativity in physics can demonstrate that their truth is limited.

30) **⇒** A

Choice (A) is correct because, in lines 40–44 and lines 76–81, Einstein implies that it is only meaningful to consider the truth of geometric propositions in terms of "objects of experience," or in other words, "real things." (B) is incorrect because Einstein does not mention experiments. (C) is incorrect because Einstein does not discuss applying concepts for practical purposes. (D) is incorrect because there is no indication that Einstein would consider something to be true simply because it is what most people think is true. Instead, Einstein is questioning readers' "proud certainty" that geometric propositions are true.

31) **⇒** B

Choice (B) is correct because in lines 40–44, Einstein points out that people believe something is true if it corresponds with a real object. (A) is incorrect because it is not a statement by Einstein about a definition of truth, but about people remembering as "true" what they learned in school. (C) simply critiques geometry because its ideas are based on "more or less exact objects," so it does not directly address Einstein's concept of "truth." (D) is incorrect because again, Einstein is pointing out a problem with the notion of "truth," not a definition of truth that he supports.

32) **⇒** D

Choice (D) is correct because in paragraph 1, Goldman implies that many marriages are not the result of love, but rather of people wanting to take part in a societal convention and gain public approval. (A) is not the answer because the author does not mention working on love in a marriage; in fact, she suggests that love rarely continues in married life. (B) is incorrect because Goldman does not claim that all people in love are "unconventional." (C) is incorrect because in the passage, Goldman uses insurance as an analogy to marriage; she does not discuss getting health insurance via marriage.

- 33) **➡ B**  
Choice (B) most clearly and directly confirms the author's assertions about marriage, namely that couples get married in order to gain approval from society. (A) is incorrect because it does not address the reason that most people get married, according to Goldman. Instead, it addresses the reason that some people who are truly in love get married. (C) is incorrect because it comprises Goldman's view that getting married never causes couples to fall in love, which does not directly address marrying for convention's sake. (D) is incorrect because it focuses on economic rather than social pressures to get married.
- 34) **➡ A**  
Choice (A) is the answer because when she mentions parasitism, Goldman is commenting on married woman in her era (she published the article in 1911). She implies that they are not allowed to work outside the home, and thus their "predicament" is that they are subjected to "life-long dependency" on their husbands. (B) is incorrect because the only role health insurance plays in the paragraph is as an analogy to marriage. (C) is incorrect because the passage focuses on the effects of marriage, with only an indirect suggestion about equality in the job market. (D) is incorrect because the metaphor of the parasite refers only to the wife being financially dependent on the husband; the metaphor does not address energy.
- 35) **➡ B**  
Choice (B) is correct because in paragraph 4, Goldman argues that society keeps men and women strangers to each other by means of an "insurmountable wall;" the wall comprises the undramatic factors of "custom and habit," so that the reader can infer that "superstition" simply means unfounded beliefs about the opposite gender. (A), (C), and (D) are incorrect because there is nothing in the rest of the sentence or the passage to suggest that Goldman is referring to magic, charm, or fear keeping the genders from knowing and respecting each other.
- 36) **➡ C**  
According to the author of Passage 2, it is intriguing that, despite the fact that half of all marriages end in divorce, people continue to get married and remain optimistic. Thus, (C) is the answer. (A) is incorrect because the main focus of the passage is on why people get married. (B) is incorrect because the author does not focus on analyzing why fewer homes include two adults. (D) is incorrect because, while the author mentions research from the mid-1800s, she does not focus on it in the passage.
- 37) **➡ C**  
Choice (C) is correct because in paragraph 4, the author says that that married people tend to have lower blood pressure and suffer less from depression than their single counterparts. This indicates the hypothesis that marriage can have a calming effect. (A) is incorrect because the author does not offer any recommendations, namely that people should or should not get married. (B) is incorrect because there is no evidence that the author is suggesting that any marriage can be happy; rather, she provides figures indicating that more than half of them end in divorce. At the same time, (D) is incorrect because the author does not imply that happy marriage is only a fantasy.
- 38) **➡ D**  
Choice (D) is correct because it most directly links healthy marriage and reduced stress levels, so it provides the best evidence that "marriage can be calming." (A) is incorrect because its focus is the happiness of married people, not their calmness. (B) is incorrect because it discusses married people living longer without attributing that to any cause. (C) is incorrect; although it reports that, as a group, people in stressful marriages do not tend to exhibit better health than singles, that is only indirect evidence that marriage can be calming.
- 39) **➡ A**  
Choice (A) is the answer because, as used here, "consideration" means the act of considering or being sensitive to another person's feelings, in this case even during an argument. (B), (C), and (D) are incorrect, because although they can all serve as synonyms of consideration in other contexts, none of them makes sense in the context of "maintaining a level of kindness and consideration..."
- 40) **➡ B**  
The answer is (B); the author of Passage 1 is writing in 1911, more than 100 years before the author of Passage 2. Thus, whereas Goldman says

that women who get married become trapped in a state of economic dependence until death, the author of Passage 2 would be likely to point out that the status of American women has changed so much that marriage is no longer a form of dubious “insurance” in the same way. (A) is incorrect because there is no indication that research on the health benefits of marriage was available in 1911. (C) is incorrect because the author of Passage 2 cites research showing that marriage can have substantial “returns.” (D) is incorrect because the author of Passage 2 is not offering a personal evaluation of marriage as an institution, so she would not likely critique Goldman’s analysis.

- 41) **➡ A**  
Choice (A) is correct because in Passage 1, Goldman uses the image of a wall to symbolize the barriers to men and women becoming close in marriage; she says that they “remain strangers.” In Passage 2, the author describes “massive amounts of data” that conclude that marriages are more successful if couples talk to each other “about more than just household chores.” Based on the data, it is likely that she would agree with Goldman that, if there is an “insurmountable wall” blocking communication, the “union is doomed to failure.” (B) is incorrect because the principle of the “insurmountable wall” is not focused on questions of arguments, but on communication. (C) is incorrect because the “insurmountable wall” is a metaphor for barriers to communication, a timeless problem. (D) is incorrect because Passage 2 incorporates more than just statistics; it includes researchers’ conclusions about relationships.
- 42) **➡ C**  
Choice (C) is correct; in Passage 1, Goldman states her view that “it is utterly false that love results from marriage.” The author of Passage 2 cites research findings in paragraph 5 that married couples who are happiest at the beginning of the marriage are the most likely to stay together. Thus, it is likely that both authors would agree that couples should not expect to fall more in love or to become happier in a relationship just by getting married. (A) is incorrect because neither author says that marriage causes stress. (B) is incorrect because neither author recommends marriage; Goldman describes a negative view of it, and the author of Passage 2 does not make any recommendations. (D) is incorrect because

neither author implies that the only way to be healthy and happy is to get married; Goldman, in fact, believes that in her era (1911), marriage causes unhappiness.

- 43) **➡ A**  
The answer is (A) because the author begins by listing well-known aspects of city life, and then adds weather to the list, something readers would not normally expect to be different in cities. (B) is incorrect because the passage is not about the author and where he grew up; it is about research on weather. (C) is incorrect because the author does not address the ways that weather affects urban culture, such as its food and music. (D) is incorrect because the passage that follows is not about general differences in city life and rural life; rather, the opening sentence sets up the following discussion about unexpected weather patterns in cities.
- 44) **➡ C**  
Choice (C) is correct because in the context, the author means that meteorologists have studied thunderstorm patterns by creating replicas, or *simulating* the conditions and patterns that they have observed. (A) is incorrect because a sculpture is a work of art, which does not fit the scientific context. (B) is incorrect because there is no indication that anyone or anything is “acting.” (D) is incorrect because modeling the weather implies creating a small image or digital depiction, and simulating possible activity, whereas to imitate something is to act like it, which is impossible in terms of atmospheric conditions.
- 45) **➡ A**  
In paragraph 4, Haberlie says that a difference of 5 percent in the number of storms per year amounts to “a couple to three” more storms per year. Thus choice (A) is correct. (B) is incorrect because Haberlie specifically states that three or more extra storms per year are possible. (C) is incorrect because “twice as many” storms is more than a 5 percent increase. (D) is incorrect because it contradicts what Haberlie says: that there are more storms per year, and not half as many.
- 46) **➡ C**  
Choice (C) is the answer because in paragraph 2, the author says that modeling made researchers aware of the phenomena of increased rainfall in cities, but that the new research verifies the



models by showing actual effects over time. Thus, modeling provides ideas about how things work, but not proof. (A) and (B) are both incorrect because the author is not evaluating the relative importance of modeling vs. data collection. If anything, the passage indicates that both are important. (D) is incorrect because the author not does address the question of models generating conflicting results.

47) **⇒ B**

The answer is (B) because it supports the notion that, in this case, modeling was verified by data, indicating a practical relationship between the two methods. (A) is incorrect because it describes the new research, but does not mention models. (C) is incorrect because it reports results, but does not compare them to models. (D) is incorrect because it is merely a researcher's reaction to data, and is too indirect to serve as evidence.

48) **⇒ B**

Choice (B) is correct because the passage describes how Haberlie's data and Shepherd's models both showed that cities experience an increased number of thunderstorms compared to their rural surroundings. (A) is incorrect because the researchers both had similar, not different, findings. (C) and (D) are incorrect because Shepherd created simulations, and Haberlie compiled measured data; therefore, their approaches were different, not similar.

49) **⇒ A**

Choice (A) is correct because the adjectives "hot, stale, and dirty" conclude a paragraph that begins by laying out "several factors" that cause storms over cities. Another clue is that the adjectives follow the phrase "in essence," which indicates that the previous information is about to be compressed and summed up. (B) is incorrect because the passage does not compare "two diverging viewpoints." The two scientists quoted in the passage both agree that cities "brew up" more thunderstorms. (C) is incorrect because, while it may be common opinion that cities are hot, stale, and dirty, the author's purpose is to explain the consequences of those factors. (D) is incorrect because the author is not explicitly addressing heat and pollution as problems; instead, he is discussing a related phenomenon and the research methods used to identify it.

50) **⇒ A**

Choice (A) is the answer because in paragraph 4, the author points out that the asphalt and concrete in cities blocks the soil from absorbing water, leading to increased run-off and flooding. The same materials presumably cause cities to be hotter (paragraph 6) and thus create conditions for more thunderstorms and rain. (B) is incorrect because the passage mentions neither population density, nor evacuation. (C) is incorrect because there is no indication that data for cities is difficult to obtain. (D) will not work because the author does not address the topic of thunderstorms' economic impact on either cities or their surrounding areas.

51) **⇒ C**

Choice (C) is correct because paragraph 7 explains that the radar-data research method cannot be applied to every city; as an example, it would be too difficult to separate out effects caused by the city and those caused by a large body of water (like New York and the Atlantic Ocean.) (A) is incorrect because the author never states that radar is ineffective. (B) is incorrect because the author does not state that the Atlantic Ocean is unpredictable, only that large bodies of water near cities make weather patterns more complicated. (D) is incorrect because the author does not address public concern regarding flooding in one place or another.

52) **⇒ B**

Choice (B) is correct because it summarizes the concept that recent data analysis has supplemented previous meteorological models to confirm the connection between cities and storms. Choices (A) and (C) are incorrect because they focus solely on either modeling or data interpretation, but they do not mention any synthesis between the topics. (D) is incorrect because it addresses the limitations, not value, of modeling and data interpretation.

## Writing and Language Test



1. (D)	5. (A)	9. (B)	13. (A)	17. (B)	21. (C)	25. (A)	29. (C)	33. (A)	37. (D)	41. (C)
2. (B)	6. (A)	10. (B)	14. (C)	18. (C)	22. (C)	26. (D)	30. (C)	34. (C)	38. (B)	42. (C)
3. (C)	7. (D)	11. (C)	15. (B)	19. (D)	23. (D)	27. (B)	31. (A)	35. (A)	39. (D)	43. (B)
4. (A)	8. (B)	12. (B)	16. (D)	20. (B)	24. (C)	28. (A)	32. (B)	36. (B)	40. (A)	44. (A)

- 1) **⇒ D**  
 "Multilingual professionals" immediately precedes the pronoun "which" in the sentence. Since "multilingual professionals" refers to a group of *people*, it is necessary to use the relative pronoun "who," so (D) is the answer. Choice (B) is not a relative pronoun; it is incorrect because "they" does not properly connect the definition to the term it defines, and it would confuse the reader. Choice (C), "whom," uses the objective case of "who," making it incorrect in the context of the sentence.
- 2) **⇒ B**  
 Although (A) and (D) are grammatically correct, they repeat the subject of the sentence, making the sentence unnecessarily lengthy. (B) is the answer because it is concise and grammatically correct. (C) is incorrect because it sounds as if the "person who speaks" also does the repeating.
- 3) **⇒ C**  
 Choices (A) and (B) both incorrectly use the adjective "precise." Choice (C) is correct because "precise" functions as an adverb that modifies "rewrite," so it needs to be written with an "-ly" ending. (D) uses "precisely," but the words "it is" are superfluous, making (D) incorrect.
- 4) **⇒ A**  
 The underlined phrase provides a meaningful example to illustrate the author's point. It should be kept, so (A) is correct. (B) is incorrect because the sentence does not transition to the topic of idiomatic phrases; they are not discussed in the following material. (C) is incorrect because, while the example is applied to translators, it does not necessarily exclude interpreters. And we can eliminate (D) because the underlined phrase does not distract the reader from the paragraph's focus on written material. In contrast, it provides an example of the very challenges translators face when writing.
- 5) **⇒ A**  
 Choice (A) is correct because "to adapt" means to change something to make it more suitable for a context, situation, or circumstance. The word is correct within this context because companies are adapting their products and services to fit local environments. Choice (B) is incorrect because "to restore" something means to bring it back to a prior or original state, which would not make sense in the sentence. (C) is incorrect because "to transform" indicates a more significant and thorough change than an adaptation. But the passage does not indicate the change is as significant as a transformation. (D) is incorrect because "to recalibrate" means to check an instrument or gauge for accuracy, so the word is not appropriate in this context.
- 6) **⇒ A**  
 No change is necessary, so (A) is the best answer choice. "Consumers" should have an apostrophe after the "s" because it is referring to more than one consumer, so we can eliminate (B) and (D) on this account. (C) is incorrect because a comma is not necessary between "language" and "preferences," as it would be were the author citing three or more items in a list.
- 7) **⇒ D**  
 The first sentence of paragraph 4 states that translators and interpreters' work settings "range from the very humble to the highly prestigious," suggesting that they work in a diversity of settings. Because (D) sets up this same focus, it is the correct choice. (A) is incorrect because the paragraph emphasizes the diversity of scenarios

in which translators and interpreters work, so it would not be appropriate to begin with a blanket statement that the jobs are “always exciting.” (B) can be eliminated because it implies that the focus of the paragraph is “fluent bilingualism” rather than language-related professions. (C) is incorrect because it makes an inappropriate shift to a more informal style by addressing the reader.

8) **⇒** D

The punctuation at the underlined portion must connect two independent clauses (clauses that can act as complete sentences). Only (D) does so correctly; a semicolon can replace a period when the clauses to either side of the semicolon contain closely related information, as is the case here. (A) is incorrect because a comma cannot separate two independent clauses unless the comma is followed by a coordinating conjunction. (B) is incorrect for the same reason, as “also” is not a coordinating conjunction such as “and.” (C) can be eliminated because, like a comma, an em dash alone cannot separate two independent clauses.

9) **⇒** B

In English when a writer or speaker wishes to state that a person will eventually attain a professional level or position, the word “prospective” is most often used. “Prospective” most clearly indicates that a person is working toward attaining a certain professional stature or position. Thus, (B) is correct. Choice (A), “eventual,” is awkward because it usually indicates something that will happen in the distant future. (C) and (D) are incorrect because it would not make sense to use “attainable” or “feasible” for people, only for goals, plans, and targets.

10) **⇒** B

The answer will be the word or phrase that is most logical. (B) is correct because it is “natural” that the highest volume of work for interpreters and translators would involve the most commonly spoken languages. (A) is incorrect because “paradoxically” would imply a contradiction; yet there is no apparent contradiction in the idea that the biggest market for language interpretation and translation would involve the most widely spoken languages, and no such contradiction is elaborated upon in the paragraph. (C) is incorrect because “as a result” would refer to the preceding sentence and would imply that the biggest need being for the most commonly spoken languages

is the result of the US Bureau of Labor Statistics predicting a rise in job opportunities, which does not make sense. Similarly, (D) implies a contrast with the preceding sentence, which is also incorrect.

11) **⇒** C

Choice (A) is incorrect because “their” describes ownership whereas the sentence indicates something happening in the future. Therefore, the answer is (C) because the homonym “there” is an existential pronoun showing that something simply exists, or in this case, will exist. Choices (B) and (D) are incorrect because they are pronouns that refer to specific entities.

12) **⇒** B

Choice (B) is correct because a pause or break is needed to separate off the part of the sentence that mentions human life. The information is not essential to the sentence; it is simply an elaboration of the previous statement. Moreover, a natural pause occurs on either side of the phrases beginning with “including,” as in “(x), including (y),” so they always take a pair of commas. (A) is incorrect because the second comma is missing. (C) is incorrect because a colon comes after an independent clause and introduces an elaboration. (D) is incorrect because it does not include any commas.

13) **⇒** A

As the two sentences on either side of 13 stand now, there is a gap between the discussion of floodplains and governments building dams to prevent flooding. A connecting sentence is needed to reveal that people often settle in floodplains, making the building of dams necessary. (A) makes this connection most clearly. (B) is incorrect because it is not as important that people settle in the specific floodplains mentioned, only that they generally tend to settle in floodplains, wherever they are located. (C) presents a historical fact that does not fit the context of the present discussion. (D) is incorrect because it raises topics that are not discussed further in the passage.

14) **⇒** C

Choice (C) is correct because it provides the most relevant information to further the author’s purpose. The clause connects the idea of people trying to control flooding to the “dilemma” that flooding is beneficial *from a very long-term*

*perspective.* (A) is incorrect because the clause becomes sidetracked into an explanation of the term “geomorphology.” (B) and (D) are incorrect because they do not add any relevant information to the sentence.

15) **➡ B**

Choice (B) is correct because “sediment” is the most precise word for geological material deposited by water. (A) is incorrect because “all the stuff” is an informal phrase, which does not fit the academic tone of the passage. (C) is incorrect because the phrase “gravel and soil” appears only about 15 words before, and to use the whole phrase again would sound redundant. (D) is incorrect because its meaning is unclear from the context.

16) **➡ D**

As written, the sentence incorrectly introduces a pause by using a comma. Generally, when two verbs connected by “and” refer to the same subject, no comma is needed between them, so (A) is incorrect. (D) removes the comma while effectively preserving the rest of the sentence, making it the correct choice. (C) incorrectly states that sediment creates vegetation rather than that it supports the growth of such vegetation. (B) incorrectly implies that the author is about to list several things that sediment does. A comma is not needed to separate a list of two things, only three or more.

17) **➡ B**

Choice (A) is incorrect because the diagram indicates that the river flows below the terraces, not above. (B) is the correct choice because it explains that the river is flanked by terraces, which, based on the diagram, are both “inclined” and “step-like.” (C) is incorrect because the diagram illustrates newly formed floodplains as being level with the river, not below it. (D) can be eliminated because the diagram does not suggest any relationship between terraces and mountains.

18) **➡ C**

Choice (C) is correct because it is the best topic sentence for the paragraph. It describes floodplains as “catch-basins,” which sets up the paragraph’s explanations about floodplains diffusing and absorbing flood water. (A) incorrectly implies that the paragraph that follows will list many reasons that floodplains are important. (B) incorrectly implies that the paragraph will focus on how

floodplains are maintained. (D) is incorrect because the paragraph does not support a general statement that floods do not cause damage to floodplains. Moreover, the paragraph does not describe how floods affect floodplains as much as it focuses on the reverse: how floodplains affect floods.

19) **➡ D**

Choice (D) is correct because the subject of the verb is “deep layers,” which is plural and requires a plural verb. Choice (A) is incorrect because “is” requires a singular subject; while “aquifer” is singular, it is not the subject of the phrase (and it determines the verb “consists”). The clause “that are saturated with drops of water” describes the “deep layers,” not the aquifer or the “rock, sand, and soil.” Choices (B) and (C) incorrectly change the meaning of the phrase, so the saturation with water becomes dependent on some factor that is not stated.

20) **➡ B**

Choice (B) is correct because the sentence at 20 provides information that helps explain the significance of underground aquifers. (A) is incorrect because the sentence focuses on underground aquifers, which are the main topic of the paragraph but not the main topic of the passage. (C) is incorrect because the data cited is clear, simple, and relevant to the point made in the previous sentence. (D) is likewise incorrect because the sentence at 21 rightly keeps the focus on aquifers and does not take the paragraph in another direction.

21) **➡ C**

Choice (A) is incorrect because it wrongly indicates consequence—one thing following from another—when it should indicate an explanation: the reason that floodplains are able to reduce the amount of nitrates in water. Thus, (C) is the correct answer. (B) and (D) are both incorrect because they indicate that the sentence at 21 is explained by the previous sentence. As in (A), they wrongly indicate consequence.

22) **➡ C**

An effective concluding sentence will state in a general way that floodplains are valuable. (C) most clearly and effectively accomplishes this task by suggesting the relationship between communities and floodplains, which is implied by the passage’s focus on flood prevention, rich soil, and clean

water. Thus, the sentence sums up the passage by referring to “natural resources.” (A) is incorrect because it is vague and wordy; the phrase “it is clear to see” is unnecessary. (B) limits the value of floodplains to richness in biodiversity, and does not include a reference to floodplains supporting human life, as mentioned in paragraph 1. (D) requires further argumentation and support. It is clear from the passage that floodplains are important, but it is not clear that communities should thereby begin dismantling their dams and levees.

23) **⇒** D

Sentence 3 includes the word “however,” which is usually used to indicate a contrast with something that was said previously. Since sentence 3 talks about the ability of the Bedu to survive in the harsh desert climate, it most appropriately goes after sentence 5, which mentions that most Bedu now live in towns. Thus, (D) is correct. Choices (A), (B), and (C) place the sentence in awkward and incohesive positions, so they are incorrect.

24) **⇒** C

Choice (C) is correct because the noun “dwellers” must be plural and has no need for a possessive apostrophe. The noun serves as a substitute for “Bedu people” in the previous sentence. Choices (A), (B), and (D) are therefore incorrect.

25) **⇒** A

The preceding sentence states that the Bedu were once known for violence and stealing. The next sentence describes positive aspects of their reputation, setting up a contrast with what was stated earlier. The term “Nonetheless” is appropriate because it clearly indicates a qualification of what was said in the previous sentence. Therefore (A) is correct. (B) is incorrect because “So far” is typically used to indicate progress up to a point in time, which is not being discussed here. (C), “In addition,” is incorrect because it does not include the required element of contrast with what was said before. (D) is incorrect because the two sentences contrast with each other whereas “consequently” implies a cause and effect relationship.

26) **⇒** D

The phrase should fit the formal tone of the rest of the passage. Therefore, (D) is correct because it appropriately and concisely conveys the information. (A) is incorrect because it uses

“you,” which reflects informal spoken English. (B) is incorrect because claiming “Europeans... wrote some on” is unclear and informal. (C) can be eliminated because the term “a lot” is generally avoided in formal written English.

27) **⇒** B

As written, this phrase inappropriately uses a comma to introduce a pause in the sentence that does not belong there, since the phrases on each side of that comma are expressing different aspects of the same thought. Therefore, (A) is incorrect. Since a comma is not needed at this particular point in the sentence, (B) is the correct answer. (C) is incorrect because two commas are never needed to separate two terms that are joined by “and.” (D) is incorrect because, even if the descriptive terms are combined, they should not be followed by a comma in this sentence.

28) **⇒** A

The phrase is appropriate as written, because it clearly indicates that resources are thinly spread in the given area. (B) is too choppy and includes the vague phrase “a place like that.” (C) does not make sense, since it is not clear how resources could currently be “spreading.” (D) incorrectly shifts the focus from the habitat onto the resources and makes the meaning of the sentence unclear.

29) **⇒** C

Choice (C) is correct because it describes the traditional custom clearly and simply. (A) is incorrect because it contains awkward syntax; it separates the verb (“would signal”) from the object of the sentence (“their friendly intentions”) with a prepositional phrase (“from far away”). It also creates a redundancy, as the next sentence also mentions the visitors arriving. (B) is incorrect because its word order and its use of the passive voice (“could be seen”) make it confusing. (D) is incorrect because it lacks a subject, so it is not clear who is signaling.

30) **⇒** C

To “query” someone is to question them in an attempt to find out information. This is the most appropriate word to describe what the Bedu were doing when they spoke with their guests, so (C) is correct. Choice (A) is incorrect because to “investigate” someone is to scrutinize and research him or her, often in relation to a crime; it is more than simply asking questions and trying to gain information from people. (B) is incorrect because

the Bedu would only be “impugning” their visitors if they disputed the validity of what the visitors were telling them. But the context of the sentence seems to suggest the Bedu were more interested in simply acquiring whatever information they could from their guests. (D) is incorrect because to “divert” is to change course or change direction, or to entertain, neither of which makes sense in this sentence.

31) **⇒** A

The concluding sentence of this paragraph should sum up the purpose and meaning of the encounters the Bedu had with visitors. (A) accomplishes this by stating what the Bedu gained from these encounters about their physical and social environment. (B) would be more appropriate to continue the paragraph, not to end it, because it includes details that elaborate on what was said previously. (C) is incorrect because it narrowly focuses on one aspect of social interaction with others—the need to find grazing areas for goats and camels—at the expense of the larger value and utility of such interaction. (D) is incorrect because it neglects to mention that the Bedu also learned about their own people through their interactions with visitors, and not just their desert surroundings.

32) **⇒** B

As written, the phrase is an elaborate and slightly confusing way of referring to the literature of the Bedu. Thus, (A) is incorrect and (B) is correct. (C) will not work because it is not the traditions of the Bedu that allow them to socialize among a small group, but their literature, which serves as the basis for discussion and communication. For the same reasons, (D) will not work. In addition, (D) needlessly incorporates several modifiers that do not convey any essential information.

33) **⇒** A

Because of the use of the pronoun “these,” which is used to indicate something mentioned previously, the phrase “These oral traditions,” located in sentence 2, is awkward and unclear unless information is added before sentence 2 that describes or defines the oral traditions. Thus, the added sentence should be placed after sentence 1 because “thousands of stories, songs, and poems” is an appropriate antecedent for the pronoun “these.” The sentence also belongs at the beginning of the discussion about literature

because it introduces and describes the topic. (B), (C), and (D) create disorganization and are therefore incorrect.

34) **⇒** C

In writing, it is often preferable to use the active voice over the passive voice. Choice (A) is incorrect because it uses the passive voice, stating that the American Civil War “was fought.” (C) is correct because it uses the more direct and easier to understand active voice. (B) uses redundant and awkward phraseology. People do not “go to civil war against each other,” they fight a civil war. (D) is incorrect because it includes too many commas, which interrupt the flow of the sentence.

35) **⇒** A

Choice (A) is correct because “which” is an effective way to introduce additional information, in this case about slavery. (B) is incorrect because the phrase “the main support of the southern economy” is unclear and awkward. (C) is incorrect because it creates an overly long sentence and because it uses the word “slavery” twice, which is redundant. Similarly, (D) uses the word “slavery” twice and joins the sentences using the word “yet,” which implies contrast and therefore does not fit the context.

36) **⇒** B

Choice (B) is correct because, in standard English grammar, “none” is treated as if it were “not one.” Thus, it is a singular subject and requires a singular form of the verb. (A), (C), and (D) are each incorrect for that reason. In (C), it is also not necessary to state “the writers,” since it is clear from the context of the sentence that the author is speaking about the writers mentioned. Also, (D) is incorrect because it wrongly places emphasis on the poems. It was not the case that the poems were unable to produce good writing, but that the authors themselves were unable to do so.

37) **⇒** D

As written, the two commas after “read” and “heard” interrupt the flow of the sentence. When using “or” to indicate two alternatives, it is not necessary to place a comma before each alternative. Therefore (D) is correct and (A) is incorrect. (B) uses an em dash, which should primarily be used to indicate an interjection or interruption in the middle of a sentence. Since there is no interruption here, the “—” symbol is not necessary. (C) also incorrectly places a break

in the sentence by placing a comma where one is not needed.

38) **B**

Choice (A) is incorrect because, as written, the sentence indicates that American writing was in a transition phase away from Victorian romanticism. Yet this information strays from the author's focus on the Civil War. It also fails to introduce the "morally ambiguous situation" that is mentioned in the next sentence. (B) is correct; it rectifies this situation by mentioning American authors and their failure to capture experiences of the Civil War. This sentence provides context for the sentences that follow. (C) has a less direct connection to the main point of the paragraph. It is less relevant that American authors wrote about travels in Europe or other distractions than that they failed to illustrate the war. (D) is incorrect because the passage does not support the idea that American authors remained silent during the Civil War, only that they failed to publish material that portrayed the realities of war.

39) **D**

The entire sentence at 39 sets up a contrast. (D) is correct because "unequivocal" (absolute) maintains that contrast. It makes sense that the moral ambiguity was caused by people having *absolute* opinions on the issues, but also hating the war. (A) is incorrect because "equivocal" (uncertain) views would not contrast with disillusionment about the war. (B) is incorrect because as in (A), the word would create an illogical sentence; "indefinite" views would be views that were not very strongly held and would not contrast with negative feelings about the war.

40) **A**

Choice (A) is correct because the sentence at 40 elaborates on the previous point: photographers documented the carnage of the Civil War. (B) is incorrect because the author is not making a statement about the overall importance of photography, but about its role in documenting the Civil War. (C) is incorrect because listing famous photographers is superfluous and interrupts the paragraph's flow. (D) is incorrect because the focus is not on the visual arts "in general," but on the visual arts as a means for conveying the graphic nature of Civil War battles.

41) **C**

Choice (C) is correct because it maintains parallel structure. If men and horses *run*, and trains *run off* bridges, then it sounds best if fires *blaze* and smoke *billows*. (A) is incorrect because in mid-sentence it shifts to a structure using "there is." (B) is incorrect because it also shifts structure in mid-sentence ("also fire and smoke are there.") (D) is incorrect; it contains a different verb tense (fires "are threatening") and a less active verb (smoke "is") compared to the series' other phrases.

42) **C**

Choice (C) is correct because the sentence indicates America's ownership of "most gifted painters." Thus, the word requires an apostrophe. Since "America" is referring to the country, it is a singular noun that requires an apostrophe before the "s." (A) is incorrect because it has no apostrophe to indicate the possessive. (B) wrongly mentions Americans, which does not make sense. Winslow Homer is a product of America, not Americans. (D) is incorrect because "America" is a singular noun, and the apostrophe belongs before the "s."

43) **B**

Choice (B) is correct because it maintains consistent verb forms in the sentence. One soldier "is shooting," so it is appropriate to say another "is running." (A) is incorrect because it shifts the sentence's verb tense from present progressive ("is shooting") to simple present ("runs"). (C) and (D) are incorrect because each create a mid-sentence shift into past tenses. The shift is awkward, and activity within images is normally described in the present tense.

44) **A**

Choice (A) is correct because it creates a cohesive flow of information. Paragraph 1 provides historical context for the American Civil War. Yet paragraph 2 begins with the word "ironically," which is confusing because no irony has been introduced. Paragraph 3, however, explains that very few contemporary American authors depicted the war experience. Thus, it makes sense to place paragraph 3 before paragraph 2 because paragraph 2 introduces a legitimate irony: few American authors wrote about the Civil War, so it is ironic that "some of the best-known American writers were alive at the time."

## Math Test



## No Calculator Portion

- |        |         |           |       |
|--------|---------|-----------|-------|
| 1. (B) | 7. (C)  | 13. (A)   | 19. 5 |
| 2. (A) | 8. (B)  | 14. (A)   | 20. 3 |
| 3. (C) | 9. (A)  | 15. (C)   |       |
| 4. (A) | 10. (C) | 16. 1,250 |       |
| 5. (C) | 11. (B) | 17. 16    |       |
| 6. (C) | 12. (D) | 18. 28    |       |



## Calculator Portion

- |        |         |         |         |         |           |          |
|--------|---------|---------|---------|---------|-----------|----------|
| 1. (D) | 7. (A)  | 13. (B) | 19. (A) | 25. (B) | 31. 4.06  | 37. 800  |
| 2. (B) | 8. (B)  | 14. (B) | 20. (D) | 26. (D) | 32. 9     | 38. 2.37 |
| 3. (D) | 9. (A)  | 15. (D) | 21. (D) | 27. (B) | 33. 2     |          |
| 4. (D) | 10. (B) | 16. (C) | 22. (D) | 28. (C) | 34. 8     |          |
| 5. (C) | 11. (D) | 17. (B) | 23. (B) | 29. (D) | 35. 3,790 |          |
| 6. (C) | 12. (D) | 18. (D) | 24. (A) | 30. (D) | 36. 60    |          |

## No Calculator Portion

- 1)
- ⇒**
- B

It must be true that  $x^2 \neq 0$  and  $(y+3) \neq 0$ .

- 2)
- ⇒**
- A

Every year, the population grows by a factor of 1.03—an increase of 3%. Over the course of  $x$  years, the factor of increase is  $(1.03)^x$ .

- 3)
- ⇒**
- C

Convert the equation of the line to slope-intercept form to determine slope:

$$y = -x + 2$$

The slope of the line is  $-1$ . The slope of the line perpendicular to this line is  $1$ . To determine the equation of the line, use the coordinates of the point through which the line passes:

$$y = (1)x + b$$

Since  $x = 1$  and  $y = 2$ :

$$2 = 1 + b$$

$$b = 1$$

- 4)
- ⇒**
- A

If Mary prints at least 500 flyers, the first 100 are charged at \$0.25 each, 200 at \$0.20, and the remaining flyers,  $(x - 300)$ , at \$0.10. The entire purchase is multiplied by a factor of 1.11 to account for the 11% sales tax.

- 5)
- ⇒**
- C

In one hour, three boys paint  $\frac{1}{5}$  of a fence, so one boy is able to paint  $\frac{1}{15}$  of a fence per hour.

Therefore:

$$\text{Four boys} = 4 \times \frac{1 \text{ fence}}{15 \text{ hour}} = \frac{4}{15} \text{ fence per hour}$$

It takes  $\frac{15}{4}$  hours for four boys to paint a fence.

- 6)
- ⇒**
- C

$$\text{Angelo's hourly wage} = \frac{x}{y}$$

$$\text{Sarah's hourly wage} = \frac{x}{y-1}$$

As  $y > y - 1$ , the positive difference between hourly wages is:

$$\frac{x}{y-1} - \frac{x}{y}$$

- 7)
- ⇒**
- C

A system of equations has no solution if the equations contradict each other. To verify that this is the case, multiply the first equation by 12:

$$12\left(\frac{1}{2}x - \frac{1}{4}y\right) = (5)12 \rightarrow 6x - 3y = 60$$

If  $a = 6$  in the second equation, the system has no solution.

- 8)
- ⇒**
- B

The cost of the lunch can be written as a function of the number of guests ( $x$ ):

$$C(x) = 250 + 15x$$

The slope of this graph is 15.



9) **⇒ A**Solve for  $x$  in the first equation:

$$\begin{aligned}(x+1)^2 &= 4 \\ x+1 &= \pm 2 \\ x &= -3, 1\end{aligned}$$

Only  $x = -3$  satisfies the second equation.10) **⇒ C**

Set the expression as a long-division:

$$\begin{array}{r} 9x-9 \\ x+1 \overline{) 9x^2+0x-4} \\ \underline{-(9x^2+9x)} \phantom{-4} \\ -9x-4 \\ \underline{-(9x+9)} \\ 5 \end{array}$$

The quotient is  $9x-9+\frac{5}{x+1}$ .11) **⇒ B**Let  $x$  be pounds of Earl Grey, and  $y$  be pounds of Orange Pekoe.

$$\begin{aligned}x+y &= 100 \\ 5x+3y &= (100)(4.50)\end{aligned}$$

Multiplying the first equation by factor of 3 and subtracting from the second gives:

$$\begin{aligned}2x &= 150 \\ x &= 75\end{aligned}$$

12) **⇒ D**The volume of a circular cylinder is:  $V = \pi r^2 h$ The radii of the cylinder before ( $r_1$ ) and after ( $r_2$ ) the change are expressed in the relationship:

$$r_2 = \frac{r_1}{2}$$

The heights of the cylinder before ( $h_1$ ) and after ( $h_2$ ) the change are expressed as:  $h_2 = 1.6h_1$ The ratio of the volume of the initial cylinder ( $v_1$ ) to the volume of the new cylinder ( $v_2$ ) is:

$$\frac{V_2}{V_1} = \frac{\pi r_2^2 h_2}{\pi r_1^2 h_1} = \frac{\left(\frac{r_1}{2}\right)^2 (1.6h_1)}{r_1^2 h_1} = 0.4$$

The volume of the new cylinder is 40% of the volume of the initial cylinder, a decrease of 60%.

13) **⇒ A**

$$x^2 - x - 2 = (x+1)(x-2)$$

We can infer that  $A = 1$ ,  $B = 1$ , and  $C = 0$ .14) **⇒ A**Because the radius includes the points  $(0, 0)$  and  $(3, 4)$ , the slope of the radius to the tangent is  $\frac{4}{3}$ .The tangent line, which is perpendicular to the radius at the point of contact, is  $-\frac{3}{4}$ . The equation of the tangent line is:

$$y = -\frac{3}{4}x + b$$

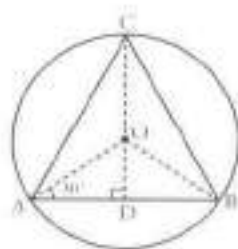
$$4 = -\frac{3}{4}(3) + b$$

$$b = \frac{25}{4}$$

The equation is:

$$y = -\frac{3}{4}x + \frac{25}{4}$$

$$3x + 4y - 25 = 0$$

15) **⇒ C**

The central angle inscribed by each of the sides of the triangle (for example,  $\angle COB$ ) is twice the measure of the angles of the equilateral triangle ( $\angle CAB$ ), that is,  $120^\circ$ . This implies that the radii to the vertices divide the circle into equivalent thirds, and also bisect the angles of the triangle. The angle  $\angle OAD = 30^\circ$ . If a line is drawn from  $O$  to  $\overline{AB}$  at  $D$ , a 30-60-90 triangle is created. According to the ratio of lengths of a 30-60-90 triangle,  $\overline{OD} = 1$  and  $\overline{AD} = \sqrt{3}$ . The area of  $\triangle AOB$  is:

$$\text{Area} = \frac{1}{2}(1)(2\sqrt{3}) = \sqrt{3}$$

As the equilateral triangle is made up of three triangles all equivalent to  $\triangle AOB$ , the area of the equilateral triangle is:

$$\text{Area of } \triangle ABC = 3\sqrt{3}$$

16) **⇒** 1,250

The price depreciation per year is:

$$\text{Depreciation} = \frac{\text{Total decrease in value}}{\text{Number of years}} = \frac{15,000 - 11,250}{3 \text{ years}}$$

$$= 1,250/\text{year}$$

17) **⇒** 16

For the equation to be true, either  $a = 4$  or  $b = -6$ .

If  $a = 4$  and  $b = 0$ , then  $a^2 + b^2 = 4^2 + 0 = 16$

If  $a = 0$  and  $b = -6$ , then  $0 + 36 = 36$

18) **⇒** 28

Plug in values for the point (1, 12):

$12 = (1)^2 + (1)m + n$

$11 = m + n$

Plug in values for the point (3, 28):

$28 = (3)^2 + 3m + n$

$19 = 3m + n$

Subtract the first equation from the second:

$$\begin{array}{r} 19 = 3m + n \\ -) 11 = m + n \\ \hline 8 = 2m \\ 4 = m \rightarrow n = 7 \end{array}$$

Thus,  $mn = 4 \times 7 = 28$

19) **⇒** 5

If  $x - 2$  is a factor,  $f(2) = 0$ :

$2^3 - (2^2)k + 2k + 2 = 0$

$10 - 2k = 0$

$k = 5$

20) **⇒** 3

When  $t = 0$ ,  $128 = k \cdot 2^0 \rightarrow k = 128$

When  $t = 1$ ,  $16 = 128 \cdot 2^{-t}$

$16 = \frac{128}{2^t}$

$2^t = 8 \rightarrow 2^t = 2^3 \rightarrow t = 3$

1) **⇒** D

Using the intercepts  $(x, 0)$  and  $(0, y)$ , calculate the slope of line  $m$ :

$$\text{slope} = \frac{(y - 0)}{(0 - x)} = -\frac{y}{x}$$

$$x = -\frac{y}{\text{slope}}$$

If the  $y$ -intercept is doubled, the new  $y$ -intercept is  $(0, 2y)$ . If the slope is also doubled, the new  $x$ -intercept  $(x_u, 0)$  can be calculated as:

$$2(\text{slope}) = \frac{2y - 0}{0 - x_u}$$

$$x_u = -\frac{y}{\text{slope}}$$

The  $x$ -intercept is unchanged.

2) **⇒** B

$$\text{Average days missed} = \frac{\text{Total days missed}}{\text{Number of students}}$$

$$= \frac{5(0) + 4(1) + 5(2) + 4(3) + 2(4)}{20}$$

$$= \frac{34}{20} = 1.7$$

3) **⇒** D

The question provides the coordinates (3, 1) and (2, 5), so the slope of the linear function  $f(x)$  is:

$$m = \frac{5 - 1}{2 - 3} = -4$$

Use the slope-intercept form of the equation of a line to determine the  $y$ -intercept:

$$y = mx + b \rightarrow y = -4x + b \rightarrow 1 = -4(3) + b$$

$$b = 13$$

4) **⇒** D

$$\text{Northeast} = \frac{4595}{6862} = 0.67$$

$$\text{Midwest} = \frac{2365}{3265} = 0.72$$

$$\text{South} = \frac{2853}{4116} = 0.69$$

$$\text{West} = \frac{4501}{5925} = 0.76$$

5) **⇒** C

Percentage using train in Midwest:

$$\frac{457}{3,265} \times 100\% = 14\%$$

### Calculator Portion

6) **⇒ C**

The perpendicular bisector of a chord passes through the center of the circle. The chord represented by the line segment between points  $(0, 0)$  and  $(0, 4)$  is perpendicular to and bisected by the line that passes through the points  $(0, 2)$  and  $(2, 2)$ . The portion of this bisector that is within the circle is the diameter of the circle. The same is true of the line that passes through points  $(0, 0)$  and  $(4, 0)$ . The intersection of these diameters is the center of the circle and is located at  $(2, 2)$ . The radius of the circle is the line segment from  $(2, 2)$  to  $(0, 0)$  and has length  $2\sqrt{2}$  according to the 45-45-90 right triangle.

The area is:  $\text{Area} = \pi r^2 = \pi(2\sqrt{2})^2 = 8\pi$

7) **⇒ A**

Cost for Larry:

$$\begin{aligned} \text{Distance of trip} \times \frac{\text{Gallon}}{\text{Distance}} \times \frac{\text{Cost}}{\text{Gallon}} &= \text{Larry's share} \\ = (380) \left( \frac{1}{28} \right) (x) \left( \frac{1}{2} \right) \\ &= \frac{380x}{28} \times \frac{1}{2} \end{aligned}$$

8) **⇒ B**

For the preceding 3-year period:

$$\text{Total Surplus} = \left( \frac{\$15 \text{ million}}{\text{year}} \right) (3 \text{ years}) = \$45 \text{ million}$$

If revenue drops to \$40 million below current levels, expenditure will drop \$25 million per year (from a point of a \$15 million surplus) for the government to break even:

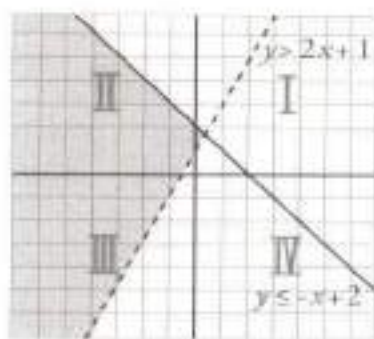
$$\text{Cut in expenditures} = \left( \frac{\$25 \text{ million}}{\text{year}} \right) (5 \text{ years}) = \$125 \text{ million}$$

Taking the existing surplus into account, we can determine the yearly reduction in expenditures:

$$\text{Yearly reduction} = \frac{\$125 \text{ million} - \$45 \text{ million}}{5 \text{ years}} = \frac{\$16 \text{ million}}{\text{year}}$$

9) **⇒ A**

Graph the two inequalities. Note that the two lines intersect in quadrant I:

10) **⇒ B**

$$\begin{aligned} \text{Class average} &= \frac{\text{Total points for boys} + \text{Total points for girls}}{\text{Number of boys} + \text{Number of girls}} \\ &= \frac{10(88) + 15(75)}{25} = 80.2 \end{aligned}$$

11) **⇒ D**

Let the two numbers be represented by variables  $x$  and  $y$ , and  $x > y$ :

$$\begin{aligned} x - y &= 2 \\ x^2 - y^2 &= 18 \end{aligned}$$

Factor the difference of square and solve for the sum of the two numbers:

$$\begin{aligned} (x - y)(x + y) &= 18 \\ 2(x + y) &= 18 \\ x + y &= 9 \end{aligned}$$

12) **⇒ D**

Convert the quadratic into vertex form:

$$\begin{aligned} h(t) &= -16t^2 + 48t + 5 = -16t^2 + 48t - 36 + 5 + 36 \\ &= -16 \left( t^2 - 3t + \frac{9}{4} \right) + 41 \\ &= -16 \left( t - \frac{3}{2} \right)^2 + 41 \end{aligned}$$

Since  $a < 0$ , the parabola is inverted and the vertex  $\left( \frac{3}{2}, 41 \right)$  is the highest point of the arc.

13) **⇒ B**

The range of scores is the difference between the highest and lowest scores; the mean must be between these scores. This necessitates that in Brad's class the lowest score is within 6 points of the mean. In Tom's class, a range of 30 points requires that the lowest score be equal to or less than 70, as the highest possible score is 100 points. This places the lowest score in Tom's class below the lowest possible score in Brad's class:  $70 < 80 - 6$ .

14) **⇒ B**

In the 2-cup mixture, the amount of flour is:

$$\text{Amount of flour} = \left(\frac{1}{3}\right)(2 \text{ cups}) = \frac{2}{3} \text{ cup}$$

After one cup of flour is added, the percentage of flour in the mixture is:

$$\begin{aligned} \text{Percent flour} &= \frac{\left(\frac{2}{3} + 1\right) \text{ cups}}{3 \text{ cups}} \times 100\% \\ &= \frac{5}{9} \times 100\% = 55.6\% \text{ which is approximately } 56\%. \end{aligned}$$

- 15) **⇒ B**

Let  $x$  be Brian's score on the final, and because the final is worth two tests, let the total number of tests be the 5 Brian has already taken plus 2 additional tests representing the final:

$$\frac{56 + 55 + 41 + 29 + 86 + 2x}{7} \geq 65$$

$$267 + 2x \geq 455$$

$$x \geq 94$$

- 16) **⇒ C**

The cost of the first mile is \$0.30, and the remainder of the trip,  $x - 1$  miles, is charged at \$0.15 per mile:

$$f(x) = 0.30 + 0.15(x - 1)$$

- 17) **⇒ B**

Let  $x$  be the price of one tape recorder and  $y$  be the price of one radio:

$$5x + 7y = 823$$

$$5x - 7y = 137$$

Add the two equations:

$$10x = 960$$

$$x = 96$$

- 18) **⇒ D**

Because the racetrack is circular, the distance once around the racetrack is  $2\pi r$  where  $r$  represents the radius of the circular track. The velocities of A and B are  $\frac{2\pi r}{15 \text{ sec}}$  and  $\frac{2\pi r}{25 \text{ sec}}$  respectively. If A passes B at time  $t$ , at this time B has traveled a distance  $x$ , and A has traveled a distance  $x + 2\pi r$ :

$$\text{Time for A to travel } x + 2\pi r = \text{Time for B to travel } x$$

Time expressed in terms of velocity and distance is:

$$\text{Therefore, Time} = \frac{\text{Distance}}{\text{Velocity}}$$

$$\frac{\text{Distance}_x}{\text{Velocity}_x} = \frac{\text{Distance}_y}{\text{Velocity}_y}$$

$$\frac{x + 2\pi r}{\left(\frac{2\pi r}{15}\right)} = \frac{x}{\left(\frac{2\pi r}{25}\right)}$$

$$15(x + 2\pi r) = 25x$$

$$x = 3\pi r$$

The time at which A passes B is:

$$\text{Time} = \frac{3\pi r}{\left(\frac{2\pi r}{25}\right)} = 37.5 \text{ sec}$$

- 19) **⇒ A**

$$75 \leq 35t + 5t^2 \leq 130$$

To determine the lower limit of  $t$ :

$$5t^2 + 35t \leq 75$$

$$5t^2 + 35t - 75 \leq 0$$

$$5(t^2 + 7t - 15) \leq 0$$

From this inequality we can infer that

$$t^2 + 7t - 15 \leq 0$$

Use the quadratic formula to determine the solutions for  $t$ :

$$t = \frac{-7 \pm \sqrt{(-7)^2 - 4(-15)}}{2}$$

$$t = \frac{-7 \pm \sqrt{109}}{2}$$

$$t = 1.7, -8.7$$

The value of  $t$  must be positive, so the car has traveled 75 meters at 1.7 seconds.

- 20) **⇒ D**

Let  $x$  be the amount invested in stocks and  $y$  be the amount invested in bonds:

$$x + y = 8000 \rightarrow x = 8000 - y$$

$$(0.04)x + (0.07)y = 500$$

Substitute the first equation into the second:

$$(0.04)(8000 - y) + (0.07)y = 500$$

$$320 - 0.04y + 0.07y = 500$$

$$0.03y = 180$$

$$y = 6000$$

21) **⇒ D**

The cost per yard of lumber, in dollars, is:

$$\text{Cost} = \frac{12}{\frac{16}{3} \text{ \$/yard}} = \frac{36}{16} = \frac{9}{4} \text{ \$/yard}$$

The cost of  $x$  yards of lumber is  $\frac{9}{4}x$  dollars.22) **⇒ D**

$$a^2 = b^2$$

The structure of the answer choices indicate that we need to find  $b$  in terms of  $a$ .

$$(a^2)^{\frac{1}{2}} = (b^2)^{\frac{1}{2}}$$

$$a^{\frac{1}{2}} = b^{\frac{1}{2}}$$

Because  $a^{\frac{1}{2}} = \sqrt{a}$ , substitute  $b^{\frac{1}{2}}$  for  $\sqrt{a}$  in  $b\sqrt{a}$ :

$$b\sqrt{a} = b\sqrt{a} = b^{\frac{1}{2}} = b^{\frac{1}{2}}$$

23) **⇒ B**Let  $x$  be the number of page views. The number of visitors that click-through is  $0.3x$  and the number of visitors that click through more than once is one-tenth of the preceding number, that is,  $(0.1)(0.3x)$  or  $0.03x$ . Revenue is:

$$\begin{aligned} \text{Revenue} &= (0.002)x + (0.01)(0.3x) + (0.1)(0.03x) \\ &= 0.002x + 0.003x + 0.003x \\ &= 0.008x \end{aligned}$$

For a revenue of \$100,000:

$$\begin{aligned} 0.008x &= 100,000 \\ x &= 12,500,000 \end{aligned}$$

24) **⇒ A**The length of the diameter is the distance between the points  $(3, 6)$  and  $(1, -4)$ :

$$\begin{aligned} d &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(3 - 1)^2 + (6 - (-4))^2} \\ &= \sqrt{104} \end{aligned}$$

The radius is:

$$r = \frac{1}{2} \text{ diameter} = \frac{\sqrt{104}}{2}$$

and the square of the radius is:

$$r^2 = \left(\frac{\sqrt{104}}{2}\right)^2 = \frac{104}{4} = 26$$

Two answer choices, (A) and (C), have a value for

$r^2$  of 26. To determine the correct choice, observe that circle represented in (C) would have a center at the point  $(-2, -1)$ . The diameter of a circle must pass through its center, and because the diameter of the circle in the diagram does not pass through quadrant IV, the center of the circle cannot be in this quadrant.

25) **⇒ B**

City A experiences its greatest increase in average daily temperature by percentage from month 5 to month 7. During this period, the average daily high in City B drops from 50 degrees to 30 degrees. The average daily high in City B over this two month period is:

$$\text{Average} = \frac{50 + 30}{2} = 40$$

26) **⇒ D**

The population of Maine in 1840 is 500,000. The population reaches 1 million at some point between 1960 and 1980, that is, between 120 and 140 years after 1840.

27) **⇒ B**The length of the curve is one-fourth the circumference of the circle, and  $r = 6$ :

$$\text{Length of curve} = \frac{2\pi r}{4} = \frac{12\pi}{4} = 3\pi$$

It can be seen that  $\overline{PS} + \overline{SO} - \overline{PO} = 6$ .As OSQT is a rectangle,  $\overline{SO} = \overline{QT}$ .It follows that  $\overline{PS} + \overline{QT} = 6$ .In a similar fashion it can be seen that  $\overline{SQ} + \overline{TR} = 6$ .

The perimeter of the shaded region is:

$$\begin{aligned} \text{Perimeter} &= PQR + (\overline{SQ} + \overline{TR}) + (\overline{PS} + \overline{QT}) \\ &= 3\pi + 6 + 6 \\ &= 3\pi + 12 \end{aligned}$$

28) **⇒ C**

$$(3 + 2i) - (i + 3i) = 10 - i$$

$$(3 - a) - i = 10 - i$$

$$a = -7$$

- 29)
- ⇒**
- D

$$2 \cos x = \sqrt{2}$$

$$\cos x = \frac{\sqrt{2}}{2}$$

According to the 45–45–90 triangle, the ratio of the hypotenuse to either side is  $x\sqrt{2}$  to  $x$ . Therefore:

$$\cos 45^\circ = \frac{\sqrt{2}}{2}$$

- 30)
- ⇒**
- D

$$f(1) = 2 \cdot f(0) + 4 \rightarrow f(1) = 2 \cdot 16 + 4 = 36$$

$$f(2) = 2 \cdot 36 + 4 = 76$$

To calculate for negative values of  $x$ , rewrite the function:

$$f(x) = 2 \cdot f(x-1) + 4$$

$$f(x-1) = \frac{f(x) - 4}{2}$$

This implies that:

$$f(-1) = \frac{f(0) - 4}{2} = \frac{16 - 4}{2} = 6$$

$$f(-2) = \frac{6 - 4}{2} = 1$$

$$\text{Finally, } f(2) + f(-2) = 77$$

- 31)
- ⇒**
- 4.06

$$\frac{0.25 \text{ inch}}{20 \text{ miles}} = \frac{x}{325 \text{ miles}}$$

$$x = \frac{(0.25)(325)}{20} \text{ inches}$$

$$x = 4.06 \text{ inches}$$

- 32)
- ⇒**
- 9

$$\text{mL of salt} = (0.2)(45 \text{ mL}) = 9 \text{ mL}$$

- 33)
- ⇒**
- 2

$$-3x^2 + (4x)^2 = 52$$

$$-3x^2 + 16x^2 = 52$$

$$x^2 = 4$$

$$x = 2, -2$$

- 34)
- ⇒**
- 8

The height that the ball reaches after  $x$  bounces is:

$$\text{Height} = (30)(0.8)^x$$

To determine  $x$  for which height is below 6 feet—that is, below 20% (0.2) of its original bounce:

$$(30)(0.8)^x < 6$$

$$(0.8)^x < 0.2$$

$$\text{For } x = 7, \text{ the bounce is: } (0.8)^7 = 0.21$$

$$\text{For } x = 8, \text{ the bounce is: } (0.8)^8 = 0.16$$

- 35)
- ⇒**
- 3790

$$\begin{aligned} \text{Royalties} &= (1200)(29.95)(0.03) + (800)(16.95)(0.2) \\ &= 3790 \end{aligned}$$

- 36)
- ⇒**
- 60

Let  $h_1$  be the height of the top of Lincoln's face and  $h_2$  be the height of the bottom of Lincoln's face.

Because we are given two angle measurements (32 and 35 degrees) and the length of a side adjacent to the angles (800 feet), and because we are trying to find the length(s) of the side opposite these angles ( $h_1$  and  $h_2$ ), we must use tangent:

$$h_1 = 800 \tan 35$$

$$h_2 = 800 \tan 32$$

$$\text{The height of his face is } 800(\tan 35 - \tan 32) = 60$$

- 37)
- ⇒**
- 800

Let  $x$  be the number of streams during the first half of the year:

$$x + 1.5x = 8 \text{ billion}$$

$$x = 3.2 \text{ billion}$$

During the second half of the year, the service streamed 4.8 billion songs. To determine the monthly streams:

$$\text{Monthly average} = \frac{4.8 \text{ billion}}{6} = 800 \text{ million}$$

- 38)
- ⇒**
- 2.37

Let  $x$  be the total streams in the three-month period:

$$(0.003)x = 7.1 \text{ million}$$

$$x = 2.37 \text{ billion}$$

## Essay Test

### Sample Response: Score 2/1/2

*The Graphic novel shows a historical perspective on speech balloons and how they have had a long and fascinating history. Speech balloons show the emotion the character is trying to express whether it is showing rage towards another or showing compassion.*

*The thought bubble is extremely effective it indicates the communication without having to write much. For example during WWII Walt Disney did many propaganda pictures to convince people what Germany was doing was wrong and to encourage Americans to join the army why? , because he showed a illustration along with a speech ballon to send a simple message to everyone.*

*In this passage the author says "...icicle ballons to indicate a frosty exchange, and color ballons to express mood." That shows the reader how the characters in a passage are feeling. In the novel Who censored Roger Rabbit, it shows a bridge between comic's and animated films How? It shows a murdered cartoon whose final words are in a speech ballon under his dead body. Speech ballon as you can see symbolic a very important idea or feeling and examples are given in this passage weather it be the de Lire Sur La Bible or on newspaper.*

### Evaluation

#### Reading: 2

The student does a good job showing an understanding of the text's main idea: the response's first line includes an overall summary of the text, correctly stating that it is a historical overview of the topic. The second sentence describes one reason the author gives for the popularity of speech balloons. The quote that the student uses in the third paragraph, however, seems haphazard because the student does not quite explain its specific relevance.

#### Analysis: 1

The student needs to practice analyzing rather than summarizing. In addition, the student may be accustomed to assignments that ask for his or her opinion on an issue, backed up with outside examples (as in using the Walt Disney example), but the SAT prompt calls for writing about only the one provided text.

#### Writing: 2

The student shows signs of becoming a strong writer with a little more practice. He or she makes good use of vocabulary ("historical," "rage," "compassion") and a good effort at sentence variation. The student needs to work on organizing thoughts into two or three points and describing them in topic sentences. The student also needs to avoid using phrases directly from the text unless they are identified as quotations.

### Sample Response: Score 4/4/4

*The author of "The Graphic Novel: A Historical Perspective" reveals how the speech balloon has grown from a means of conveying written messages in visual art to a versatile and pervasive means of communication. By presenting this history, the author suggests that the development of the speech balloon influenced the acceptance of the graphic novel as a serious form of art. Moreover, the author uses history and interesting diction to suggest that speech balloons allow people to experiment with the presentation of information. By exploring the ways that speech balloons have been used in the past, the reader can better understand how and why they are used today. For example, many readers will be surprised to learn that speech balloons originated in 13th century France. By including this information, the author connects the speech balloon to "respectable" medieval art that is studied by scholars. This information makes it easier for the reader to believe the author's central claim: the speech balloon contributed to people considering "comic books and graphic novels serious art forms."*

*Discussing the history of the speech balloon also helps the*

reader understand why speech balloons have become so pervasive in modern society. According to the author, graphic novelists were experimenting with the function of the speech balloon long before it was used for text messages or studied in neurobiology. When the author explains that the comic Pogo “shows characters physically manipulating speech balloons in humorous ways,” the audience can appreciate the versatility of speech balloons and understand why they appear so often in popular culture and day-to-day communication.

Finally, the author’s vivid diction serves to interest the reader in the topic and then underscore the speech balloon’s many uses. For instance, the author’s claim, “icicle balloons...indicate a frosty exchange,” manages to concisely convey the connection between the balloon’s appearance and its function. Moreover, the author’s inclusion of colloquial phrases, such as when he refers to the speech balloon as “this little device,” helps establish a conversation tone with the reader; yet the author’s use of academic terms, such as “imbue” and “rebus,” adds academic authority to his writing.

The author of the passage appreciates that readers must understand something’s origins in order to appreciate how it functions in the present; relating the history of the speech balloon reveals how it achieved such versatility today. The author’s inclusion of well-researched history and vivid language allow him to deliver his central claim clearly and concisely while keeping the reader interested.

## Evaluation

### Reading: 4

The student says that the text shows that the history of the speech balloon has made it “a versatile and pervasive means of communication”—a compact and excellent summary. He or she uses quotations to explain the central ideas of the text throughout the response. In short, the student demonstrates thorough comprehension.

### Analysis: 4

The response focuses on the strategy of providing historical background, and why it is effective in understanding the use of the speech balloon today. For example, regarding the origins of the speech balloon

the student says that “by including this information, the author connects the speech balloon to ‘respectable’ medieval art that is studied by scholars.” The analysis pinpoints and explains the author’s main strategy in a sophisticated manner.

### Writing: 4

The writing earns top marks because the student develops ideas in an organized manner, with a central claim at the beginning and a clear progression of ideas. A coherent introduction, orderly paragraphs, and cogent conclusion make it easy to read and understand. Vocabulary is precise, with sophisticated words such as “colloquial,” and sentence structures are varied. Further, the response shows a strong command of the conventions of standard written English; there are no grammar or spelling errors.



## Reading Test



- |        |         |         |         |         |         |         |         |         |         |         |
|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1. (C) | 6. (A)  | 11. (B) | 16. (B) | 21. (A) | 26. (C) | 31. (B) | 36. (C) | 41. (D) | 46. (B) | 51. (A) |
| 2. (C) | 7. (B)  | 12. (B) | 17. (A) | 22. (H) | 27. (D) | 32. (D) | 37. (A) | 42. (B) | 47. (D) | 52. (B) |
| 3. (A) | 8. (D)  | 13. (A) | 18. (D) | 23. (A) | 28. (A) | 33. (A) | 38. (B) | 43. (D) | 48. (B) |         |
| 4. (B) | 9. (C)  | 14. (D) | 19. (C) | 24. (A) | 29. (D) | 34. (C) | 39. (B) | 44. (C) | 49. (D) |         |
| 5. (A) | 10. (A) | 15. (C) | 20. (B) | 25. (B) | 30. (B) | 35. (H) | 40. (C) | 45. (B) | 50. (B) |         |

1) C

Choice (C) is correct because the narrator wants to give the body a “spark of being,” or fill it with life, and “imbue” means to cause someone or something to absorb feelings or qualities. (A) is incorrect because “pervade” is not something that can be done to another person or object; while life could pervade the body, it would not make sense to say that the doctor “pervaded” the body with life. (B) is incorrect because “bathe” most nearly means to immerse, which would be an exterior treatment only. Finally, (D) is incorrect because “inspire” means to give someone the will to do something, which does not fit the context.

2) C

Choice (C) is correct because the narrator says that the creature’s otherwise beautiful features “formed a more horrid contrast with his watery eyes,” which were almost as white as his eye sockets. (A) is incorrect because, although the narrator mentions the creature’s yellow skin, he specifically calls the eyes “horrid.” (B) is incorrect because the only comment the narrator makes about the creature’s build is positive—that his “limbs were in proportion.” Finally, (D) is incorrect because the narrator mentions the creature’s “lustrous” hair as one of its positive features.

3) A

This statement means that the different circumstances and events of life do not change as much as feelings change; in other words, a person’s feelings frequently undergo transformations. Thus, (A) is correct. (B) is incorrect because the narrator is not specifically speaking of misfortune, but instead about all kinds of circumstances. (C) is incorrect because the narrator is not focusing

on fate and does not express an outlook on it. Finally, (D) is incorrect because the narrator is not commenting on the effects of accidents. Rather, he is explaining how drastically his feelings changed.

4) B

Choice (B) is correct because, at the end of paragraph 3, the narrator states that “horror and disgust” filled his heart. In other words, he was “revolted and repulsed.” (A) is incorrect because the narrator does not specifically mention in the passage that he is afraid that the creature is violent. (C) is incorrect because the narrator does not leave the creature in order to help it gain self-sufficiency, but because of his own overwhelming emotions. (D) is not the best answer because in paragraph 4 the narrator says that he rushed out of the room because he was “unable to endure the aspect of the being I had created”; thus, although he may have been tired, he did not leave because of it.

5) A

Choice (A) is correct, as the narrator leaves his creation because he cannot stand to look at it, and sleeplessly paces in his bedroom. This behavior strongly suggests that the narrator—the creator—rejects the monster—his own creation. (B) is incorrect because a customer is able to return a product at will, but the monster cannot be returned, which is the cause of the narrator’s agitation. (C) is incorrect because an editor generally revises manuscripts written by others; in this case, not only is the narrator unable to change the creature, but he himself created it, and thus has responsibility for it. Finally, (D) is incorrect because the narrator is not pursuing the creature; rather, he is fleeing it.

- 6) **➡ A**  
Choice (A) is correct because the narrator's dream is about the death and decay of his loved ones. The horrific images indicate that even in sleep, he is not able to forget what he has created with parts of corpses. (B) is incorrect because the main focus of the narrator's dream is not sorrow at the death of his mother, but his preoccupation with death now that he has created life from death. (C) is incorrect because the narrator's dream hints at, but does not fully explain, his reasons for undertaking the experiment. Finally, (D) is incorrect because the dream indicates the narrator's disgust and regret, not his acceptance, of his creation.
- 7) **➡ B**  
The correct choice is (B) because the narrator says that when the creature held up the bed curtain, the creature's eyes were fixed on him. When eyes "fix on" something it means they are staring; in other words, the creature's eyes were focusing on the narrator and nothing else. (A), (C), and (D) are incorrect because these other meanings of "fixed" would not make sense in this context.
- 8) **➡ D**  
Choice (D) is correct because in the opening paragraph, the narrator speaks of his "anxiety that almost amounted to agony." By paragraph 3, he says that what he had desired "with an ardor that far exceeded moderation" horrified him as soon as he accomplished it. (A) is incorrect because, while the narrator may have felt fear that the experiment would fail, he feels horror, not joy, when it succeeds. (B) is incorrect because the narrator does not feel that the creature is beautiful; moreover, he does not attempt to communicate with it. Finally, (C) is incorrect because the narrator does not start out feeling tired. Also, by the end of the passage, he indicates regret, not exhilaration.
- 9) **➡ C**  
The answer is (C) because it captures the hopeful excitement that the narrator had for his experiment—"the beauty of the dream"—and the "breathless horror" he felt the instant the creature came to life. (A) is incorrect because it expresses only the nervous feelings of the narrator before he brings his creation to life. (B) is incorrect because it reveals only the shock and horror the narrator feels when the creature opens his eyes. Finally, (D) is incorrect because it does not support the narrator's major shift from excitement to horror; rather, it describes his desire to escape his feelings for awhile with sleep.
- 10) **➡ A**  
Choice (A) is correct because, by calling his creation a "thing" and a "creature," the narrator identifies it as an object or an animal, not as a human with thoughts and feelings. Thus, the narrator's descriptions "dehumanize" it. (B) is incorrect because the narrator is not attempting to disorient his creation; he is too caught up in his own feelings of revulsion to be concerned with confusing his creation. (C) is incorrect because the narrator does not attempt to hide his feelings toward his creation. Finally, (D) is incorrect because the terms "thing" and "creature" have a more general rhetorical effect; they emphasize the creature's non-human status, not just its unusual appearance.
- 11) **➡ B**  
Choice (B) is correct because Clinton says in line 1 that "Africa has changed so much in just 10 years," and the rest of the passage is about how to reinforce positive changes in Africa, contrasting the troubled past with the hopeful future. (A) is incorrect because although paragraph 3 states that Americans must change their stereotypes of Africa, that contrast is not a focus of the speech. (C) is incorrect; although Clinton praises Ghana's democratic movement by saying that "Ghana blazed the path of that new Africa," he does not dwell on the differences between Ghana's government and those of other African nations. Finally, (D) is incorrect because Clinton only mentions Ghana's economy to point out a firm from Ghana that is traded on the New York Stock Exchange.
- 12) **➡ B**  
Choice (B) best summarizes the points made in the first two paragraphs: (1) Africa has changed politically and economically over the last decade, and (2) Africa is not "free from peril." (A) is incorrect because Clinton says that "democracy has not yet gained a foothold even in most successful nations" in Africa (lines 6–8), not that African nations tend to have elected governments now. (C) is incorrect because paragraphs 1 and 2 talk about the African continent in general, not about Ghana in particular. (D) is incorrect because Clinton does not mention the United States in the

first two paragraphs of the passage; rather, he provides a general overview of African nations' positive shifts and continuing challenges.

13) **⇒** A

Choice (A) is correct because the term "elemental" refers to parts of something that cannot be broken down further. Within the context of the speech, "elemental" refers to the basic rights of every human; in other words, "fundamental" rights. (B) is incorrect because "rudimentary" carries the connotation of undeveloped, which does not make sense in Clinton's reference to human rights. (C) is incorrect because "instrumental" connotes something that is helpful or useful, which does not make sense in the context. Finally, (D) is incorrect because "environmental" refers to the conditions surrounding something, which would not make sense in terms of human rights.

14) **⇒** D

Choice (D) is correct because Clinton praises Ghana for blazing "the path of that new Africa" through political and peacekeeping efforts (lines 36 - 51), implying that Ghana is a progressive African nation. Thus, (D) is correct. (A) is incorrect because Clinton praises Ghana, but he never refers to it as a "utopia": a perfect, idealized society. (B) is incorrect because Clinton's speech focuses largely on Ghana's social and political progress in recent years; (D) is incorrect because, although Clinton relates the establishment of democracy in Ghana to democracy in America, he does not imply that Ghana *mirrors* America.

15) **⇒** C

Choice (B) is correct because it clearly establishes Ghana as a model for other African nations by stating, "Ghana again lights the way for Africa." (A) is incorrect because it focuses on Americans' perceptions of Africa, not on Ghana's relationship with Africa. (C) and (D) are incorrect because they do not focus on Ghana's potential as a model for the rest of the continent.

16) **⇒** B

Choice (B) is correct because, when Clinton gave the speech in 1998, the middle class was experiencing slight growth while the number of poor people was gradually decreasing, indicating slightly higher incomes for many Africans. (A) is incorrect because even with the positive changes, around two-thirds of Africans could still be classified as "poor," which is the opposite

of "widespread prosperity." (C) cannot be supported because the table is not differentiated by region. (D) is incorrect because the changes are slight, which does not indicate a sudden change, or "revolution."

17) **⇒** A

Choice (A) is correct because it refers to the trend toward "growing economies" in Africa, which is supported by the slight rise in the middle class and slight decrease in poor people throughout Africa, as indicated by the table. (B) is incorrect because it refers to political change, which cannot be supported by the information in the table. (C) is incorrect because it refers to economic exploitation of resources, which is not reflected in the contents of the table. (D) is incorrect because it refers to the trend of peace and tolerance within Ghana, not to economic trends indicated by the table.

18) **⇒** D

Choice (D) is correct because in lines 65 - 66 Clinton refers to society metaphorically as a family, and says that a good society "honors," or *respects*, each family member. The overall emphasis is on respect for individuals' human rights. (A) is incorrect because it would not make sense to suggest that society should obey each member. (B) is incorrect because Clinton is not referring to praising each member of society, but to recognizing that each member has basic rights. (C) is incorrect because "worship" refers to demonstrating reverence, typically for a deity; Clinton does not intend to speak of worshipping all members of a society.

19) **⇒** C

Choice (C) is correct because in the passage Clinton uses the term "we" when proposing various measures that must be taken to put Africa on a path to prosperity and democracy. The use of "we" coming from the leader of the United States indicates the U.S. commitment, or pledge, to help set Africa on a new course. (A) is incorrect because Clinton does not use "we" to distinguish Ghana from other nations, but to encourage Ghana and other nations to see themselves as unified by common political and social goals. (B) is incorrect because, although Clinton does emphasize that America is interested in helping to cultivate democracy in Africa, this point is subsumed under the larger focus on unity and cooperation in Clinton's speech. (D) is incorrect because the

passage consistently focuses on African society, and the U.S. is only mentioned in passing.

20) **➡ B**

Clinton expresses optimism in Africa's political future when he says that the U.S. sees Ghana's success "taking root throughout the new Africa." Yet Clinton remains pragmatic, acknowledging that Africa still has many hurdles to overcome, and that democracy "is never perfect or complete." (A) is incorrect because while Clinton does say in the paragraph that war and genocide still "tear at the heart of Africa" (line 86), he does not elaborate on the horrifying outcomes, so pessimism is not his dominant attitude. (C) is incorrect because Clinton never mentions jealousy, even though he does claim that "the United States admires your [Ghana's] success." And (D) is incorrect because Clinton never shows resignation. Rather, he consistently expresses optimism and determination.

21) **➡ A**

Choice (A) is correct because the author uses analogy to help explain his perspective: he likens humans' cosmic significance to that of "foam and bubbles upon the river's current." He also uses logic and reasoning to emphasize his points: he uses reasoning to conjecture that life elsewhere in the universe must be as fleeting as life on Earth. (B) is incorrect because the passage is a philosophical musing, not a structured argument containing counterarguments. (C) is incorrect because it is too limited; the passage does use metaphor, but the passage is primarily philosophical in nature, so the author makes use of reasoning as well and uses no exaggeration or hyperbole. Finally, (D) is incorrect because the author does not appeal to specific physical laws to present his views.

22) **➡ B**

The correct choice is (B). If we use the idiom "in the light of (x), we have decided (y)" we mean "considering (x), we think (y);" in other words, the idiom "in light of" refers to ideas or information that help one interpret other ideas or pieces of information. In this case, humans think highly of themselves, and in this context interpret themselves as being important in the universe. Thus, (B) "context," is close to "in light of" because it refers to circumstances that lead to a particular interpretation. (A), (C), and (D) do not make sense in the sentence.

23) **➡ A**

The answer is (A) because the author's point is that living matter in the universe is minuscule and short-lived compared to nonliving matter. Life is analogous to a thin layer of snow that melts quickly on a warm spring morning, insignificant when compared to the miles of rock upon which it briefly exists. (B) is incorrect because the analogy does not include any mention of life recurring in spring; the point of the "spring morning" is the idea that the warm sunlight will quickly melt the snow. (C) and (D) are incorrect because the author says he is comparing the amount of living matter to non-living matter, so his purpose is neither to speculate on the conditions that created life, nor to describe a shallow understanding of life.

24) **➡ A**

The answer is (A) because, according to the information available in the author's era (he published the passage in 1915), it appeared that in past geological periods life "seems to have more completely enveloped" the Earth (lines 33 - 39). (B) and (C) are incorrect because they contradict the author's assertion in lines 33 - 39. Finally, (D) is incorrect because the author does not make a comparison between the amount of life on Earth and the amount of life on other planets. He says that other planets likely contain life, but he does not compare the amount of life on Earth to the amount on other planets.

25) **➡ B**

Choice (B) is correct; when the author states that life "hangs on the verge of dissolution," he means that life exists on the verge of termination. Thus, "hangs" means "exists precariously," or simply "exists." (A) is incorrect because the author is not implying that life is attached or stuck in the universe in any way; rather, he is emphasizing that it is in constant danger of disappearing. (C) is incorrect because "dangles" implies that life is literally hanging over a precipice. In the passage, however, "hangs" is used metaphorically, not literally. Finally, (D) is incorrect because to say that life "depends" on the verge of dissolution would not have a clear meaning, as dependence involves relying upon something.

26) **➡ C**

Choice (C) is correct, because the chart shows that the element oxygen makes up 65 percent of a human body. The chart shows proportions

of materials at the level of (elemental) atoms, rather than compounds made up of molecules, such as water. (A) is incorrect because there is no information in the chart about how well understood the composition of the human body is. (B) is incorrect because the chart lists four elements and one “other” category, which consists of an unknown number of additional elements. (D) is incorrect because the chart does not compare the elements in humans to the elements in other species, so it does not address whether the human composition is unique.

27) **⇒** D

The answer is (D) because it refers to the mystery of life that is evident in the chart: living things such as humans are made up of nonliving elements (as shown in the chart) without which they cannot live. Yet, if one were to mix those same elements together in a laboratory, the result would not be a living thing. (A), (B), and (C) are incorrect because the chart shows only the proportions of elements that make up the human body; there is no direct connection to the insignificance of life in the universe or the limited conditions in which life can exist.

28) **⇒** A

Choice (A) is correct because the author states that, when it comes to life, we do not know “whether the physical conditions sum up the whole truth about it.” The author calls the question “insoluble,” meaning that science may never be able to answer it. (B) is incorrect because the author does not criticize science. (C) is incorrect because, although the author uses poetic analogies to articulate his points, these are not meant to indicate that science itself is poetry. Finally, (D) is incorrect because the author never indicates that he considers science to consist of an arbitrary or meaningless set of principles. Rather, the author seeks to draw attention to scientific facts.

29) **⇒** D

Choice (D) is correct because lines 75–80 provide the clearest evidence of the author’s belief that there are certain questions that science is not equipped to answer. (A) is incorrect because it focuses on humans lacking perspective on their own place in the universe, which by itself does not address science’s limitations. (B) is incorrect because it focuses on the amount of life present on

Earth over the course of time; it does not comment on scientific limitations. Finally, (C) is incorrect because it is a straightforward factual claim; life ends, but the universe’s chemical and mechanical process seem to be without end. The statement does not address the deeper questions of whether science can determine what creates life, what life is, or whether it matters.

30) **⇒** B

Choice (B) is correct because the author considers whether life originates from materials only, and whether life is a phenomenon that science can ever explain. Thus, he is exploring a scientific question, but at the same time, his approach is philosophical; he predicts that the question is “insoluble,” meaning that we will never be able to solve the problem. (A) is incorrect because the author is not interrogating, or asking questions; he is providing perspective on human understanding. (C) is incorrect because, although the author uses poetic analogies (bubbles, snow, cliffs, apples, rainbows, etc.), he is not primarily concerned with either poetry or technical subjects. Finally, (D) is incorrect because the author does not demonstrate personal skepticism, or disbelief, about anything.

31) **⇒** B

Choice (B) is correct because the authors say that their purpose is to “prevent misconstruction or abuse of powers” with “restrictive clauses.” (A) is incorrect because, although freedom of speech is mentioned in the First Amendment, the Bill of Rights addresses the larger purpose of limiting government powers. (C) is incorrect because although the introduction does mention that the Bill of Rights is designed to increase public confidence in the government, the way to do so is to prevent abuses by the government. Finally, (D) is incorrect because although the authors mention “abuse,” they are referring specifically to government exceeding its rightful powers.

32) **⇒** D

Choice (D) is correct because in paragraph 2—the First Amendment—the authors state that Congress does not have the power to make any law regarding setting up any religion, nor to prohibit people from freely exercising religion. Thus, it cannot favor, sponsor, or ban any religion. (A) is incorrect for the same reason; the word “respecting” in this case means “regarding”

not “honoring.” (B) is incorrect because a “redress of grievances” refers to compensation/recognition for being wronged or harmed; thus, the passage does not mention “grieving.” (C) is incorrect because a discussion of “arms,” in the sense of guns and other weapons, occurs in the Second Amendment, not the First Amendment.

33) **⇒** A

Choice (A) is correct because a “grievance” is a complaint of a wrong or an injustice that was committed. The “redress of grievances” means that citizens will have the right to petition the government to acknowledge and address their complaints. (B) is incorrect because although “grievance” shares the same root as “grief,” which means “sorrow,” a grievance is an injustice, not a feeling of sadness. (C) is incorrect because a “grievance” is a complaint, while a “right” is an entitlement to act a certain way. Finally, (D) is incorrect because an “indignity” refers to a situation that makes a person feel embarrassed or ashamed; an indignity might cause someone to have a grievance—a feeling of anger at having been wronged—but it is not the same as a grievance.

34) **⇒** C

Choice (C) is correct because the Fourth Amendment describes the only conditions under which representatives of the government (such as the police) can undertake searches. A “Warrant” (justification) to search must include a specific explanation of purpose. (A) is incorrect because the purpose of the amendment is to protect people from “unreasonable searches and seizures” by authorities, not to keep records. (B) is incorrect because the amendment does not provide details about exactly what would justify searches; that is left open to interpretation. (D) is incorrect because while the amendment does emphasize the privacy of homes and belongings, it is not enough for officials to enter respectfully. Rather, officials must have formal permission for a justifiable search.

35) **⇒** B

Choice (B) is correct because the Fifth Amendment states that no person be “deprived of life, liberty, or property, without due process of law”; in the context of the amendment, this provides protection from being executed, imprisoned, or having property taken without fair legal procedures. (A) is incorrect because lines 35–37 make a fairly minor point, which is that in

times of crisis, members of the military may not have access to the same grand jury protection regarding being charged with a crime that they would have in civilian life. (C) is incorrect because the focus of the amendment is on the rights of people accused of wrongdoing, not on preventing government problems. Finally, (D) is incorrect because Amendment 5 is quite general, and does not discuss the role of attorneys or bureaucrats.

36) **⇒** C

The answer is (C) because lines 41–42 summarize the major concern of the authors here, which is to limit the government’s power to accuse people, bring them to trial, and so on. Choices (A) and (B) are incorrect because they include details rather than a summary of the purpose of the amendment. Finally, (D) is incorrect because it concerns the separate matter of the right to compensation if the government takes one’s property, as in claiming someone’s land to make room for a road.

37) **⇒** A

The correct choice is (A) because the Fifth Amendment restricts the government from accusing and imprisoning people without the “due process of law,” while the Sixth Amendment focuses on the rights of people who have been accused and are being tried in court. (B) is incorrect because it is inaccurate; the Fifth Amendment does not provide details about forming grand juries, and the right to having an attorney is not the major focus of Amendment 6. (C) is incorrect because it does not capture the overall focus of either amendment. (D) is incorrect because seizing the property of individuals is an aspect, but not an overall focus, of Amendment 6.

38) **⇒** B

Choice (B) is correct because the authors indicate that they intend that bail, fines, and punishments be reasonable and standard. The authors do not provide specifics, leaving open the interpretation of their words. (A) is incorrect because the authors’ purpose is not exactly to emphasize humanitarian values, but rather to set limits on government powers. (C) is incorrect because the authors are not establishing the power of the courts in this amendment, but rather, limiting it. (D) is incorrect because Amendment 8 has a narrower purpose: keeping the treatment of convicted criminals within bounds.

39) **⇒** B

The correct choice is (B). To “construe” something

is to interpret it a particular way; in line 68, the authors are warning that their words should not be *misconstrued*—they have listed certain rights, but readers should not *interpret* that to mean they have listed the *only* rights guaranteed to people. (A) is incorrect because to “decipher” something means to figure it out, and the act of listing rights does not need to be figured out. (C) is incorrect because simplifying someone else’s action is not necessarily the same as interpreting it. Finally, (D) is incorrect because “translated” also would be an imprecise synonym for “construed.”

40) **➡ C**

The correct choice is (C) because the authors state in the introductory paragraph that they are adding the Bill of Rights to the Constitution to satisfy critics who want more “declaratory and restrictive clauses” to be added regarding governmental powers. Most of the wording in the amendments is about what the government “shall not” do. (A) is incorrect because the authors do not appear to think that the founding document should try to resolve all future problems that people will have with the government. (B) is incorrect because the restrictions on government power outlined in the passage suggest that the government cannot necessarily be trusted. Finally, (D) is incorrect because the authors do not suggest or imply in the Bill of Rights that any of the amendments should be altered in the future.

41) **➡ D**

The correct choice is (D). In the Tenth Amendment, the authors make a sweeping statement about the Constitution and its first amendments. They declare that the federal government holds only those powers that are delegated to it in the Constitution, and that all other powers belong to the people through the states. This best supports the authors’ view that the founding document should primarily describe limitations on power. Choices (A), (B), and (C) are incorrect because they describe specific restrictions rather than general purpose.

42) **➡ B**

Choice (B) is correct because generally, when a field of study (preventative medicine, in this case) is in its infancy, it is just beginning, like an infant just beginning life. (A) is incorrect because it would be awkward and unclear to say that the study of preventive medicine is “in its childhood.” (C) is incorrect because it is a less precise synonym than (B); “immature” can convey a critical tone,

which would not match the author’s attitude, and in addition, it is not logical to say that something is “in its immaturity.” Finally, (D) is incorrect because “fantasy” refers to imaginary ideas, which would not make sense in the context.

43) **➡ D**

Choice (D) is correct because it describes preventive medicine thoroughly, encompassing the study of how different bacteria cause infectious diseases and how to prevent their spread. (A) is incorrect because it describes the increasing interest at the time (1915) in preventing rather than just trying to cure disease but does not describe the concept of preventive medicine in any detail. (B) is incorrect because it says that preventive medicine is based on the knowledge of bacteria but does not explain the connection. (C) is incorrect because it is simply a general statement about avoiding disease by knowing what causes it; the statement does not describe any specific aims of preventive medicine.

44) **➡ C**

The answer is (C) because the author says that stemming the spread of cholera is one instance of the “really great triumphs” of preventive medicine (lines 18–19). (A) is incorrect because the author’s purpose is to highlight, not downplay, the importance of scientific research. (B) is incorrect because the author is not addressing personal responsibility or negligence regarding cholera. (D) is incorrect because the author discusses triumphs over cholera but does not speculate about a disease-free future.

45) **➡ B**

Choice (B) is correct. In lines 51–56, the author discusses the “foul odors associated with human corpses”; The reader can infer that “foul” here means “disgusting” and “repulsive,” similar meanings to “putrid.” (A) is incorrect because “avian” refers to “fowl”—birds—a homonym to the word “foul” which would not make sense in the context. (C) and (D) are incorrect because it does not make sense to say that an odor is “illegal” or “frightening.”

46) **➡ B**

The answer is (B). In lines 47–56, the author of Passage 2 is pinpointing a time when “the concept of cleansing hands with an antiseptic agent probably emerged”: he mentions that around 1822, “chlorides of lime and soda” became known as disinfectants. (A) is incorrect because the author is not criticizing 19th century medicine as primitive;

rather, his diction suggests that he admires people for understanding hygiene “as early as 1822.” (C) is incorrect because the author of Passage 2 is not talking about “recent advances;” rather, he is writing in 2002 about events taking place in 1822. Finally, (D) is incorrect because the author does not indicate whether chlorides of lime and soda were a household remedy.

47) **⇒** D

The correct choice is (D) because lines 57 – 63 describe the government recommending washing hands with soap before and after contact with patients; but lines 64 – 75 describe more recent and more specific federal recommendations about what kinds of soaps to use in which situations. In other words, recommendations went from general to more specific. (A) and (B) are incorrect because both paragraphs 2 and 3 describe the guidelines as recommendations, not requirements or regulations. (C) is incorrect because “disinfectant” generally refers to cleansers for non-living surfaces, while “antiseptic” refers to cleansers for living tissue, such as the skin. The paragraphs do not discuss the difference.

48) **⇒** B

Choice (B) is correct because the author of Passage 2 mentions in paragraph 4 that despite most hospitals adopting more specific guidelines for hand washing procedures, “adherence of HCWs (health care workers) to recommended handwashing practices has remained low” (lines 96 – 100). Thus, the challenge is “compelling” or convincing workers to cooperate. (A) is incorrect because the author does not mention challenges regarding educating people in health care settings, although such a problem is indirectly implied. (C) and (D) are incorrect because the author does not mention either topic.

49) **⇒** D

Choice (D) is correct because it directly mentions the biggest challenge to improving hand washing procedures in health-care settings: getting people to do what they should. (A), (B), and (C) are incorrect because they describe historical facts or specific hand-washing recommendations; they do not precisely address improving hand-washing procedures in today’s health care settings.

50) **⇒** B

The answer is (B) because the author of Passage 1 is describing the triumphs of preventive medicine; his positive attitude indicates that he would

approve of the 1822 discovery of disinfectants and antiseptics. (A) is incorrect because the author of Passage 1 states that the practice of preventive medicine arose over the past few years, not that all related discoveries only took place within the 20th century. (C) is incorrect because it does not match the tone of Passage 1, and because the French pharmacist is not described as treating disease. Finally, (D) is incorrect because the French pharmacist’s discovery is directly related to the author’s area of concern: preventing the spread of harmful bacteria.

51) **⇒** A

Choice (A) is correct. The “scientific breakthrough” described in Passage 1 is the study of “contagious and epidemic diseases in the light of bacteriological knowledge” (lines 11 – 17), which provided a clear understanding of how to prevent diseases such as cholera. Passage 2’s “public health perspective” shows how that understanding has furthered the practice of hand washing recommendations in health-care settings. (B) is incorrect because Passage 1 describes a successful trend in medical research, not a failed project. (C) is incorrect because Passage 2 does not discuss any international concerns, but rather focuses on U.S. health care settings. (D) is incorrect because Passages 1 and 2 do not make direct proposals or criticisms; they report information neutrally.

52) **⇒** B

The correct choice is (B). Passage 2 provides an overview of the development of hand-washing, especially hand-washing expectations for health-care workers in hospitals and other health-care settings. Thus Passage 2 most directly relates to the mention in Passage 1 about the effect of preventive medicine research on “rules for the management of the sick-room which largely prevent contagion from patient to nurse” (lines 31 – 34). (A) is incorrect because it is a general statement that preventive medicine has “accomplished much,” and the author of Passage 2 does not discuss the accomplishments of preventive medicine. (C) is incorrect because it concerns learning about sources of contagion, and the connection between this topic and Passage 2 is indirect. Finally, (D) is incorrect because it addresses preventive medicine’s importance, which is not mentioned in Passage 2.



## Writing and Language Test



1. (D)	5. (C)	9. (C)	13. (A)	17. (B)	21. (B)	25. (B)	29. (B)	33. (B)	37. (B)	41. (A)
2. (A)	6. (C)	10. (B)	14. (C)	18. (A)	22. (C)	26. (D)	30. (C)	34. (C)	38. (A)	42. (B)
3. (B)	7. (B)	11. (A)	15. (C)	19. (C)	23. (C)	27. (A)	31. (C)	35. (C)	39. (B)	43. (D)
4. (D)	8. (B)	12. (B)	16. (D)	20. (D)	24. (A)	28. (A)	32. (D)	36. (D)	40. (D)	44. (A)

1) **⇒** D

(D) is correct because it separated the two main verbs of the sentence with a conjunction (“and”) and does not include any inappropriate punctuation. Choice (A) is incorrect because the subject of the sentence, “the medicine,” is not repeated between the verbs “blocks” and “renders,” so no comma is needed. Colons are commonly used to separate a statement from an elaboration or definition of that statement. Because the information following the colon in (B) is neither an elaboration nor a definition of the first part of the sentence, (B) must be incorrect. When a subject corresponds with two main verbs in a sentence, the verbs must be separated by a conjunction. (C) lacks any such conjunction and is therefore incorrect.

2) **⇒** A

Choice (A) is correct because to “oversee” an activity means to supervise it, so doctors “supervise anesthetic use in the United States.” To overlook is to fail to notice, and the sentence does not indicate that doctors ignore anesthetic use, so (B) is incorrect. Although choice (C) conveys the correct idea, the phrase “watch over” is not as precise as “oversee,” making (C) less appropriate than (A). Saying that “doctors view most anesthetic use” implies that doctors always watch nurses as they administer anesthetics, which contradicts the intended meaning of the passage; thus, (D) is incorrect.

3) **⇒** B

The paragraph focuses on the benefits that come with working as a nurse anesthetist, so (B) is correct. (A) is incorrect because the tone of the paragraph is positive in that it focuses on the aforementioned benefits rather than pointing out a negative aspect of the work. (C) is incorrect because the paragraph does not mention that

the work of nurse-anesthetists is boring; the paragraph focuses on the benefits of being a nurse-anesthetist, not the drawbacks. Finally, (D) is incorrect because the paragraph does not mention anesthesiologists objecting to nurses administering anesthetics.

4) **⇒** D

The sentence describes “diverse settings,” and then operating rooms and obstetrical wards, both of which would be found in a hospital, along with emergency rooms. A contrast would include an area of medicine that is not found in a hospital. Only (D) mentions somewhere other than a hospital setting. (A) is incorrect because an emergency room is located in a hospital. (B) is incorrect because surgery centers are either located in or connected with hospitals, and surgery is similar to operating rooms. (C) is incorrect because pediatric hospitals have operating rooms and emergency rooms, so they do not constitute a contrast.

5) **⇒** C

We can infer that the purpose of talking to patients before a surgery is to *lessen* any anxieties a patient might have. Choice (C) means to alleviate or dispel, so (C) is the correct answer. Although (A) looks similar to (C), “ally” means “friend” or “supporter,” which is unrelated to lessen. Choice (B) is unrelated to lessening anxieties and is therefore incorrect. Choice (D) is incorrect because to “purge” something is to clean or remove something undesirable, which does not fit in the context.

6) **⇒** C

A list must maintain parallel structure in formal writing. In other words, the items in a list must be presented using the same word pattern. The list at 6 refers to “necessary machines.” Because “machines” is plural, the items in the list should

also be plural. (A), (B), and (D) can be eliminated because one or more of the items are singular and include unnecessary articles. Thus, (C) is the correct answer.

7) **➡ B**

The sentences that precede the underlined portion begin with the pronoun “they,” so the correct choice will maintain this subject pattern. Choice (B) is correct because it does so. (A) and (D) can be eliminated because they use “nurse anesthetist” as a subject instead of “they.” Additionally, the preceding sentences in the paragraph are written using the active voice—the subject of the sentence (they) is performing an action. For this reason, we can eliminate (C), as it uses the passive voice.

8) **➡ B**

Joining the two sentences would require indicating a succession relationship, as one step comes after another. Only choice (B) combines both sentences using “(and) then” to indicate that one qualification follows upon another. (A) is incorrect because an em dash is not grammatically correct here and is usually used to indicate nonessential information in a sentence. (C) is incorrect because it introduces an unnecessary and superfluous phrase—“known as an ‘RN,’”—which makes the sentence wordy. Finally, (D) is incorrect because it indicates a relationship of cause and effect, when the correct relationship is one of succession.

9) **➡ C**

Sentences must maintain parallel structure. In other words, phrases or clauses on either side of a coordinating conjunction (“and” in this case) must use verb forms consistently. The phrase before 9 uses the infinitive verb “to return,” so the second part of the sentence, which describes the next step in the same process, should also use an infinitive verb. Thus, (C) is the correct choice because it uses the infinitive verb “to pass.” Choice (A) is not a parallel structure, while choices (B) and (D) introduce past-tense verb forms, which do not make sense in the sentence.

10) **➡ B**

The correct choice is (B) because, according to the graph, the median income for an anesthetist is just over 150,000 dollars, and the median income for a midwife is just under 100,000 dollars. Therefore, the median wage for an anesthetist is just over 50,000 dollars—about 50 percent—more

than that of a midwife. (A) is incorrect because the graph only includes data for wages at the 25th, 50th, and 75th percentiles, so we cannot say what the highest-paid midwives earn in the 100th percentile. We can eliminate (C) because the combined median incomes for a practitioner and a midwife is just under 200,000 dollars, 50,000 more than the median income for an anesthetist. And (D) is incorrect because the graph does not reflect all other nursing professions, only midwives and practitioners.

11) **➡ A**

Choice (A) is correct because the paragraph mainly discusses the high demand for nurse anesthetists. Because the added sentence contributes to this discussion by reporting the trend toward using nurse anesthetists in place of medical doctors, it should be kept. (B) is incorrect because the paragraph focuses on anesthetist job prospects, not where nurse anesthetists can work. (C) and (D) are incorrect because the underlined sentence is relevant to the paragraph, so it should not be deleted.

12) **➡ B**

The second half of the sentence is a definition; it needs to convey the idea that “anther” and “stigma” correspond to the male and female parts of a plant *in the order that they are listed*. The term with that meaning is “respectively,” making (B) the correct choice. (A) is incorrect because to put something “in perspective” is to realize its importance, which does not make sense in the context of the sentence. Similarly, (C) and (D) are incorrect because “respectfully” means doing something with respect, and “perceptively” means wisely, so neither provides the necessary meaning of “corresponds to.”

13) **➡ A**

The underlined portion at 13 must be a pronoun that refers to “a mobile assistant.” Because the pronoun refers to the object of the sentence, “a mobile assistant,” the correct answer must be (A), which is the *objective* case of the pronoun “who.” (B) is incorrect because “who” is the subjective case, so it can only refer to the subject of a sentence or clause. The gender of the assistant cannot be determined based on the sentence, so (D) is incorrect. The demonstrative pronoun “that” is very rarely preceded by a comma, so we can eliminate (C).

14) **➡ C**

The paragraph's focus is flowers' adaptations to attract specific assistants. However, the sentence at 14 wrongly shifts the paragraph's focus to the perceptions of bees and butterflies. This information appears to be unrelated to the information about flowers attracting assistants and breaks the continuity of the paragraph. Thus, answer choice (C) is correct. (A) is incorrect because the paragraph focuses on flowers attracting assistants while colors that attract pollinators is only a detail. (B) is incorrect because the sentence adds details that do not directly support the paragraph's main topic. Finally, (D) is incorrect because explaining how butterflies and bees can see UV light would only further distract from the focus of the paragraph, so the sentence does not offer a good reason for deletion.

15) **➡ C**

In the sentence containing 15, the assistant (it) "brushes up against pollen" and "transports pollen." Because the verb "transports" must agree with "brushes" in terms of number and tense, we can eliminate (A), which uses "transporting", and (D), which uses "has transported." For (B) to be correct, there would have to be a comma before the conjunction "and" because the inclusion of "it" in (B) makes the sentence into a compound sentence. The lack of a comma before "and" makes (B) grammatically incorrect. Thus, the correct choice is (C) because it does not repeat the subject of the sentence—"it"—and conjugates "transports" to match "brushes."

16) **➡ D**

Up to this point, the passage has indicated that insects and birds are attracted to specific flowers. Yet the paragraph beginning at 16 changes the focus from insects and birds to bats, which are mammals. Thus, a sentence is needed to set up the change. Only choice (D) accomplishes this. (A) is incorrect because it inappropriately sets up a focus on reasons that plants produce flowers rather than the relationship between some bats and flowers. (B) is incorrect because it sets up a focus on how unusual it is for bats to serve as pollinators rather than the actual focus of the paragraph. Finally, (C) is incorrect because it sets up a discussion about competitive pressures among different plants. It therefore fails to set up the paragraph's information about bat and flower coevolution.

17) **➡ B**

The sentences that precede 17 follow a certain pattern: each sentence starts, "In (place), the trait..." Thus, the sentence at 17 should maintain this word pattern and begin with the prepositional phrase "In (place), it..." Because (B) is the only choice to maintain this word pattern, it is the correct choice. Other choices begin differently than preceding sentence and/or use a different verb tense than previous sentences.

18) **➡ A**

Choice (A) is correct because it is concise and clear. (B) is relatively clear, but it includes redundancies ("bats," "pollinators"). (C) also contains redundancies ("them"). (D) includes archaic language ("bestow upon"). Thus, (B), (C), and (D) are incorrect because they are not as clear and concise as (A).

19) **➡ C**

Semicolons function to connect two related independent clauses in the same sentence. Because the two ideas in the sentence containing 19 are independent clauses with closely related ideas, (C) is correct. (A) is incorrect because the pronoun "which" traditionally refers to the noun that immediately precedes it. Because pollen does not "fly around a wider range..." we can infer that the pronoun "which" is being misused. (B) is incorrect because the adverb "additionally" is generally used to transition between two sentences, not between two ideas within the same sentence. (D) is incorrect because "even though" implies contrast, yet the sentence does not suggest that any contrast is intended.

20) **➡ D**

An appropriate concluding sentence would sum up the types of traits that flowers must develop in order to attract to bats. Only choice (D) does this effectively by acknowledging all of the constraints previously mentioned, and concluding with an insight into how bat-attracting flowers appear. (A) is incorrect because it invites further discussion by commenting on the odors of bat-attracting flowers. It does not summarize the information presented. (B) is incorrect because it shifts the focus of the paragraph onto butterflies, bees, and moths, when the focus should be the subject of the paragraph—bat-attracting flowers. Finally, (C) is incorrect because it makes a general statement about the uniqueness of bat-attracting flowers that, like (A),

invites further discussion rather than neatly and succinctly concluding the paragraph.

21) **➡ B**

The phrase attributes the use of echolocation to bats. Thus, "bats" must be plural and possessive, eliminating (A) and (C). (D) makes the sentence somewhat unclear: the use of the present participle "using" implies that some flowers have adapted to bats that *currently* use echolocation. However, we can infer that the flowers have adapted over time to the use of echolocation by bats.

22) **➡ C**

The descriptions contained in the underlined portion refer to "flowers and leaves." Because both flowers and leaves are plural, the corresponding descriptions must also be plural. Choices (A) and (B) are incorrect because one or both of the descriptions are singular. Although (D) is grammatically correct, it is unnecessarily wordy and can be eliminated. Thus, the correct choice is (C).

23) **➡ C**

Choice (C) is correct because a colon is appropriate when combining two independent clauses if the second clause elaborates on or defines the information in the first clause, as is the case here. (A) is incorrect; "because" is used to describe effects, yet this sentence contains an elaboration. (B) is incorrect because a comma cannot separate two independent clauses unless the comma is followed by an appropriate coordinating conjunction. Finally, (D) is incorrect because the phrase "which is that" is unnecessarily wordy.

24) **➡ A**

The plural subject "most of the Mayans" requires the plural noun "were," so (C) and (D) are incorrect. The word "literary," when applied to people, means well-read or intellectual, yet the passage clearly focuses on people having a system of writing and being able to read, or being "literate," so (B) is incorrect, and (A) is the correct choice.

25) **➡ B**

Choice (B) is correct because it is the most clear and concise choice. (A) is incorrect because it uses the transition word "however" as a coordinating conjunction even though there is no contrast in ideas. (C) is incorrect because of its awkward phrasing, such as "from 250 CE to 900 CE..."

was when literacy flourished." (D) can also be eliminated because of unnecessary wordiness, such as using "the flourishing of literacy" instead of "literacy flourished."

26) **➡ D**

The main goal when answering this question is to determine the relationship between Mayan codices and the decline of Mayan civilization. Only choice (D) does so by stating that writing declined with the Mayan "city-states of the southern lowlands." Choice (A) uses "as" to imply a connection between the two, but it does not elaborate on this connection, so it can be eliminated. (B) makes no attempt to connect the codices and agriculture, so it is incorrect. (C) is incorrect because it explains why agriculture declined, but it does not clarify the relationship between literacy and agriculture.

27) **➡ A**

Choice (A) is correct because it clearly indicates that it is ironic that the ancient books survived only because they were taken away by the Spaniards. (B) is incorrect because the word "ironic" appears to begin a casual, informal aside, but the elliptical sentence leaves the reader unsure. (C) is incorrect because its syntax implies that the Spaniards sent the books ironically, which is inaccurate. (D) is incorrect because it is unclear whether the three books are the only surviving ones, or the only surviving ones in Europe.

28) **➡ A**

Choice (A) is correct because a "forebear" is an ancestor, or someone or something that came before the current generation. It makes sense to say that Mayan people continue to live "in the same territory as their" ancestors did. (B) is incorrect because an antecedent is something that came before a current version, but "antecedent" is used to reference things or events. "Descendants" refers to offspring, or individuals who come *after* the current generation, so (C) is incorrect. Finally, (D) can be eliminated because a "lineage" refers to one's ancestry in the abstract (as in one's origins or genealogy), not to actual people.

29) **➡ B**

Choice (B) is correct because sentence 4 mentions that "only three codices survived" because they were sent to Spain. The added sentence should precede sentence 4 in order to introduce the Spanish conquest and its effect on the codices. Choices (A), (C), and (D) would not create a

coherent flow of information.

- 30) **➡ C**  
Choice (C) is correct because it is concise. Choices (A), (B), and (D) all contain redundant terms, making them unnecessarily wordy. Additionally, the word “contemporaneously” in (B) is illogical because it means “existing or occurring at the same time.”
- 31) **➡ C**  
The paragraph focuses on the difficulties of decoding the Mayan language. Sentence 2 mentions the biggest hurdle, so it should go after sentences 3 and 4, which mention two additional problems. Thus, (C) is correct and (A) is incorrect. (B) is incorrect because it would interrupt the topic of Mayan languages in sentences 3 and 4. Finally, (D) is incorrect because sentence 2 is not appropriate as a concluding sentence of the paragraph. It does not sum up the information in the previous sentences and instead invites further comment.
- 32) **➡ D**  
The correct answer must convey the relationship (if any) between the two clauses using punctuation. (A) is incorrect because the ideas joined by a comma are distinct. They need to be separated into two sentences. (B) is incorrect because the relationship between the two ideas is not one of exception, as implied by “nevertheless,” and because the sentence is grammatically incorrect because it lacks an appropriate conjunction. (C) is incorrect because an em dash (—) generally functions to show that one idea is a related but nonessential element to another idea, which is not the case here. Choice (D) clearly transitions between clauses by creating separate sentences, making it correct.
- 33) **➡ B**  
The underlined portion should link the rest of the sentence to information in the paragraph. The only answer that makes a connection between the surviving Mayan books and the final sentence is (B) because it shows how the surviving texts have affected scholars’ understanding of Mayan culture. The other choices are wordy and less effective than (B).
- 34) **➡ C**  
The answer is (C) because it correctly uses parallel

structure to show that ancient humans (plural) used “hands, rocks, or sticks” for percussive purposes. Choices (A) and (B) misuse the singular pronoun “one” to refer to humans, and choice (D) misuses the correlative conjunction “either...or” by writing “either...and” instead. Moreover, using “either” implies that people used only one of the choices, which is unlikely.

- 35) **➡ C**  
Choice (A) is incorrect and (C) is correct because sentence 6 discusses the idea that Malinke drummers can make drums “talk,” while sentence 5 makes a more general claim that rhythm is “the mother tongue.” Thus, sentence 6 should go before sentence 5, because the more general claim at 5 effectively summarizes the specific points in the paragraph. Thus, (C) is correct and (A) is incorrect. (B) is incorrect because putting sentence 6 before sentence 3 breaks the logical progression from sentence 2 to sentence 3. Finally, (D) is incorrect because the paragraph should start with an appropriately general statement about percussion and rhythm to provide the context and focus of the paragraph. Starting the paragraph with sentence 6 would mistakenly give the reader the impression that the focus of the paragraph will be on the Malinke people.
- 36) **➡ D**  
The focus of the paragraph is the emotional effects of percussive music, and an appropriate opening sentence would state this generally. (D) clearly and explicitly focuses on the emotional effects of percussion. (A) is incorrect because it implies that the paragraph will focus on attitudes toward percussion and its importance in music. But the paragraph’s focus is on percussion’s effects on people who hear it. (B) is incorrect because it focuses on the roots of the word “percussion” without a direct connection to the emotional effects of percussion. Finally, (C) is incorrect because it introduces a topic (types of percussive instruments) that is not the focus of the paragraph.
- 37) **➡ B**  
When verb phrases are separated by a coordinating conjunction (“and,” in the case of 37), the phrases’ verbs must use the same form. Here, the first verb phrase uses the infinitive “to embolden,” which means the verb in the second phrase “to scare their opponents” ought to be infinitive as well. No choice contains the infinitive “to scare,” but when two infinitive verbs are listed in the same

sentence, it is often acceptable to leave off the second "to." Thus, claiming that drumming was used "to embolden...and scare" is grammatically correct, making (B) the most appropriate choice. Other choices fail to maintain parallel structure and are therefore incorrect.

38) **⇒** A

This question is testing your ability to recognize parallel structures. The end of the sentence includes the infinitive phrase "to generate customers' enthusiasm," so the underlined portion must match the structure of this phrase. Thus, (C) is incorrect because it begins with a participle ("creating") rather than an infinitive, breaking parallel structure. (A), (B), and (D) all make some attempt at maintaining parallel structure, but (A) is the best option because it is most concise. Choices (B) and (D) contain unnecessary wordiness and/or awkward phrasing.

39) **⇒** B

The titles of long works performed on a stage (ballets, plays, musicals) should be placed in italics. For this reason, choices (A) and (C) are incorrect, as quotation marks are generally used on shorter works (such as the names of individual songs). As phrased in this sentence, *The Rite of Spring* serves as an appositive for "a ballet," so the title must be set apart from the rest of the sentence as an appositive (a nonessential noun phrase) using commas. Because (D) fails to separate the ballet from the rest of the sentence using commas, (B) is the correct answer.

40) **⇒** D

Choice (D) is correct because, in order to conclude the sentence in a way that makes sense, the underlined portion should explain that the audience got more excited than expected and rioted. (A) is incorrect because it fails to explain the first part of the sentence and instead changes the topic. (B) is incorrect because it includes a statement that does not support the claim that Stravinsky's piece was more effective at exciting people than Stravinsky had expected. Finally, (C) is incorrect because the consequence it describes is not connected to the paragraph's topic: excitement generated by percussion.

41) **⇒** A

In the sentence containing 41, the author implies that the beats in lullabies attempts to copy heartbeats. Because the verb "mimic" means to

copy or impersonate, (A) is the correct choice. (B) is incorrect because "portraying" means representing visually, not copying a sound. (C) can be eliminated because "to feign" is to fake or pretend, and (D) is incorrect because "to personify" means to embody or give human form or characteristics. Neither (C) nor (D) fits the meaning precisely.

42) **⇒** B

Generally, a transition word must be set apart from the rest of a sentence using a comma. Therefore, we can eliminate choices (A) and (C) because these choices incorrectly punctuate the transition phrase "in addition." (D) is incorrect because a comma should never separate a subject from its main verb. Thus, (B) is the correct choice.

43) **⇒** D

The pronoun at the end of the underlined portion refers to "percussive rhythm," a singular noun phrase. (B) can be eliminated because it uses a plural pronoun (them) to refer to a singular noun phrase. (A) and (C) are incorrect because, as written in these choices, it is unclear what it means to "participate" in "rhythm." Therefore, (D) is the correct answer because it clarifies that participating in *playing* percussive rhythm can be therapeutic.

44) **⇒** A

An appropriate concluding sentence would summarize peoples' emotional connections to percussion while incorporating ideas about how percussion is a "language." Only (A) accomplishes this, namely by indirectly referring to the claim that percussion is "the mother tongue." (B) is incorrect because the passage is a description of the diverse ways in which people relate to their emotions through percussion, not an argument. Also, as a rule, it is less effective to conclude a paragraph or passage with a question than a factual statement. (C) is incorrect because personal speculation on the part of the author about future medical therapies would not fit the academic tone of the passage. Finally, (D) is incorrect because claiming that percussion is of "vital importance" to humans is unsupported. The passage focuses on percussion's pervasiveness and emotional effect, but it does not claim that percussion is of "vital importance."

## Math Test



## No Calculator Portion

- |        |         |         |         |
|--------|---------|---------|---------|
| 1. (A) | 7. (B)  | 13. (C) | 19. 350 |
| 2. (D) | 8. (A)  | 14. (A) | 20. 93  |
| 3. (C) | 9. (C)  | 15. (D) |         |
| 4. (A) | 10. (B) | 16. 2   |         |
| 5. (A) | 11. (D) | 17. 12  |         |
| 6. (A) | 12. (C) | 18. 18  |         |



## Calculator Portion

- |        |         |         |         |         |                            |          |
|--------|---------|---------|---------|---------|----------------------------|----------|
| 1. (B) | 7. (D)  | 13. (B) | 19. (D) | 25. (C) | 31. 31                     | 36. 64   |
| 2. (D) | 8. (A)  | 14. (D) | 20. (B) | 26. (D) | 32. 30                     | 37. 7.53 |
| 3. (C) | 9. (D)  | 15. (D) | 21. (C) | 27. (A) | 33. 12                     | 38. 0.06 |
| 4. (B) | 10. (C) | 16. (D) | 22. (A) | 28. (D) | 34. $\frac{1}{3}$ or 0.333 |          |
| 5. (C) | 11. (C) | 17. (A) | 23. (D) | 29. (B) |                            |          |
| 6. (D) | 12. (B) | 18. (D) | 24. (B) | 30. (C) | 35. 25                     |          |

## No Calculator Portion

 1) **⇒** A

The number of books sold is  $3m - p$  and books are sold at  $n$  dollars each.

 2) **⇒** D

Rewrite the first equation so that the variables are on the same side:  $-2x + 2 - 9y - 4x \rightarrow 2x - 9y = -2$

Subtracting the second equation from the equation above:

$$\begin{array}{r} 2x - 9y = -2 \\ -) 2x + y = -6 \\ \hline -10y = 4 \rightarrow y = -\frac{2}{5} \end{array}$$

Substitute this value into the second equation in the system:

$$2x + \left(-\frac{2}{5}\right) = -6 \rightarrow 2x = \frac{2-30}{5} \rightarrow x = \frac{14}{5}$$

$$\text{Finally, } \frac{x}{y} = \frac{\frac{14}{5}}{-\frac{2}{5}} = -7$$

 3) **⇒** C

Person 1 shakes five times with each of the others.  
 Person 2 shakes four times with Persons 3, 4, 5, and 6.  
 Person 3 shakes three times with Persons 4, 5, and 6.  
 Person 4 shakes twice with Persons 5 and 6.  
 Person 5 shakes with Person 6.  
 The total number of handshakes is:  
 $5 + 4 + 3 + 2 + 1 = 15$

 4) **⇒** A

Calculate the lowest possible score for A and the highest possible score for B. If A is in 3<sup>rd</sup> place in Event III, its total is:

$$\text{Total points for A} = 3 + 5 + 1 = 9$$

If B comes in 2<sup>nd</sup> place in Event II and 1<sup>st</sup> place in Event III, its total is:

$$\text{Total points for B} = 1 + 3 + 5 = 9$$

It is apparent that B cannot exceed A in points.

 5) **⇒** A

$$\begin{array}{l} -6 < 2x + 4 \leq 0 \\ -10 < 2x \leq -4 \\ -5 < x \leq -2 \end{array}$$

 6) **⇒** A

If  $x$  is a real number, the term  $-3x^2$  is always negative, the largest value for the function is  $f(0) = 5$ . All values of  $f(x)$  must be less than or equal to 5.

 7) **⇒** B

Rewrite the function  $g(x)$  in vertex form:

$$\begin{aligned} g(x) &= x^2 - 6x + 14 \\ g(x) &= x^2 - 6x + 9 + 14 - 9 \\ &= (x - 3)^2 + 5 \end{aligned}$$

The vertex of the parabola that is the graph of  $g(x)$  is (3, 5). The vertex of  $f(x) = x^2$  is (0, 0).

8) **⇒** A

Let  $x$  be the number of adult tickets sold and  $y$  be the number of student tickets sold:  $x + y = 10$

This equation is equivalent to  $5x + 5y = 50$

As the total could have been \$39 or \$41, there are two equations that could express the total:

$$5x + 2y = 39 \quad \text{OR} \quad 5x + 2y = 41$$

By using the subtraction method on the equations we have created, we can determine that only the second of these gives an integer value for  $y$  when subtracted from  $5x + 5y = 50$ :

$$\begin{array}{r} 5x + 5y = 50 \\ -) 5x + 2y = 41 \\ \hline 3y = 9 \\ y = 3 \end{array}$$

9) **⇒** C

$$\sqrt{x+4} = x$$

$$x+4 = x^2$$

$$x^2 - x - 4 = 0$$

Solve for  $x$ :

$$x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(-4)}}{2}$$

$$x = \frac{1 \pm \sqrt{17}}{2}$$

Both solutions are irrational. Approximating the value of  $\sqrt{17}$ :  $x = 2.56, -1.56$

As the square root of a number cannot be negative,  $x = -1.56$  is not a solution to the original equation.

10) **⇒** B

The object hits the ground when  $h(t) = 0$ :

$$240t - 16t^2 = 0$$

$$t(240 - 16t) = 0$$

Therefore,

$$240 - 16t = 0$$

$$t = 15$$

11) **⇒** D

The function  $g(x)$  can be rewritten as:

$$g(x) = \frac{x^2 - 9}{x - 3} = \frac{(x - 3)(x + 3)}{x - 3} = x + 3 \text{ for } x \neq 3$$

The graph of  $g(x)$  is the same as the graph of  $f(x)$  except for  $x = 3$ .

12) **⇒** C

For  $f(x - 3) = 0$ ,  $x - 3$  must have a value equal to one of the members of the set  $\{-3, 0, 1\}$ . If  $x - 3 = 1$ , then:

$$x - 3 + 1 \rightarrow x = 4$$

Only choice (C) includes  $x = 4$  in its set.

13) **⇒** C

Let  $x$  be the cost of one hamburger and  $y$  be the cost of one shake:  $2x + 3y = 4.21$ ,  $3x + 2y = 5.24$

Adding these equations gives:  $5x + 5y = 9.45$

Dividing both sides of the equation above by 5 gives:  $x + y = 1.89$

14) **⇒** A

The dimensions of the rectangular solid are 8 centimeters by 3 centimeters by 1 centimeter. The volume of the solid is:

$$V = l \times h \times w$$

$$V = 8 \text{ cm} \times 3 \text{ cm} \times 1 \text{ cm} = 24 \text{ cm}^3$$

15) **⇒** B

The vertex of the parabola is  $(-3, 4)$ . We can write the equation for the parabola in vertex form, for which  $a < 0$  because the parabola is inverted:

$$y = a(x - h)^2 + k$$

$$y = -(x + 3)^2 + 4$$

$$y = -(x^2 + 6x + 9) + 4$$

$$y = -x^2 - 6x - 5$$

16) **⇒** 2

$$x^2 - x - 2$$

$$x^2 - x - 2 = 0$$

$$(x - 2)(x + 1) = 0$$

$$x = 2, -1$$

17) **⇒** 12

$$\frac{3}{x-3} + \frac{5}{2x-6} = \frac{11}{12}$$

$$\frac{6}{2x-6} + \frac{5}{2x-6} = \frac{11}{12}$$

$$\frac{11}{2x-6} = \frac{11}{12} \rightarrow 2x - 6 = 12$$



18) **⇒** 19

Add all three equations:

$$x + y = 11$$

$$y + z = 14$$

$$x + z = 13$$

$$\hline 2x + 2y + 2z = 38$$

Therefore,  $x + y + z = 19$ 19) **⇒** 350Let  $x$  be the weight, in pounds, of the first lift and  $y$  be the weight of the second lift. We can write the following two equations:

$$x + y = 750$$

$$2x - 300 = y$$

Substitute the second equation into the first:

$$x + (2x - 300) = 750$$

$$x = 350$$

20) **⇒** 93The team has played a total of 24 games, with 15 wins and 9 losses. This constitutes  $16\frac{2}{3}\%$  or  $\frac{1}{6}$  of all games in the season. Let  $x$  be the number of games in the season:

$$\frac{x}{6} = 24$$

$$x = 144$$

In order to achieve a 75% win percentage:

$$\text{Total wins needed} = (0.75)(144) = 108$$

The number of additional wins needed is:

$$\text{Additional wins needed} = 108 - 15 = 93$$

### Calculator Portion

1) **⇒** BPaper and wood, together, make up 60% of the budget. If  $x$  represents total expenditures:

$$(0.6)x = 277,200 \rightarrow x = 462,000$$

To determine the share of this portion that is spent on paper:

$$462,000 \times 0.28 = 129,360$$

2) **⇒** DThe  $y$ -intercept is given. To determine slope:

$$m = \frac{15 - 0}{0 - 6}$$

$$m = -\frac{5}{2}$$

The equation of the line is:  $y = -\frac{5}{2}x + 15$ 3) **⇒** C

$$\frac{12 \text{ peaches}}{1 \text{ dozen}} \times \frac{1.5 \text{ lb}}{6 \text{ peaches}} \times \frac{\$24.00}{20 \text{ lb}}$$

$$= \frac{(12)(1.5)(24)}{(6)(20)} \$/\text{dozen}$$

$$= \$3.60/\text{dozen}$$

4) **⇒** B

Begin by evaluating III: the mode is the value that appears most often. Looking at the list, it is clear that the mode is 80, so III is true. Eliminate choices (A) and (C). Next, evaluate II: as there are seven scores, the median score is 70. II is not true.

5) **⇒** C

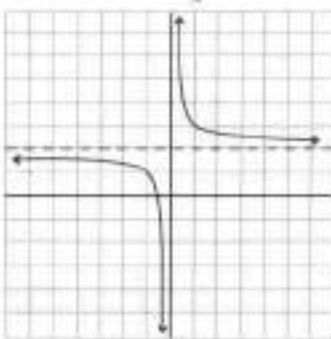
Test the ordered pairs with the inequalities. The second inequality is the easier to work with:

$$x - y > 1$$

Only choice (C) satisfies this inequality:

$$2 - (-1) > 1$$

$$3 > 1$$

6) **⇒** DThe graph of the function  $f(x) = \frac{1}{x} + 2$  is the graph of  $f(x) = \frac{1}{x}$  translated vertically 2 units:The only value of  $f(x)$  that is excluded is  $f(x) = 2$ .7) **⇒** DLet  $n$  be the number of years that have passed since 2000. The increase in the deer population is:

$$\text{Factor of increase} = (1.3)^{\frac{n}{20}}$$

In the year 2080:

$$\text{Factor of increase} = (1.3)^{\frac{80}{10}} = (1.3)^8 = 2.856$$

8) **➡ A**

The points on the scatterplot indicate a positive linear relationship between height and weight. Only choice (A) represents this type of relationship.

9) **➡ D**

Let  $x$  represent the BMI in units  $\frac{\text{lb}}{\text{inch}^2}$ .

$$x \cdot \frac{\text{lb}}{\text{inch}^2} \times \frac{0.453\text{kg}}{\text{lb}} \times \left(\frac{\text{inch}}{0.0254\text{m}}\right)^2$$

$$= x \cdot \frac{0.453}{0.0254^2} \times \frac{\text{kg}}{\text{m}^2} = x \cdot 702 \frac{\text{kg}}{\text{m}^2}$$

10) **➡ A**

The first equation can be rewritten as:

$$y = 2x - 5$$

Substituting into the second equation gives:

$$3x + 2(2x - 5) = -3$$

11) **➡ C**

$$2x^2 + 7x + 5 = 0$$

$$(2x + 5)(x + 1) = 0$$

$$x = -\frac{5}{2}, -1$$

The sum of the solutions is:  $-\frac{5}{2} + (-1) = -\frac{7}{2}$

12) **➡ B**

The two functions have the same values at only two points,  $x = 0$  and  $x = 1$ .

13) **➡ B**

Use the formula  $A = P(1+r)^t$ , where  $A$  is the amount in the fund,  $P$  is the principal,  $r$  is the interest rate, and  $t$  is the time in years. Here, the principal is \$1000, the interest rate is 4.5%, and the term is 18 years:

$$A = P(1+r)^t \rightarrow A = 1000(1.045)^{18} \approx 2200$$

14) **➡ D**

Let  $x$  be the price of the car in 1975:

$$\text{Price in 1980} = (1.3)x$$

$$\text{Price in 1985} = (1.5)(1.3x) = 1.95x$$

The price of the car in 1985 is 95% greater than the price in 1975.

15) **➡ D**

The cost of mailing is a linear function. The  $y$ -intercept is the baseline cost, \$0.46. The slope is the cost per additional ounce, \$0.20:  $c(z) = 0.2(z - 1) + 0.46$

16) **➡ D**

As all salaries increase by the same amount, the median will increase by this amount. If  $a$  is the number of employees and  $x$  is the mean before the raises:

$$\text{Adjusted mean} = \frac{ax + 1000a}{a} = x + 1000$$

17) **➡ A**

Solve the system of equations by multiplying the second equation by a factor of 4 and subtracting the two equations:

$$\begin{array}{r} 4x - y = 7 \\ -) 4x + 12y = 20 \\ \hline -13y = -13 \\ y = 1 \end{array}$$

Solve for  $x$ :

$$x + 3(1) = 5$$

$$x = 2$$

18) **➡ D**

Write the equation  $a + c = 70$  in terms of  $b$ :

$$a = \frac{b}{2}, c = 3b$$

$$\frac{b}{2} + 3b = 70$$

$$\frac{7}{2}b = 70$$

$$b = 20$$

Therefore,  $a = 10$ ,  $c = 60$

$$a + b + c = 90$$

19) **➡ D**

$$f(8, 3) = \frac{1}{4}(8) - 3 = -1$$

$$f(-12, -2) = \frac{1}{4}(-12) - (-2) = -1$$

20) **➡ B**

Let  $x$  be the amount of 50% glucose solution that is added:

$$(0.24)(16) + (0.5)(x) = (0.35)(16 + x)$$

$$3.84 + 0.5x = 5.6 + 0.35x$$

$$x = 11.7$$

21) **⇒ C**

The axis lines indicate that the total amount of trash collected across districts is "13." The unit of measurement indicated by the axis lines can be represented by  $x$ :

$$13x = 130,000 \text{ tons} \rightarrow x = 10,000 \text{ tons}$$

22) **⇒ A**

Let  $x$  be number of hours it takes to remove the water. 50 liters of water enter the basement for 2 hours before removal begins, and for  $x$  hours of removal:  $50(2+x)$ . We can set this expression equal to the amount of water removed per hour:

$$60 \text{ liters} = x$$

Therefore:

$$50(2+x) = 60x \rightarrow 100 + 50x = 60x \rightarrow x = 10$$

23) **⇒ D**

23% of the portfolio is invested in Technology.

Twenty percent of this portion is:  $(0.2)(23\%) = 4.6\%$

The percent invested in Health after the transfer is:  $11\% + 4.6\% = 15.6\%$

The dollar amount invested in Health is:

$$(0.156)(500,000) = 78,000$$

24) **⇒ B**

Let  $x$  be the distance of the one-way trip. The times to travel up and down the route are:

$$\text{Time}_{\text{up}} = \frac{x \text{ mile}}{12 \frac{\text{mile}}{\text{hr}}} = \frac{x}{12} \text{ hr}$$

$$\text{Time}_{\text{down}} = \frac{x \text{ mile}}{18 \frac{\text{mile}}{\text{hr}}} = \frac{x}{18} \text{ hr}$$

The time for the round trip is:  $\frac{x}{18} + \frac{x}{12} = \frac{5x}{36} \text{ hours}$

The average speed for the round trip ( $2x$ ) is:

$$\frac{2x}{\left(\frac{5x}{36}\right)} = \frac{72}{5} = 14.4 \frac{\text{miles}}{\text{hour}}$$

25) **⇒ C**

Let  $x$  be the weight of one cellphone. The weight of all recycled cellphones is:

$$(150 \text{ million})(0.1)x = (15 \text{ million})x$$

The percentage by weight of all recycled electronics made up cellphones is:

$$100\% \times \frac{(15M)x}{(55M)(0.3)(100x) + (32M)(0.2)(10x) + (15M)x}$$

$$= 100\% \times \frac{15}{1729} \approx 1\%$$

26) **⇒ B**

As sixty percent of students are in the Arts Program, 40% of students—or 4000 students—are in the Science program. The Science program is forty percent male and sixty percent female:

$$\text{Female students in Science program} = (4000)(0.6) = 2400$$

The remaining female students are in the Arts program:

$$\text{Female students in the Arts program} = 5000 - 2400 = 2600$$

The percentage of students in the Arts program that are female is:

% of students in Arts that are female

$$= \frac{2600}{6000} \times 100\% = 43\%$$

27) **⇒ A**

The equation of a circle with center  $(2, -3)$  and diameter of 4 units—radius 2 units—is:

$$(x-2)^2 + (y+3)^2 = 4$$

Expanding the expressions in brackets:

$$x^2 - 4x + 4 + y^2 + 6y + 9 = 4$$

$$x^2 + y^2 - 4x + 6y + 9 = 0$$

28) **⇒ D**

$$f(t) = t^2 + t + 2t + 6$$

$$= (t^2) + t^2 + 2t + 6$$

$$= -t - 1 + 2t + 6$$

$$= 5 + t$$

29) **⇒ B**

To answer this question, use the trigonometric identity:

$$(\sin x)^2 + (\cos x)^2 = 1$$

$$\cos x = \pm \sqrt{1 - (\sin x)^2}$$

$$\text{Since } \cos x < 0, \cos x = -\sqrt{1 - \left(\frac{3}{5}\right)^2} = -\frac{4}{5}$$

We can calculate  $\tan x$  using the identity:

$$\tan x = \frac{\sin x}{\cos x}$$

$$\tan x = \frac{\left(\frac{3}{5}\right)}{\left(-\frac{4}{5}\right)} = -\frac{3}{4}$$

30) **➡** C

The perimeter of the shaded region is made up of one side of the triangle and a portion of the circumference of the circle. Beginning with the side of the triangle:  $\overline{PO} = \overline{OQ}$  so  $\triangle POQ$  is an isosceles triangle.

$$\angle OPQ = \angle PQQ \text{ and } \angle OPQ + \angle PQQ = 120^\circ$$

Therefore,  $\angle OPQ = \angle PQQ = \angle POQ = 60^\circ$   
 $\triangle POQ$  is an equilateral triangle, and  $\overline{PQ} = 3$ .

Next, consider the arc. The length of the arc is proportional to the central angle:

$$\frac{60^\circ}{360^\circ} = \frac{\widehat{PQ}}{2\pi r}$$

$$\widehat{PQ} = \frac{6\pi}{6} = \pi$$

The perimeter of the shaded region is  $= 3 + \pi$ .

31) **➡** 31

$$\text{Number of trips} = \frac{91 \text{ gallons}}{\frac{3 \text{ gallons}}{\text{trip}}} = 30.3 \text{ trips}$$

The minimum number of trips is 31. There are 30 trips where the jar is filled, and the last trip, when the jar is filled to 1 gallon.

32) **➡** 30

Let the distance that Peter has traveled when David catches up to him be  $x$ . The time it takes for David to catch Peter is:

$$\frac{x \text{ miles}}{60 \frac{\text{miles}}{\text{hour}}} = \frac{x+10}{80 \frac{\text{miles}}{\text{hour}}}$$

$$80x = 60x + 600$$

$$20x = 600$$

$$x = 30 \text{ miles}$$

David will catch Peter at time  $t$ :

$$t = \frac{30 \text{ miles}}{60 \frac{\text{miles}}{\text{hour}}} = \frac{1}{2} \text{ hour} = 30 \text{ minutes}$$

33) **➡** 12

$$\frac{5}{3}(x-3) - \frac{3}{2}(x-2)$$

$$\frac{5}{3}x - 5 - \frac{3}{2}x + 3$$

$$\frac{10x - 9x}{6} = 2$$

$$x = 12$$

34) **➡**  $\frac{1}{3}$  or 0.33

Although the question asks about the probability of drawing two balls simultaneously, we get the same result if we think of drawing the balls one at a time.

For red balls:

$$P(\text{one red ball}) = \frac{4}{12} = \frac{1}{3}$$

$$P(\text{second red ball}) = \frac{3}{11}$$

$$P(\text{drawing two red balls}) = \frac{1}{3} \cdot \frac{3}{11} = \frac{3}{33}$$

For white balls:

$$P(\text{one white ball}) = \frac{8}{12} = \frac{2}{3}$$

$$P(\text{second white ball}) = \frac{7}{11}$$

$$P(\text{drawing two red balls}) = \frac{2}{3} \cdot \frac{7}{11} = \frac{14}{33}$$

$$\text{The difference in probabilities is: } \frac{14}{33} - \frac{3}{33} = \frac{11}{33} = \frac{1}{3}$$

35) **➡** 25

The heartrate is modeled as a linear function, with slope of the function representing the change in beats per minute and equal to 5. The increase in beats per five minutes of running is 25.

36) **➡** 64

The distance of the object from the mirror is 1.5 feet:

$$L = 4 \left( \frac{2}{1.5 - 2} \right)^2 = 4(-4)^2 = 64$$

37) **➡** 7.53

Men in workforce

$$= (0.5)(65.5 \text{ million}) = 32.75 \text{ million}$$

Men in Industry

$$= (0.23)(32.75 \text{ million}) = 7.53 \text{ million}$$

38) **➡** 0.06

If 61% of the workforce is male, 39% of the workforce is female. Among females, 15% work in business:

$$P(\text{woman in business}) = (0.39)(0.15) = 0.06$$

## Essay Test

### Sample Response: Score 1/2/1

*In the passage, the author Ricki Lewis persuades her audience by using examples of relevant movies and books; the use of humor to gain credibility for her point that science concepts are being misused in literature causing problems.*

*Just how the audience may become confused is connected to many movies. Lewis gives an example of misused science concept in *The Day After Tomorrow*. Weather is a huge hazard the world lives with; however, the movie makers just use it to make money and entertainment. About 95% of the people who watch it will not understand the true science, which makes it problematic: people will have their mind wrapped around that this science concept are true or partly true to science. Although, Lewis does state "scientific accuracy just doesn't matter." To a point of giving false science, science does matter. Lewis also uses examples of books and how characters are these well educated professors, or just people, who with their scientific knowledge they are able to save the world from disaster. Lewis proves that the science used in these books is nonsense, which makes the audiences feel, "What is the true science then?"*

*Even though its quite a strong subject, Lewis builds humor into her passage to show that science could be use correctly. She states "The last thing our science-phobic world needs is another mad scientist—even a fictional one." She gives the audience a laugh by giving them a view that most movies and books are just entertainment and for science are not to be believed. However, that scientist or people should not be based on nonsensical science concepts.*

### Evaluation

#### Reading: 1

The student may need to spend more time reading the source text. The student's response would have scored much higher overall if the student had better comprehended the title and beginning of the text (i.e., that the author was reviewing a novel) and to the

conclusion (that the author wishes the novelist had portrayed some positive contributions of geneticists.) Another sign of rushed reading was that the student uses a quote from the author ("scientific accuracy just doesn't matter") without explaining its context, which makes the reader unsure why the student has included it.

#### Analysis: 2

The response is a good effort to explain what the author does and how it affects the reading audience ("Lewis proves that the science used in these books is nonsense, which makes the audiences feel, 'What is the true science then?'") The student should work on identifying the author's strategies even more specifically, in other words describing in more detail how Lewis proves her points.

#### Writing: 1

In the response, the main problem is clarity. It is sometimes unclear how thoughts connect to each other, and whether the student is slipping into personal opinion, or explaining the effect of the author's strategy. The student can improve clarity in his or her responses by practicing using more precise vocabulary, as well as learning more about using phrases and commas.

### Sample Response: Score 4/3/3

*The book *Inferno*, by Dan Brown, is the topic of Ricki Lewis in the essay, "Dan Brown's Inferno: Good Plot, Bad Science." She is getting ready to give a talk on the novel, about an insane geneticist, and she has decided that it gets an "A" in style but an "F" in genetics. Lewis uses her own factual knowledge to prove how the book is wrong regarding its plot, and she builds her argument against the book with stylistic and reasoning methods.*

*The reader can tell that Lewis is a scientist because she does not need to refer to an authority in order to state that the facts are wrong. Right away, she makes a strong case because she says that Brown confuses "cerebellum with cerebrum, and PET scans with CT scans," which seem like very basic mistakes. She lists more mistakes as she goes on to point*

*mixes up natural selection with genetic enhancement. When she writes about that, the reader almost feels embarrassed for Brown, because he is so famous.*

*The author is very blunt and choppy at the end, so it has stylistic impact. She is talking about how Brown explains the science, and she calls it "hand-waving—throw out a bunch of terms that presumably readers won't recognize to make it sound like it makes sense. It doesn't." Also, she says that the world that is already "science-phobic" does not need "another mad scientist—even a fictional one." So these features make the reader believe that she has the final word, and Dan Brown could not argue against her.*

*The reasoning element comes into play when Lewis wonders why Brown didn't include a subplot about something good achieved by genetics. She says that Brown is so famous, and he had an opportunity to teach people, but he did not use it. He could have written in a subplot about how a family saves its child from a genetic disease, according to Lewis. Her argument is logical because she raises a good point. Overall, Lewis uses her own facts, combined with blunt style and logical reasoning to explain why Dan Brown's novel gets an "F" in science. She kind of implies that he may scare people about genetics in ways that they don't need to be scared, because it's not possible to do the things he shows people doing.*

## Evaluation

### Reading: 4

The student quickly establishes that he or she understands the article's central idea by claiming that the article's author "has decided that it [*Inferno*] gets an 'A' in style but an 'F' in genetics." The student's summaries are accurate and concise and make excellent use of quotes from the article. The student's skillful use of quotations and ability to connect the author's ideas within the response indicate a strong understanding of the source material.

### Analysis: 3

The student's analysis remains focused and relevant to the source material. For example, in paragraph 2 of her response, the student explains that the author appeals to her authority as a scientist when criticizing Dan Brown; in the last sentence of the paragraph, the

student briefly elaborates on this idea by explaining the impact the author's strategy has on the reader. However, for a more comprehensive analysis, the student could further explore the ways in which the author's stylistic decisions influence the reader or support the article's central idea.

### Writing: 3

The student consistently uses clear phrasing and simple but precise diction. Additionally, the student's response is structured well, presenting a clear progression of ideas. The student could improve his or her response by including a greater variety of sentence structures; using sentence structures that are more sophisticated may allow the student to convey a more complex and nuanced analysis of the source material.

# SAT Practice Test 5: Answers & Explanations

## Reading Test



1. (D)	6. (A)	11. (D)	16. (B)	21. (D)	26. (C)	31. (B)	36. (D)	41. (C)	46. (C)	51. (C)
2. (A)	7. (B)	12. (B)	17. (D)	22. (A)	27. (B)	32. (A)	37. (C)	42. (B)	47. (C)	52. (A)
3. (B)	8. (C)	13. (A)	18. (A)	23. (B)	28. (D)	33. (B)	38. (C)	43. (C)	48. (D)	
4. (B)	9. (B)	14. (C)	19. (C)	24. (D)	29. (B)	34. (A)	39. (B)	44. (B)	49. (A)	
5. (A)	10. (C)	15. (B)	20. (A)	25. (A)	30. (C)	35. (A)	40. (A)	45. (D)	50. (C)	

1) **⇒ D**

Choice (D) is correct because Nevyrazimov does not react with pleasure to the sounds of festivities and the spring air from outdoors, and in the following paragraph, the narrator implies that the sounds only make the room seem darker and dirtier in contrast. (A) is incorrect because the character's childhood does not factor into his thoughts at this point in the story. (B) is incorrect because, although the joyful noises outside do serve to distract Nevyrazimov, they in themselves do not explain the reasons for his "distracted demeanor." (C) is incorrect because there is no indication in the story that the festivities outside inspire Nevyrazimov to make any lifestyle changes; they merely deepen his negative feelings.

2) **⇒ A**

Choice (A) is correct because "tumult" precisely conveys the idea of a "chaos of sound" caused by excited crowds of people outside Nevyrazimov's window. (B) and (C) both refer to confusing disturbances and conflicts, thus they do not make sense in the context of festivities. (D) is incorrect because "turbulence" refers to violent or unsteady movement of air or water, or to violent confusion, so it does not fit with the context of the passage.

3) **⇒ B**

The answer is (B) because, while the holiday seems to provoke the character to consider several ways that he might change his evening, and even his life, in the end, he has resigned himself to the fatalistic belief that none of these plans will work and that he is trapped

by his circumstances. (A) is incorrect because the character never appears optimistic. For instance, when he considers stealing and running away to America, he rejects the entire idea because he has no idea where America is (lines 75 - 77). (C) is incorrect because the reader does not know enough to appraise the character as opportunistic or cunning; we learn nothing of his behavior in the past. Finally, (D) is incorrect because the passage begins with Nevyrazimov writing a formal but friendly letter to his employer, even though he has contempt for him. Therefore, the reader cannot consider the character to be honest and sincere.

4) **⇒ B**

Choice (B) is correct because, in these sentences, the character decides not to leave the office for the Easter festivities after all because he probably would not have a good time, and that even if he did, it would not change his life. This illustrates that he is discontented with his life and feels powerless to change it. (A) is incorrect because it indicates only a difficult relationship with his "Honored Sir, Father and Benefactor." (C) is incorrect because it indicates only the character's desire for a better life, but not his feelings that it is impossible for him to have one. Finally, (D) is incorrect because, though the act of killing the cockroach shows Nevyrazimov's bitterness and callousness, it does not clearly demonstrate a sense of resignation.

5) **⇒ A**

Choice (A) is correct in the context of the passage. It forms a phrase, "solemn festivities,"

which combines two words that appear to be opposite in meaning, unless "solemn" is taken in the sense of "serious" or "earnest." The phrase then has the meaning that the celebrants are sincere and serious, which is consistent with the descriptions in the passage. Choices (B), (C), and (D) are incorrect because they do not describe this sentiment.

6) **➡ A**

The correct choice is (A). In line 1, Nevyrazimov starts his letter with "Honored Sir, Father and Benefactor!" – all of which indicate that he is writing to a superior. Later the reader learns that Nevyrazimov has been trying to get a promotion from the man to whom he is writing, providing definitive evidence that the man is his boss (line 80 – 86). (B) is incorrect because it is unlikely that the character would call a friend by such titles, and there is no indication that he is trying to get a loan from the recipient. (C) is incorrect because Nevyrazimov begins writing greetings "to your family," indicating that the recipient is not related to him. Finally, (D) is incorrect because there are no indications that the recipient is corrupt or engages in criminal activity of any kind.

7) **➡ B**

The correct choice is (B) because it is ironic that Nevyrazimov addresses the man as "Honored Sir" in the letter, and then privately calls him a "rascal" (line 16). This inference is confirmed later in the story, when it is revealed that Nevyrazimov despises the man "with his whole soul" (lines 82 – 83). (A) is incorrect because, although Nevyrazimov dislikes the recipient, there is no direct indication of either generosity or greed on his part. (C) is incorrect because, although the letter is formal and serious, it is clear from the context of the entire passage that Nevyrazimov is not a high-spirited person, or in any way "flippant" or "jocular." Finally, (D) is incorrect because it appears that Nevyrazimov has respect for religious institutions, as he longs to take part in the religious festivities (lines 57 – 61).

8) **➡ C**

The correct choice is (C) because it captures the irony of the letter, which is written with warmth in spite of the character's true feelings.

(A) is incorrect because, while it includes the honorific titles the character is using to address his recipient, it does not indicate anything about his actual feelings. (B) is incorrect because although the character calls the recipient a "rascal" in this sentence, it does not reveal the extent of his negative feelings for him. (D) is incorrect because it does not concern the letter.

9) **➡ B**

Choice (B) is correct; in lines 22 – 28, the reader learns that Nevyrazimov feels sorry for the cockroach because it cannot leave the office, but in lines 90 – 93, Nevyrazimov calls it a "nasty thing" and throws it into the flame. (A) is incorrect because it is not true to say that the character ever felt protective of the cockroach. (C) is incorrect because, although the character does seem "unperturbed" by the cockroach, he does not become obsessed by it. (D) is incorrect because it is in the wrong order; it is correct to say that the character felt camaraderie and then disgust, but not the other way around.

10) **➡ C**

Choice (C) is correct because the character's anger grows as he contemplates his "hopeless situation," a feeling which is mirrored by the cockroach wriggling its legs "in despair." (A) is incorrect because Nevyrazimov is concerned with his situation, not his office. (B) is incorrect because the passage does not portray Nevyrazimov's attitude toward anyone he might consider to have an inferior position. Finally, (D) is incorrect because the character appears to kill the cockroach out of anger, not due to optimism about making positive changes.

11) **➡ D**

Choice (D) is correct because the phrase is part of a longer sentence that begins, "It is said, and insisted upon by Mr. Attorney, that..." (lines 1 – 2) in which Hamilton lists the justifications put forth by the other side. Answer choices (A), (B), and (C) fail to correctly comprehend the meaning of Hamilton's long sentence.

12) **➡ B**

The correct choice is (B) because, according to the prosecution's claims (in Hamilton's



paraphrase), government cannot be effective if the “supreme magistrates” have their actions criticized—i.e., if they are admonished—“by private men.” (A) is incorrect because “censor” has a different meaning than “censure.” In this sentence, Hamilton is not referring to people censoring (suppressing) governmental actions, but rather, criticizing them. (C) is incorrect because evaluating is a private mental process, not necessarily an outward expression. Finally, (D) is incorrect because the paragraph does not discuss “sentencing” anyone for a crime; rather, its topic is the open criticism of the government.

13) **➡ A**

Choice (A) is correct because in paragraph 2 Hamilton says that leaders have historically used “specious pretenses,” or tricky excuses, for totalitarian rule. (B) is incorrect because Hamilton is not discussing types of laws, but abuses of power. (C) is incorrect because it is not the primary, specific purpose of the phrase “specious pretenses.” (D) is incorrect because Hamilton is not singling out British officials, but talking about leaders in general.

14) **➡ C**

The correct choice is (C). In paragraph 1, Hamilton describes the prosecution’s view, namely that the government cannot enforce laws if people do not respect its authority. In paragraph 2, Hamilton responds to these charges, arguing that if people do not respect leaders’ authority, it is due to the leaders themselves and their abuse of power, not because people are criticizing them. (A) is incorrect because in paragraph 2 Hamilton does not focus on issues of respect for himself or his client. (B) is incorrect because Hamilton does not concede any points in paragraph 2. (D) is incorrect because, although Hamilton does use an example from Roman history later in his speech, paragraph 2 does not introduce details or themes that directly relate to it.

15) **➡ B**

The correct choice is (B). In paragraph 3, Hamilton states that many people throughout history have lent a hand in destroying their own countries “for the sake of preferment or some imaginary honor,” that is, for some benefit

or favorable status. (A) is incorrect because those who have a hand in oppression may or may not value liberty, but act primarily out of their own self-interest. (C) is incorrect because Hamilton does not suggest that people who help tyrants expect them to restore freedoms. Finally, (D) is incorrect because Hamilton does not suggest that certain people want to destroy their countries. Instead, they want to secure certain advantages for themselves.

16) **➡ B**

Choice (B) is correct because it provides direct support of the idea that people assist oppressive leaders out of self-interest. They help “for the sakes of preferment or some imaginary honor.” (A), (C), and (D) are incorrect because none of them explains the probable motivations of the people who have “freely lent a helping hand” to oppressors (lines 33–34).

17) **➡ D**

The correct choice is (D). In lines 35–45, Hamilton refers to Brutus, a senator in ancient Rome who opposed the dictator Julius Caesar. Brutus warns other senators that when they help Caesar set up the means of oppression, they should remember that they themselves will be among the oppressed. (A) and (B) are incorrect because Hamilton is speaking of enslavement or imprisonment metaphorically, not literally. Choice (C) is incorrect because Hamilton is using Caesar as an example for a specific point, not an extended comparison.

18) **➡ A**

The correct choice is (A). According to Hamilton, power is similar to beautiful and useful rivers that nevertheless occasionally overflow their banks; potential danger is always present. (B) is incorrect because the river metaphor does not imply that power is always destructive, only that it always carries the potential to become destructive. (C) is incorrect because Hamilton’s river metaphor is not a prediction about particular governments or people. (D) is incorrect because the imagery of a river creates a specific effect; it is not merely an indication of a larger context.

19) **➡ C**

Choice (C) is correct. In lines 54–55, Hamilton

urges listeners to “support liberty, the only bulwark against lawless power” in the sense that the only “wall” that protects against the abuse of power is liberty. (A) is incorrect because Hamilton is talking about containing and managing power, not attacking it with a weapon. (B) and (D) are incorrect because it does not make sense to say that liberty is a convincing argument; nor does it make sense to say that liberty is a stern warning. Liberty is an abstract concept, which cannot be described as a type of statement.

20) **➡** A

The correct choice is (A); Hamilton focuses on the impact that jury members can have by laying a “noble foundation” for liberty, not just in their state, but throughout the colonies. (B) is incorrect because there is no indication that Hamilton wishes the jury members to speak out. (C) is incorrect because it can be assumed that all lawyers want to persuade all juries to vote unanimously in their favor, so that alone cannot explain Hamilton’s action. Finally, (D) is incorrect because Hamilton is not clarifying details, and there is no indication that the case was confusing.

21) **➡** D

Choice (D) is correct because here Hamilton says that ruling in favor of his client will lay a foundation of liberty for “ourselves, our posterity, and our neighbors...” Specifically, the decision will secure the right to oppose and expose “arbitrary power...by speaking and writing truth.” In other words, Hamilton is predicting that the case will make history as a victory for freedom of speech. (A), (B), and (C) are incorrect because they describe the importance of the case to the colonies, but not its historical significance.

22) **➡** A

The correct choice is (A). In the first paragraph, the author says that the lark (a type of bird) “hushes her song” so that the fields of lavender can hear the crickets; the fields are like an audience listening to a musical performance. Answer choices (B), (C), and (D) do not make sense in the context of the analogy.

23) **➡** B

Choice (B) is correct. At the beginning of paragraph 3, the author writes of the body of the cricket: its “right wing-cover overlaps the left” (line 18). The structure is “the reverse of the green grasshopper...” which is “left-handed;” in other words the wings are folded left over right. (A), (C), and (D) are all incorrect interpretations of the text.

24) **➡** D

Choice (D) is correct. While the statement in lines 19 – 22 compares similar insects in terms of wing arrangement, the focus of the paragraph returns to a description of cricket wings; “The two wing-covers have the same structure” and “To know one is to know the other” indicate that the cricket’s two wing-covers are identical. Choices (A) and (B) are incorrect because they do not focus on crickets or their wing structures. (C) is incorrect because, although the statement follows a comparison to the grasshopper in terms of wing-cover arrangement, the author’s purpose is primarily to describe cricket wings. In order to describe only one of the wings in the following paragraph, he points out that the right and left wing-covers of the cricket are identical.

25) **➡** A

Choice (A) is correct. Paragraph 3 discusses the wings of crickets and related species, as well as the relationship of the cricket’s two wings to each other. The sentence serves to clarify that the following paragraph refers to a single wing. (B) is incorrect because the author is inviting the reader to examine a single cricket wing, the one on the right; there is no mention of differences between mirror images. (C) is incorrect because it does not reflect the author’s purpose, which is to describe cricket wings. (D) is incorrect because the author is not asserting the importance of the right wing-cover. Rather, he seems to have chosen it randomly, since he has said that the two have the same structure.

26) **➡** C

The correct choice is (C). The reference to Arabic calligraphy—a type of writing renowned for its elaborate beauty—serves to underscore

the author's admiration for the tiny structure: he refers to "powerful" veins of "the deepest black" on the back of the cover. (A) and (B) are incorrect because the author is describing the "general effect" of the veins on the wing-cover's appearance, not conveying information about their use or their place of origin. (D) is incorrect because there is no speculation in the passage about any biological advantage the cricket might gain from the appearance of its wings.

27) **⇒** B

Choice (B) is correct. In paragraph 5, the author indicates that a light through a cricket wing-cover illuminates its overall color of pale red, with two spots that are exceptions—an anterior triangular area, and a posterior oval area. Thus it is apparent that the author is describing the locations of the shapes, or their "positions." (A) is incorrect because the terms are clearly part of a description of the wings, not a discussion of different cricket species. (C) is incorrect because the sentence begins by describing the wing-cover's color, and then two adjacent regions on it that are a different color. Thus, "anterior" and "posterior" clearly indicate positions of regions of the wing-cover, not shapes of the wing-covers. (D) is incorrect because, while the author does mention later in the paragraph that the two regions make up the "sonorous," or sound-making, area of the wing, the author is primarily describing appearance, not function, in the paragraph.

28) **⇒** D

Choice (D) is correct because the phrase refers to the two "sonorous" spots on each cricket wing that create sound when they vibrate. (A), (B), and (C) are incorrect because they do not address the topic of the sentence, which is producing sound.

29) **⇒** B

The author describes the cricket's ability to "modify the intensity of the sound" by pressing down or slightly raising its folded wing covers from its abdomen. Thus, choice (B) is the answer because it describes the mechanism for chirping loudly or softly. (A) is incorrect because the passage does not discuss cicada noise-making structures.

(C) is incorrect because the wing-covers are always folded, according to the passage. (D) is incorrect because a "skill at chirping loudly" is too general to explain the author's specific description.

30) **⇒** C

Choice (C) is correct because the author uses the words "loudness," "note," and "raucous" in the sentence, indicating that he is referring to sound; "tone" is the only choice that indicates sound. Choices (A), (B), and (D) are incorrect because they do not refer to sound. Although (D) refers to a feature or a distinguishing characteristic, the word "trait" is usually used in terms of people—not a phenomenon such as a sound.

31) **⇒** B

According to lines 48–54, a cricket's sound is produced when the wing-covers rub together and create vibration in the tympani. In lines 17–19 and lines 62–63, the wing covers are described as extending and folding over the animal's flank. This suggests that the most likely position of the tympani are on the sides of the cricket close to the wings. Position B fits this description, so choice (B) is correct. Choices (A), (C), and (D) are incorrect because they are not consistent with the passage.

32) **⇒** A

Choice (A) is correct because the terms "mezzo voce" and "fortissimo" are terms used in musical notation to signify medium or loud volume. The use of musical terms implies a musical or melodic sound. (B) is incorrect because the author is not suggesting that the sounds function as communication. (C) is incorrect because the author does not claim that he is identifying "the most important difference" between the two species. (D) is incorrect because there is no discussion in the text about where the species originated.

33) **⇒** B

The correct choice is (B). By mentioning his wife, Nancy, and talking about the couple's emotional response to the explosion, Reagan is responding on a personal level and identifying with the feelings of many of the people who are watching the speech. (A) is incorrect

because Reagan does not focus on the morbid details of the explosion. (C) is incorrect because the description "pained to the core" is not a tranquil, or calm, one. (D) is incorrect because Reagan's statement that he and his wife are feeling deep pain does not serve as an introduction to impassioned criticism of the system.

34) **➡** A

Choice (A) is correct because Reagan's statements emphasize a sense of shared grief as a whole nation, not as a political group. (B) is incorrect because Reagan does not attempt to persuade viewers to feel sadness. Rather, his statements assume that the feeling already exists. (C) and (D) are incorrect because the short phrases describe a sense of grief and unity and do not address the larger ideas of the explosion's legacy.

35) **➡** A

Choice (A) is correct because as used here, "bear" implies carrying a heavy load, or (metaphorically) experiencing grief. (B), (C), and (D) are incorrect because they are different meanings for "bear," which do not make sense in the context of the sentence.

36) **➡** D

Choice (D) is correct because the president calls the crew members "heroes" (line 17), saying that "they wished to serve, and they did. They served all of us" (lines 28–29). These statements imply the crew members' lives were meaningful to the whole nation and even the world. (A) is incorrect because Reagan does not mention anything about the cause of the explosion. Instead, the tone suggests that the nation is in shock ("Today is a day for mourning," lines 4–5), and that it is too early for explanations. (B) is incorrect because Reagan says the crew members did their jobs "brilliantly," and there is no indication that anyone is blaming or faulting them. (C) is incorrect because Reagan does not speak in a critical tone regarding the space shuttle program. In fact, in paragraph 5 (lines 47–63), Reagan vows to continue the shuttle program.

37) **➡** C

Choice (C) is correct because it provides the

most direct evidence to support the suggestion that crew members' lives were meaningful because they served the public. (A) is incorrect because it does not focus on the lives of the crew members. Choice (B) is incorrect because, while Reagan calls the crew members "heroes," in this sentence he does not explain the significance of their lives. Finally, (D) is incorrect because it does not focus solely on the astronauts.

38) **➡** C

Choice (C) is correct. The chart shows that Challenger has six flights in 1983 and 1984, whereas all other shuttles had a combined three flights during the same period. Choices (A) and (B) are incorrect according to the information in the chart. (D) is incorrect because there is no information about safety issues in the chart.

39) **➡** B

Choice (B) is correct because when Reagan says that "We'll continue our quest in space," the context suggests an adventurous journey in *search* of something, like the Medieval knights' "quests" for the Holy Grail. (A) is incorrect because "inquiry" does not incorporate the sense of an ongoing journey. (C) is incorrect because a pilgrimage is a regular, usually religious, journey to a known location, unlike the exploration of space. (D) is incorrect because "pursuit" implies an attempt to catch or achieve a specified objective, which would not fit in a general statement about space exploration.

40) **➡** A

Choice (A) is correct because in lines 55–59, Reagan explicitly states that the space shuttle program will continue. These statements make clear Reagan's stance on funding NASA's missions. (B) is incorrect because Reagan does not mention an investigation in the speech. (C) is incorrect because Reagan never implies that the accident was caused by enemies of democracy and freedom. Reagan's tone here is not accusatory. Finally, (D) is incorrect because Reagan seeks to reassure "every man and woman who works for NASA" (lines 60–64) that the nation has been moved and impressed by them "for decades," but this encouragement does not imply that the accident might cause

them to quit their jobs.

41) **➡ C**

Choice (C) is correct because it is the most comprehensive statement in which Reagan says that he wants NASA to continue in spite of the accident. (A) is incorrect because it is vague and does not directly refer to NASA. (B) is incorrect because it is a positive description of NASA's transparency but does not address its future. Finally, (D) is incorrect because it expresses sympathy to NASA employees, but like (B), it does not address the agency's future.

42) **➡ B**

Choice (B) is correct because Reagan implies that the space shuttle crew were like Sir Francis Drake: they explored the unknown frontiers of their time, right up until their deaths. (A) is incorrect because, even though the implication is that we still remember Drake after 390 years and that the shuttle crew will also be remembered, it is not the primary purpose of mentioning Drake. (C) is incorrect because Reagan's focus is the astronauts' lifelong dedication, not the dangers of risk-taking in general. Finally, (D) is incorrect because mention of Drake's sea explorations does not serve to clarify any difficult concepts.

43) **➡ C**

Choice (C) is correct because the speech's main focus is on the crew's courage and dedication to discovery. One can infer that these words are meant to comfort viewers and to inspire viewers to follow the crew's example. (A) is incorrect because history is only mentioned at a few points in the speech. (B) is incorrect because Reagan's main audience is television viewers, and his remarks are mainly directed to them. Finally, (D) is incorrect because the speech is primarily about the admirable traits of the crew members, not space exploration.

44) **➡ B**

The author points out that the public relies on meteorologists' "skill, knowledge, and expertise." Thus, "expertise" here indicates experience that surpasses skills and knowledge. (B) is the correct choice because "prowess" connotes a superior ability, which is similar to expertise. (A) and (D) are incorrect because

both of these words simply suggest a quick reaction or physical skill, while (C) is incorrect because "aptitude" refers to natural ability, not mastery of a field of knowledge.

45) **➡ D**

The paragraph quotes an employee of the National Weather Service explaining what types of information only radar can provide and what types trained storm spotters can provide. Thus, (D) correctly identifies the contrast described in the paragraph. Choice (A) is incorrect because it does not describe contrasting elements, and, like (B) and (C), it does not reflect the main point that the speaker makes in the quotation.

46) **➡ C**

The introductory sentences in Passage 1 describe how the community relies on meteorologists, who in turn rely on community volunteers, to "keep us safe and in the know." Thus, the passage is mainly about contributions that improve weather forecasting, and (C) is correct. The passage does suggest that Skywarn provides the public with information and opportunities, but these are minor points, thus (A) and (B) are incorrect. (D) is incorrect because the passage focuses on making better predictions, not on preventing damage once a storm arrives.


47) **➡ C**

Choice (C) is correct because the sentence fully articulates the passage's central claim: that "ground truth" provided by volunteers helps meteorologists predict storm activity. (A) and (B) are incorrect because, although they describe the Skywarn program, neither of them describes the program's ultimate value. (D) is incorrect because it describes basic characteristics of volunteer storm spotters, which does not convey the passage's central claim.

48) **➡ D**

Choice (D) is correct because Passage 1 describes professional forecasters' frequent reliance on amateur radio operators who "provide additional assistance during

storms." The radio operators can "maintain communication" between forecasters and communities during large storms that "knock out phone service." These statements suggest that radio operations can occur even when telephones and the Internet are disabled, and thus (D) is correct. Meanwhile, there is no textual support for choices (A), (B), or (C).

49)  A

In Passage 2, the author describes the butterflies clustering in Mexico in winter. After the monarchs' winter of inactivity, they disperse all over the northern areas of the continent, where citizen scientists are called upon to study them. Thus, (A) is correct. The author does not state that citizen scientists should grow host plants, that they take the place of professional naturalists, or that they provide more reliable data than any other source. Therefore, (B), (C), and (D) are incorrect.

50)  C

Choice (C) is correct because it states that citizen scientists participate when the monarchs migrate and reproduce throughout the United States and Canada. The reader can infer that citizen scientists are not needed to observe the population while it overwinters (and is inactive) in Mexico. Choices (A) and (B) are incorrect because they do not address the work of citizen scientists; (D) is incorrect because it does not indicate anything about when citizen scientists participate in data collection.

51)  C

The author of Passage 1 describes citizen scientists reporting from specific locations within areas covered by "satellites and Doppler radars." The author of Passage 2 describes citizen scientists contributing information from the monarch's "vast summer range." Thus, (C) is correct because both authors emphasize the practical effect of far-flung volunteers. (A) and (D) are incorrect because neither author addresses the quality of the data from volunteers, nor do they address the skills required within the fields that they discuss. (B) is incorrect because, while Passage

1 mentions required training, Passage 2 does not, so it is impossible to predict the author's attitude toward it.

52)  A

The answer is (A) because each passage primarily describes a particular case where non-scientists provide valuable assistance to scientists. Meanwhile, the tone of both passages is neutral, allowing readers to eliminate choices (B) and (C). Choice (D) is incorrect because in a precise sense neither passage's focus is on environmental issues, but rather on scientific research.

## Writing and Language Test



1. (D)	5. (A)	9. (C)	13. (B)	17. (C)	21. (C)	25. (B)	29. (B)	33. (B)	37. (C)	41. (B)
2. (A)	6. (D)	10. (B)	14. (A)	18. (B)	22. (B)	26. (D)	30. (C)	34. (C)	38. (A)	42. (C)
3. (C)	7. (C)	11. (D)	15. (B)	19. (D)	23. (A)	27. (C)	31. (D)	35. (D)	39. (B)	43. (A)
4. (C)	8. (B)	12. (D)	16. (A)	20. (A)	24. (B)	28. (C)	32. (C)	36. (B)	40. (B)	44. (C)

1) **⇒** D

When starting a quotation within a sentence, the first letter of the sentence in quotes must be capitalized, and a comma must be placed immediately before the first quotation mark. The correct choice is (D) because all other choices fail to include one or both of these elements.

2) **⇒** A

Relative pronouns, such as *who*, *which*, *where*, and *when*, serve to link a noun to additional information about that noun. In the sentence containing 2, the noun "a person" is being linked to information about that person's job. The appropriate relative pronoun for referring to people is a form of "who." Therefore, choices (C) and (D) can be eliminated because they use relative pronouns that are used to refer to places (*where*) or things (*that*). Moreover, (B) is incorrect because "who's" is a contracted form of "who is," and plugging "who is" into the sentence makes it grammatically incorrect. Thus, (A) is the correct answer because the possessive relative pronoun "whose" accurately shows that "a person" is showing ownership over the "job" he or she performs.

3) **⇒** C

The pronoun at 3 refers to "a computer." This can be determined using the context of the sentence: it makes sense that a software developer tells "a computer that if a user does this, a computer must do that" in response. "A computer" is a singular noun, meaning we can eliminate (A) because "they" can only refer to plural nouns. Additionally, because "a computer" is a thing whereas the pronouns "one" and "someone" refer to people, (B) and (D) can be eliminated. Therefore, (C) is the correct answer.

4) **⇒** C

Sentence 3 outlines the process by which a developer gives a computer a "series of instructions," and sentence 4 uses the term "code" (which is introduced in the added sentence) as if the term has already been introduced. Thus, the best place for the added sentence is after sentence 3 because it builds upon the topic of sentence 3 while defining a term used in sentence 4.

5) **⇒** A

The paragraph containing the underlined portion is primarily talking about specializations that developers can pursue other than applications, which was discussed in the previous paragraph. Therefore, this paragraph is adding information on the same topic, making (A) the most appropriate choice. (B) is incorrect because it suggests that the topics of paragraphs 2 and 3 contrast with each other, which is not the case. (C) can be eliminated because "As a result" implies a cause-and-effect relationship, yet paragraphs 2 and 3 simply provide examples of developer career specializations. (D) is incorrect because "As with" suggests a comparison, which does not make sense in the context.

6) **⇒** D

Choice (D) is correct. In the current and previous sentences, the passage states that software developers must solve problems, and that they do so by working on code until they "obtain the desired result." This process suggests trial-and-error and is best described as "adjusting." Choice (A) is incorrect because "to ameliorate" means to make a negative situation better, whereas making adjustments to code is a normal part of software development. Choice (C) is incorrect for a similar reason: "to enhance" is to add to something or otherwise increase it, whereas the process being described here involves small changes.

not necessarily additions. Choice (B) is incorrect because “to renovate” is used in the context of physical structures such as buildings.

7) **➡ C**

The question asks for “a different type of private company.” Choice (C) is correct because electronics manufacturers are different from software publishers and financial institutions, so the term provides the most contrast for the list. (A) is incorrect because a “local government” is not a private employer. It refers to a city or county. (B) is incorrect because the author already mentions financial institutions, which by definition would include banks. Finally, (D) is incorrect because a police department is a public agency.

8) **➡ B**

Sentence 5 discusses the hours that are a minimum for most software developers. Since sentence 2 makes a claim about overtime, it is logical that sentence 5 should be placed before it, so (B) is correct. (A), (C), and (D) are incorrect because they do not result in an organized and logical flow of ideas.

9) **➡ C**

When forming a comparison between two things, you must ensure that you are comparing two of the same type of thing. Thus, (A) is incorrect because it compares the responsibility of software engineers to developers. To form a logical comparison, we must ensure that the responsibility of software engineers is being compared to the responsibility of developers. Although no choice makes this comparison directly, (C) does an acceptable job by claiming that software engineers have more responsibility than software developers do. Here, the word “do” serves as a substitute for what the developers have (in this case, responsibility). Like (A), choices (B) and (D) incorrectly compare responsibility to software developers.

10) **➡ B**

Choice (A) is incorrect because the passage states that there are over 1 million software developers in the U.S. Since there are only about 200,000 working in California, Washington, and Texas, it is inaccurate to claim that the majority (more than 50 percent) come from these three states. The correct choice is (B) because 10 percent of 1 million is 100,000, and just over 100,000 software developers work in California. (C) is incorrect

because, based on the graph, approximately 42,000 software developers work in Texas and Washington, and just under 40,000 work in New Jersey. Thus, at least 120,000 software developers work in these three states, more than the approximately 105,000 who work in California. (D) can be eliminated because the graph shows the number of software developers, not the rate of growth by state. Thus, even if (D) were true, it would be impossible to determine based on the graph.

11) **➡ D**

The correct choice will concisely summarize why strong job growth is predicted for software developers. All choices provide valid reasons for this job growth, but only (D) does so concisely. Other choices convey the same information as (D) but use more words and convoluted phrasing.

12) **➡ D**

Choices (A) and (C) can be eliminated because they are wordy and convoluted. (D) is the correct choice because it specifies that the passage’s focus is the human digestive system. Because the digestive systems of other organisms may function differently, choice (B) is too general to be the correct choice.

13) **➡ B**

Choice (A) is incorrect because the verb “fail” is generally followed by an infinitive verb (e.g. “to concentrate”) and not a participle, as is the case in (A). (C) and (D) can be eliminated because they convey the same meaning as (B), but are less concise. Thus, (B) is correct because it is the most concise, grammatically correct choice.

14) **➡ A**

The paragraph primarily talks about what happens in the stomach shortly after a person stops eating. One of the main effects, explained in detail throughout the paragraph, is that the stomach begins to produce loud noises. Choice (A) is correct because it introduces the topic of stomach noises by mentioning the idiom of “growling” stomachs. Choice (B) focuses on the consumption of “big meals,” which distracts from the passage’s focus on starvation. (C) is incorrect because it introduces the processes of breaking down food, whereas the focus of the paragraph is the stomach’s response to a lack of food. And (D) is incorrect because, although the passage briefly



mentions a hormone called ghrelin, this hormone is by no means the main focus of the paragraph.

15) **⇒** B

Because the passage describes the process of starvation in humans, it is written in the present tense (the present tense is usually preferred for general processes). Thus, choice (B) is correct because it maintains the passage's use of the present tense with the verb "depletes." (B) is also the most concise choice, further solidifying its position as the correct choice. (A) is incorrect because it uses the past-tense form "used" in an otherwise present-tense sentence. Similarly, (C) is written in the past-perfect tense, breaking the passage's pattern of using present-tense verbs. Finally, (D) can be eliminated because it unnecessarily uses the passive voice ("becomes used up"), and it uses too many phrases, making it wordy.

16) **⇒** A

The verb "forced" is generally followed by an infinitive verb. For this reason, we can eliminate choices (C) and (D); after all, one would not say, "the liver is forced breaking down protein." When choosing between (A) and (B), we can determine that (A) is correct because (B) does not maintain parallel structure. The sentence must maintain the infinitive-verb word pattern established by "to break." (A) maintains parallel structure when it claims, "the liver is forced to break...and convert."

17) **⇒** C

A proper list will separate each item in the list using a comma (or a semicolon in the case of complex lists), and it will include either "and" or "or" between the last two items in the list. The correct choice is (C) because it fulfills both of the aforementioned requirements. (A), (B), and (D) are incorrect because they incorporate too many conjunctions ("ands" and "ors"), which muddies the meaning of the sentence. If the author wanted to say that hunger causes one to become either restless and sad or irritable, (A) could be correct, but there is no indication that doing so was the author's intention.

18) **⇒** B

The pronoun in the underlined portion at 18 is referring back to "a hungry person" mentioned in the previous sentence. Because "a hungry person" is a singular noun phrase that refers to a particular (though theoretical) individual, the correct answer must be (B). (A) and (D) are

incorrect because "them" and "us" refer to more than one person or thing. (C) can be eliminated because "one" refers to an individual in general. Because we are referring to a specific person, the singular "him or her" is preferable.

19) **⇒** D

Choice (D) is correct because it maintains parallel structure within the list of nouns, increasing clarity and concision. (A), (B), and (C) are incorrect because each of them includes the phrase "feelings of" at some point, making the list inconsistent and awkward. Moreover, (B) indicates that low blood pressure and dehydration are feelings, whereas more precisely, they are physical conditions.

20) **⇒** A

The paragraph's introduction reveals that the focus of the paragraph is the "increasingly severe" symptoms of starvation. Because the underlined portion reveals that one symptom is becoming "quiet and withdrawn," we can determine that the sentence includes valuable information that adds to the paragraph's focus. Thus, (A) is the correct answer. Although the underlined sentence itself focuses on sociability, this is not the paragraph's primary focus, so (B) is incorrect. (C) is incorrect because the underlined sentence focuses, rather than blurs the focus, on mental symptoms, and (D) can be eliminated because reserving energy is not the focus of the paragraph, so there is no need for the underlined sentence to provide detailed information on this topic.

21) **⇒** C

To regain something is to get it back, and "regain" can apply to physical objects or mental processes. Thus, (C) fits in the context of the sentence and is the correct choice. Because the underlined verb refers to mental health, which is not something that can be physically manipulated, (A) is incorrect. Similarly, to regrow something is generally a physical process, making (B) incorrect. To revise is to review or change something that was created, such as a document, statement, or work of art. Because mental health is not created in the artistic sense, (D) is incorrect.

22) **⇒** B

Paragraph 2 discusses how the brain triggers the release of hormones that stimulate a person's appetite. Because paragraph 4 begins by saying "Besides stimulating appetite," we can infer that it should follow the information in paragraph

2, which discusses the brain's role in increasing appetite. Thus, (B) is the correct choice.

23) **⇒** A

Although each choice is technically grammatically correct, only (A) conveys the intended meaning clearly using the active voice. Because "medical doctors" perform the action of the clause (they "prescribe"), "medical doctors" should come first in the sentence. Because (C) and (D) move the subject to the end of the clause, they can be eliminated. (B) is incorrect because it is unclear whether "only" modifies "doctors" or what doctors are able to prescribe.

24) **⇒** B

The underlined portion should convey the idea that some people with mental health issues were tied down. To "constrain" generally means to limit options, not to physically hold down. So although "constrain" is close in meaning, (A) is incorrect. To "restrain" is to physically hold in place, making (B) the correct choice. To "repress" is to psychologically block or suppress something, so (C) fails to convey the physical action suggested by the context of the sentence. (D) is incorrect because to "retain" is to keep, which has little to do with holding something or someone down.

25) **⇒** B

The underlined portion of the paragraph is important because it notes a relevant aspect of Freud's psychotherapy: symptoms of distress were often due to traumatic experiences. This fact in turn shaped how Freud spoke with his patients to analyze and understand the source of their distress. Thus, (B) is the correct answer. (A) is incorrect because the paragraph does not focus specifically on childhood trauma, but instead focuses on Freud's attitude that mental illness could be treated. (C) is incorrect because the paragraph does not focus on psychological distress and does not claim that it is innate. Rather, it focuses on Freud's insights about its causes and treatment. Finally, (D) is incorrect because the paragraph does not confuse any concepts. It clearly notes that Freud believed that symptoms of distress often resulted from prior trauma.

26) **⇒** D

Choice (D) is correct because, in this case, it is unnecessary for the noun "patients" to show ownership, or possession, over "talk." Thus, any answer with an apostrophe in patients is incorrect.

27) **⇒** C

An appropriate concluding sentence would note that although Freud's theories about the stages of development have been rejected, his general approach to psychotherapy has proven to be successful. Thus, (C) is the correct answer. (A) is incorrect because it understates the legacy of an approach that is described in the paragraph as "revolutionary." (B) is incorrect because it changes the focus to Freud's theories about stages of development rather than his "revolutionary" approach. Finally, (D) is incorrect because it mentions only Freud's "ideas," without specifying which specific ideas changed attitudes toward the mentally ill. In contrast, (C) provides a concrete example of the way in which Freud's approach influenced the future course of psychotherapy, which appropriately concludes a paragraph describing them.

28) **⇒** C

When making a comparison, the things being compared must be of the same type. In other words, you must compare a person to another person or a concept to another concept. Because choices (A) and (B) compare psychological therapy (a practice) to Freud (a person), they are illogical comparisons and therefore incorrect. (D) fails to make a comparison at all because it excludes the word "more," which serves as a common marker that a comparison is being made. (C) is the correct answer because, although it does not explicitly say "Freud's *psychological therapy* was," such a meaning is implicit.

29) **⇒** B

Although each choice conveys approximately the same meaning, only (B) does so clearly and concisely, making it the correct choice. (A) is too wordy, as "being swept off our feet by a strong current" includes no more information than "being swept up by a strong current." (C) and (D) are also less concise than (B), and both of these choices include convoluted phrasing.

30) **⇒** C

The previous paragraph focuses on the behaviorist approach—that learning is the result of positive or negative consequences, and that therapists should focus on changing patients' behaviors. The paragraph beginning at 30 gives specific examples of how behavioral therapists change patients' behaviors, so it would be appropriate to open with a broad statement of behaviorism's

philosophy as sketched in the previous paragraph. Only answer choice (C) accurately captures behaviorism's stated goal of changing behavior. (A) is incorrect because it includes extraneous information that is not supported by either the paragraph before 30 or the one beginning with 30. (B) is incorrect because its focus is too narrow and specific. The paragraph does not focus only on children, nor does it focus on only positive reinforcement. Finally, (D) is incorrect because it merely repeats a sentence from the preceding paragraph. Moreover, the focus of the paragraph is not precisely on how behavior is the result of positive or negative consequences but how behavior can be learned or unlearned.

31) **➡ D**

The correct choice is (D) because it follows the active subject-predicate construction established as a pattern in the paragraph. (A) lacks a subject and uses an infinitive verb where a verb with tense would be more appropriate. (B) is unclear, as it does not clarify for whom or why "a deeper pool would work." (C) can be eliminated because it excludes the subject, leaving the reader wondering who, exactly, would go into a deeper pool.

32) **➡ C**

The sentence containing 32 does not specify who "focuses on relearning thought habits." Thus, the use of a pronoun at the underlined portion is unnecessary—it has no one to refer to. (C) is the correct answer because all other choices incorrectly use a personal pronoun or pronouns. The use of "you" and "your," when referring to a general audience, is more common in casual spoken English, but it is not appropriate in most formal writing.

33) **➡ B**

The information after the underlined portion at 33 describes a consequence of regarding small problems as catastrophes. Since this consequence is essential to the coherence of the sentence, no punctuation is necessary after the word "catastrophes," making (B) the correct choice. Other choices introduce an unnecessary break in the sentence and are therefore incorrect.

34) **➡ C**

Because the passage is written in a fairly neutral, academic tone, choice (A) can be eliminated. Generally, academic written English does not include direct addresses to the audience. (B) is

incorrect because it does not provide enough information. It fails to tell the reader what is "usual" about Santa Claus. (C) is the correct answer because it is consistent with the academic tone of the passage, and it provides a sufficient amount of information. From (C), we can determine that Saint Nicholas is commonly called Santa Claus. (D) is incorrect because it contains a redundancy. If something is described as international, it goes without saying that it applies "around the world."

35) **➡ D**

Based on the context of the sentence, Santa Claus is a symbol, or representation, "of altruism and kindness," so the correct choice will be the one that most closely means "a symbol." (A) is incorrect because a signal generally refers to a gesture or cue that is used to convey instructions, which does not make sense in the context. (B) is incorrect because a sign is either a physical marker or supernatural indication; Santa Claus is a fictional person, not a marker or indication. (C) can be eliminated because a mark is a physical indication, which does not apply to Santa Claus. (D) is the correct answer because an "emblem" is often a person or thing that represents an idea, which applies to Santa Claus in the context of the sentence.

36) **➡ B**

In the underlined phrase, "something much more menacing than Santa Claus" is the subject and "visits" is the verb; subjects should not be separated from their main verbs by commas. Because (B) is the only choice that avoids excessive comma usage, it is the correct choice.

37) **➡ C**

As written, the clauses to either side of the semicolon are independent clauses. Moreover, the clauses to either side of the semicolon should maintain parallel structure by containing similar grammatical structures. Because choice (C), "poorly behaved children," maintains the same word order as "Well-behaved children," and because a semicolon can separate two related independent clauses, (C) is correct. (A) does not maintain parallel structure, as "children who have behaved poorly" is structured differently than the preceding phrase "Well-behaved children," and it is less concise than choice (C). (B) is incorrect because a comma cannot separate two independent clauses unless the comma is followed by a coordinating conjunction. And (D)

can be eliminated because the word “poor” fails to answer the question, “How are the children behaving?” Any time a modifier answers a question beginning with “how,” an adverb must be used (adverbs generally end in “-ly”), making “poorly” the correct form in the context of the sentence.

38) **➡ A**

Actions that are separated by a coordinating conjunction (“and” in this case) must maintain parallel structure. Because the participle “tossing” is used first, we must ensure that the participle “hauling” comes after the conjunction, so (A) is correct. Other choices fail to maintain parallel structure by using present-tense verbs, as in the case of (A), or past-tense verbs/participles, as in the case of (C) and (D).

39) **➡ D**

The paragraph just prior to 39 notes the tradition of the Krampus in Germany, Austria, and Hungary. The paragraph beginning at 39 also notes that today cities and towns host “Krampus Runs.” Thus, an appropriate transition should focus on Krampus traditions in European culture. Only (D) does this. (A) is incorrect because the paragraph beginning at 39 does not focus on the historical lineage of Krampus-inspired Christmas traditions. It instead focuses on Krampus traditions in the present. (B) is incorrect because it wrongly focuses on the time of the month that Germanic cultures celebrate Christmas. Though the paragraph does mention December 5 as Krampus night, the entire paragraph does not focus on the date. Finally, (C) is incorrect because neither the paragraph prior to 39, nor the one beginning at 39, speak of the Krampus’s physical characteristics.

40) **➡ B**

The information at 40 provides relevant information about the origins of the Krampus. Specifically, it provides an example of the previous statement that the Krampus comes from pagan mythology. Thus, it should be kept, and (B) is the correct answer. (A) is incorrect because the main topic of the paragraph is not Norse mythology, but rather the pagan origins of the Krampus and its appropriation by Christianity. (C) is incorrect because the paragraph is not focused on modern Christian traditions, but instead on the origins of the Krampus. Finally, (D) is incorrect because the sentence at 40 does not contradict the information in the previous sentence. It instead provides

information that adds detail to the previous sentence.

41) **➡ B**

Choice (B) is correct because “it” can stand for the subject of the sentence, “Christianity,” which is a singular noun. Choices (A) and (D) are incorrect because “they” and “these” are plural pronouns. Moreover, (C) is incorrect because “this” is a demonstrative pronoun, and demonstrative pronouns are used to “point” toward a certain noun to give that noun emphasis or to avoid confusion, which is not necessary here.

42) **➡ C**

The verb at 42 must convey the idea that many people think the rise in the Krampus’ popularity is caused by the rise of Christmas “counterculture.” In other words, they attribute the surge to the rise of a Christmas “counterculture,” and (C) is correct. (A) is incorrect because “to attain” is to achieve, which does not convey the same meaning as “caused.” (B) and (D) are incorrect because they do not make sense in the context of the sentence. “To equate” is to associate or compare two or more things, and “to impart” is to inform or tell.

43) **➡ A**

The correct answer will properly communicate the relationship between the sentence preceding 43 and the sentence containing it. The sentence containing 43 is reconfirming the statements made in the preceding sentence. When used as a transition, “After all” often indicates that a summary of or an elaboration on previous information will follow, so (A) is the most appropriate choice. (B) is incorrect because “thus” implies that one thing is a consequence of another, which is not the case here. “Finally” usually introduces a new, concluding idea. Because the information in the sentence containing 43 does not introduce a new idea, (C) is incorrect. (D) can be eliminated because “however” implies contrast, which does not occur here.

44) **➡ C**

Generally, a sentence that begins with an interrogative (question words such as “what,” “why,” and “where”) is a question and therefore must end with a question mark. The sentence containing 44 asks a question, making (C) the correct answer.

## Math Test



## No Calculator Portion

- |        |         |                   |        |
|--------|---------|-------------------|--------|
| 1. (D) | 7. (D)  | 13. (B)           | 18. 8  |
| 2. (A) | 8. (H)  | 14. (A)           | 19. 37 |
| 3. (C) | 9. (B)  | 15. (A)           | 20. 6  |
| 4. (D) | 10. (B) | 16. 16            |        |
| 5. (C) | 11. (A) | 17. $\frac{3}{5}$ |        |
| 6. (D) | 12. (D) |                   |        |



## Calculator Portion

- |        |         |         |         |         |          |           |
|--------|---------|---------|---------|---------|----------|-----------|
| 1. (C) | 7. (A)  | 13. (C) | 19. (B) | 25. (D) | 31. 3    | 37. 2,813 |
| 2. (D) | 8. (H)  | 14. (C) | 20. (A) | 26. (D) | 32. 50   | 38. 4     |
| 3. (D) | 9. (C)  | 15. (B) | 21. (D) | 27. (A) | 33. 67.4 |           |
| 4. (A) | 10. (B) | 16. (D) | 22. (C) | 28. (C) | 34. 144  |           |
| 5. (B) | 11. (H) | 17. (C) | 23. (D) | 29. (C) | 35. 22   |           |
| 6. (C) | 12. (B) | 18. (C) | 24. (C) | 30. (B) | 36. 130  |           |

## No Calculator Portion

 1) **⇒** D

Students that did not select macaroni or breakfast sandwich

$$= 260 - \left(\frac{1}{3}\right)260 - (0.15)260 = 169$$

 2) **⇒** A

The graphs of functions  $f(x)$  and  $-f(x)$  are reflections of each other across the  $x$ -axis. The graph of function  $g(x) = -x^2$  is the vertical reflection of the graph of function  $f(x) = x^2$ .

 3) **⇒** C

The caller is charged for 13 minutes:

First minute = 0.40

12 minutes = 0.20 per minute

Cost =  $0.40 + 12(0.20) = 2.80$

 4) **⇒** D

To verify I:

$$\text{Calories} = (13.2)(22) + 20.5 = 311$$

I is true. The slope of the linear function is positive, so the relationship between calories and minutes is directly proportional; II is not true. The slope of the linear function is 13.2, which indicates that 13.2 calories are burned for each minute on the machine. III is true. The correct answer is choice (D).

 5) **⇒** C

$$S = \frac{11(n-2)}{5} \rightarrow n = \frac{5S}{11} + 2$$

 6) **⇒** D

The line  $x = 3$  represents all points in the  $xy$ -plane at which the value of  $x$  is 3. This is a vertical line (parallel to the  $y$ -axis).

 7) **⇒** D

Solve for  $x$ :

$$x + 1 = \frac{20}{x} \rightarrow x^2 + x - 20 \rightarrow x^2 + x - 20 = 0$$

$$\rightarrow (x + 5)(x - 4) = 0 \rightarrow x = -5, 4$$

Both solutions satisfy the equation.

 8) **⇒** B

The  $y$ -intercept is the point  $(0, 4)$ . For the line to pass through quadrant IV, it must slope downwards when  $x > 0$ . This implies that the slope,  $m$ , must be negative.

 9) **⇒** B

For the function  $f(x)$ ,  $f(2) = 4$ . This implies that  $f(x + 3) = 4$  when  $x = -1$ . We can conclude that the point  $(-1, 4)$  is on the graph of  $f(x + 3)$ .

 10) **⇒** B

$$\begin{aligned} \frac{f(x+h) - f(x)}{h} &= \frac{2(x+h) + 1 - (2x+1)}{h} \\ &= \frac{2x + 2h + 1 - 2x - 1}{h} \\ &= \frac{2h}{h} = 2 \end{aligned}$$

11) **⇒** ALet  $x$  be the length of the rectangle:

$$\text{Width} = \left(\frac{3}{4}\right)x$$

$$\text{Area} = (x)\left(\frac{3}{4}x\right) \rightarrow \frac{3x^2}{4} = 192 \rightarrow x^2 = 256 \rightarrow x = 16$$

$$\text{Calculate width: } \left(\frac{3}{4}\right)(16) = 12$$

12) **⇒** D

We can rewrite the function as:  $f(x) = (x-2) \times \frac{1}{(2-x)}$

$$f(x) = \frac{x-2}{2-x} = \frac{x-2}{-(x-2)} = -1 \text{ for } x \neq 2$$

As  $f(2)$  is not included in any of the Roman numerals, all values of the function listed are equal to each other and to  $-1$ .

13) **⇒** B

$$2^0 - \left(\frac{1}{2}\right)^2 + (4-1)^{-1}$$

$$= 1 - \frac{1}{\left(\frac{1}{2}\right)^2} + \frac{1}{4-1}$$

$$= 1 - 4 + \frac{1}{3}$$

$$= -\frac{8}{3}$$

14) **⇒** A

Let  $x$  be the number of cars and SUVs, and  $y$  be the number of trucks. Since he worked 48 hours:

$$2x + 4y = 48$$

As it takes 2 hours to service a car and 4 hours to service an SUV:

$$2(14x) + 4(36y) = 1288 \rightarrow 28x + 144y = 1288$$

Multiplying the first equation by 14 and subtracting from the second gives:

$$\begin{array}{r} 28x + 144y = 1288 \\ -) 28x + 56y = 672 \\ \hline 88y = 616 \\ y = 7 \end{array}$$

15) **⇒** A

For all acute angles (angles between  $0^\circ$  and  $90^\circ$ ), the sine of the angle is equal to the cosine of the complementary angle.

16) **⇒** 16

$$\text{Number of red balls} = \frac{1}{3}x$$

$$\text{Number of blue balls} = \frac{2}{7}x$$

$$\text{Number of green balls} = \frac{4}{7}x - 8$$

$$\frac{1}{3}x + \frac{2}{7}x + \left(\frac{4}{7}x - 8\right) = x \rightarrow \frac{25}{21}x - 8 = x$$

$$\frac{25}{21}x - x = 8 \rightarrow \frac{4}{21}x = 8 \rightarrow x = 42$$

$$\text{Number of green balls} = \frac{4}{7}(42) - 8 = 16$$

17) **⇒**  $\frac{3}{5}$ 

Multiplying the first equation by 2 and subtracting from the second equation gives:

$$\frac{6}{y} - \left(-\frac{1}{y}\right) = 35 \rightarrow \frac{7}{y} = 35 \rightarrow y = \frac{1}{5}$$

Substitute for  $y$  in the second equation:

$$\frac{4}{x} - \frac{1}{\left(\frac{1}{5}\right)} = 7 \rightarrow \frac{4}{x} - 5 = 7 \rightarrow x = \frac{1}{3}$$

Therefore,

$$\frac{y}{x} = \frac{\left(\frac{1}{5}\right)}{\left(\frac{1}{3}\right)} = \frac{3}{5}$$

18) **⇒** 8

$$\frac{16}{5} = a + \frac{1}{b + \frac{1}{c}}$$

$$16 = 5a + \frac{5}{b + \frac{1}{c}}$$

The fraction on the right side of the equation will be easy to manage if it can be set equal to 1. This can be accomplished if  $a = 3$ . Thus,  $\frac{5}{b + \frac{1}{c}} = 1$ .

By inspection, this equation is satisfied if  $b = 4$  and  $c = 1$ . Therefore,  $a + b + c = 8$ .

19) **⇒** 37

Set up and complete the long division:

$$\begin{array}{r}
 3x^3 - 6x^2 + 10x - 20 \\
 x + 2 \overline{) 3x^4 + 0x^3 - 2x^2 + 0x - 3} \\
 \underline{-) 3x^4 + 6x^3} \phantom{- 20} \\
 -6x^3 - 2x^2 \phantom{+ 0x - 3} \\
 \underline{-) -6x^3 - 12x^2} \phantom{+ 0x - 3} \\
 10x^2 + 0x \phantom{- 3} \\
 \underline{-) 10x^2 + 20x} \phantom{- 3} \\
 -20x - 3 \\
 \underline{-) -20x - 40} \\
 37
 \end{array}$$

We can write the quotient as:

$$\frac{3x^3 - 2x^2 - 3}{x + 2} = 3x^2 - 6x + 10x - 20 + \frac{37}{x + 2}$$

20) **⇒** 6

As both the area and the arc length of the segment are proportional to central angle, we can set these proportions equal to each other:

$$\frac{6\pi}{\pi r^2} = \frac{2\pi}{2\pi r}$$

$$r = 6$$

### Calculator Portion

1) **⇒** CConvert the equation of the line into the slope-intercept form  $y = mx + b$ :

$$2x - 5y = 10$$

$$2x - 10 = 5y$$

$$\frac{2}{5}x - 2 = y$$

Therefore,  $m = \frac{2}{5}$ 2) **⇒** D

$$\frac{2 \times 10^{-5} \text{ mg}}{\text{mL}} = \frac{x}{3 \times 10^3 \text{ mL}}$$

$$x = \frac{(2 \times 10^{-5} \text{ mg})(3 \times 10^3 \text{ mL})}{\text{mL}}$$

$$x = 6 \times 10^1 \text{ mg}$$

3) **⇒** D

Subtract the second equation of the system from the first:

$$x^2 - y = -3$$

$$\underline{-) 2x^2 - y = -2}$$

$$x^2 = 1$$

$$x = \pm 1$$

If we substitute  $x = -1$  into the first equation above:

$$(-1)^2 - y = -3 \rightarrow y = 4$$

We obtain the same value for  $y$  if  $x = 1$ .4) **⇒** AThe amount in Tom's bank account can be modeled as the following exponential function, where  $t$  is number of years that have passed since the initial deposit:

$$\text{Amount in Tom's account} = 100(1.05)^t$$

The amount in Christine's bank account is modeled as a linear function, as the amount increases by the same amount each year:

$$\text{Amount in Christine's account} = 100 + 5t$$

5) **⇒** BIf  $x$  is the number of dimes, then the number of nickels is  $x + 4$ . The total amount in terms of coins can be written as:

$$0.10x + 0.05(x + 4) = 1.25$$

6) **⇒** CA solution to a system of equations must satisfy all equations. Only  $(6, 3)$  satisfies both equations.7) **⇒** AEach score is 73 points higher than the previous score. The first time Tim plays the game, which corresponds to  $n = 1$ , he achieves a score of 4526. This is expressed in choice (A):

$$\text{Points} = 73n + 4,453$$

8) **⇒** BLet  $r$  be the number of minutes spent running, and  $s$  be the number of minutes spent walking;  $r + s = 60$ 

$$\text{Calories burned are } 15r + 10s = 700$$

Multiply the first equation above by 10, and subtract from the second equation:

$$15r + 10s = 700$$

$$\underline{-) 10r + 10s = 600}$$

$$5r = 100$$

$$r = 20$$

- 9)
- ⇒**
- C

Whale population =

$$\left(\frac{3 \text{ whales}}{\text{hour}}\right)\left(\frac{(24)(7) \text{ hours}}{\text{week}}\right)(8 \text{ weeks})$$

$$= (3)(24)(7)(8) = 4,000$$

- 10)
- ⇒**
- B

If  $x$  is the cost of the meal, the tip is:

$$0.08x \leq \text{tip} \leq 0.20x$$

For  $x = 15$ ,

$$1.2 \leq \text{tip} \leq 3.0$$

- 11)
- ⇒**
- B

There are three sections in U.S. History: sections A, B, and C. The average number of students is:

$$\text{Average} = \frac{25 + 29 + 24}{3} = 26$$

- 12)
- ⇒**
- B

There are 27 books in one set and 25 in the other, and 52 books in both sets. Only Period 3 has more than 52 students with 56 students.

- 13)
- ⇒**
- C

Let  $x$  be the number of hot dogs, and  $y$  be the number of hamburgers:

$$3x + 4y = 10$$

The answer choices indicate that he bought *at most* 4 items in total. Thus, we can plug in the values 1 and 2 for  $x$  and  $y$  to determine which combination totals 10. The only combination that equals ten is:  $x = 2, y = 1$ 

- 14)
- ⇒**
- C

For the inequality to be true, the numerator and denominator of the rational expression on the left must be either both positive or both negative. This is true when:

$$x > 5 \text{ (both positive)} \text{ OR } x \leq -2 \text{ (both negative)}$$

- 15)
- ⇒**
- B

Percent herbaceous or evergreen

$$= \frac{\text{Acres herbaceous and evergreen}}{\text{Total acres}} = 100\%$$

$$= \frac{17 + 17}{146 + 17 + 37 + 25 + 3} \times 100\% = 24\%$$

- 16)
- ⇒**
- D

The proportion of wildlife habitat that is barren

land by state:

$$CA: \frac{16}{149.8} = 0.107$$

$$NV: \frac{44}{502.5} = 0.088$$

$$OR: \frac{2.9}{161.1} = 0.018$$

$$UT: \frac{25}{228} = 0.110$$

- 17)
- ⇒**
- C

In 2012, there are 12,500,000 acres of shrubby habitat in Oregon. In ten years:

$$\text{Shrubby habitat} = 12,500,000 + (0.15)(720,000)$$

$$= 12.6 \text{ million}$$

- 18)
- ⇒**
- C

Developer's land =  $(0.03)(1,600,000 \text{ acres}) = 48,000 \text{ acres}$ 

$$\text{Profit per acre} = \left(\frac{\$350}{\text{acre}}\right)(8.5) = \$2,975 \text{ per acre}$$

$$\text{Profit} = (48,000 \text{ acres})\left(\frac{\$2,975}{\text{acre}}\right) = \$143 \text{ million}$$

- 19)
- ⇒**
- B

$$\text{Days of studio time} = \frac{50 \text{ hours}}{12 \frac{\text{hour}}{\text{day}}} = 4.2 \text{ days}$$

As studio time must be purchased by the day, the band must pay for 5 full days of studio time. The engineer is hired for half the recording time: 25 hours. The total cost of recording is:

$$\text{Total cost} = \left(\frac{\$200}{\text{day}}\right)(5 \text{ days}) + (25 \text{ hours})\left(\frac{\$28}{\text{hour}}\right) = \$1,700$$

The cost per hour over the course of recording is:

$$\text{Cost Per hour} = \left(\frac{\$1,700}{50 \text{ hours}}\right) = \$34 \text{ per hour}$$

- 20)
- ⇒**
- A

Convert the equation into slope-intercept form:

$$2x - 3y - 10 = 0$$

$$y = \frac{2}{3}x - \frac{10}{3}$$

The slope  $m$  of the line perpendicular to this line is:

$$m\left(\frac{2}{3}\right) = -1$$

$$m = -\frac{3}{2}$$

Substitute the coordinates of the point  $(8, -3)$ :



$$y = -\frac{3}{2}x + b$$

$$-3 = -\frac{3}{2}(8) + b$$

$$b = 9$$

The equation of the line perpendicular to the given

$$\text{line is: } y = -\frac{3}{2}x + 9$$

21) **⇒ D**

If you work 40 hours at Timmy's Tacos, earnings are:

$$(40 \text{ hours}) \left( \frac{\$4.50}{\text{hour}} \right) - \$45.00 = \$135$$

If you work 40 hours at Kelly's Carwash, earnings are:

$$(40 \text{ hours}) \left( \frac{\$3.50}{\text{hour}} \right) = \$140$$

22) **⇒ C**

The number of words typed increases with time spent typing, so the slope of the line of best fit is positive. When the time increases by one minute, from 2 minutes to 3 minutes, the number of words typed increases 60 words, from 122 to 182. When the time increases by one minute from 3 minutes to 4 minutes, the number of words typed increases 58 words. When the time increases two minutes, from 4 minutes to 6 minutes, the number of words typed increases 128 words, or 64 words per minute. We conclude that the slope of the line of best fit is approximately 60.

23) **⇒ D**

Amy and Charlie both doubled their first test score in the second test, an increase of 100%.

24) **⇒ C**

The length of  $\overline{XY}$  is maximum when the points  $X$  and  $Y$  are  $180^\circ$  from each other on the circle. The cross-section of the cylinder with points  $X$  and  $Y$  at opposite ends of the circle is a right triangle with one side equal to the diameter of the base (6 units), one side equal to the height of the cylinder (12 units), and hypotenuse  $\overline{XY}$ :

$$\overline{XY}^2 = 12^2 + 6^2$$

$$\overline{XY} = \sqrt{180} = \sqrt{36 \cdot 5} = 6\sqrt{5}$$

25) **⇒ D**

$$\text{Price of airfare} = (378)(1.22)(0.9) = 415.04$$

$$\text{Baggage fees} = (25 + 5(2.5)) + (25 + 12(2.5)) = 92.50$$

$$\text{Total cost} = 415.04 + 92.50 = 507.54$$

26) **⇒ D**

Let  $x$  be the distance in miles from Town A to Town B, and  $y$  be the 'scheduled' time it takes, in hours, to travel the distance  $x$ . When traveling 50 miles per hour:

$$\frac{x}{50 \frac{\text{mile}}{\text{hour}}} = y + \frac{1}{3} \text{ hour}$$

When traveling 80 miles per hour:

$$\frac{x}{80 \frac{\text{mile}}{\text{hour}}} = y - \frac{1}{6} \text{ hour}$$

Solve for  $y$ :

$$50y + \frac{50}{3} = 80y - \frac{80}{6}$$

$$30y = \frac{180}{6}$$

$$y = 1$$

Solve for  $x$ :

$$x = 50 + \frac{50}{3} = \frac{200}{3} \text{ miles}$$

At 60 miles per hour, the time it takes to travel  $x$  is:

$$\left( \frac{200 \text{ miles}}{3} \right) \left( \frac{60 \text{ mile}}{\text{hour}} \right) = \frac{200}{180} \text{ hours} = 1\frac{1}{9} \text{ hours}$$

We conclude that the train is  $\frac{1}{9}$  hour late when traveling at 60 miles per hour. In minutes:

$$\left( \frac{1}{9} \text{ hour} \right) \left( \frac{60 \text{ minutes}}{\text{hour}} \right) = \frac{20}{3} \text{ minutes}$$

27) **⇒ A**

$$\frac{x^i - y^i}{x - y} = \frac{\left( \frac{1}{x} - \frac{1}{y} \right)}{\left( \frac{1}{x} - \frac{1}{y} \right)} = \frac{\left( \frac{y-x}{xy} \right)}{\left( \frac{y-x}{xy} \right)} = \frac{-1}{xy}$$

28) **⇒ C**

Rationalize the denominator (Note:  $i^2 = -1$ ):

$$\frac{3-4i}{5+3i} \cdot \frac{5-3i}{5-3i} = \frac{15-9i-20i+12i^2}{25-9i^2}$$

$$= \frac{15-29i+12(-1)}{25-9(-1)} = \frac{3-29i}{34}$$

29) **⇒ C**

The area and arc length of the segment are

proportional to the central angle:

$$\frac{24^\circ}{360^\circ} = \frac{\text{arc length}}{2\pi r} = \frac{\text{area of segment}}{\pi r^2}$$
$$\frac{1}{15} = \frac{\text{arc length}}{2\pi r} = \frac{\text{area of segment}}{\pi r^2}$$

Solve for  $r$ :

$$\frac{1}{15} = \frac{8.4}{2\pi r}$$
$$r = \frac{(15)(8.4)}{2\pi} = \frac{63}{\pi} \text{ cm}$$

Solve for area of the segment:

$$\frac{1}{15} = \frac{\text{area of segment}}{\pi \left(\frac{63}{\pi}\right)^2}$$

$$\text{area of segment} = \frac{63^2}{15\pi} = 84 \text{ cm}^2$$

- 30) **⇒** B

The circle has center  $(0, 0)$  and radius 5. The equation is:  $x^2 + y^2 = 25$

From the equation, we see that when two points share the same  $x$ -coordinate. The  $y$ -coordinates of these points must be the same or related by a factor of  $-1$ .

- 31) **⇒** 3

The radius perpendicular to a chord bisects the chord, so  $\triangle OCB$  is a right triangle with hypotenuse equal to the radius (5 units) and side  $\overline{CB} = 4$ . This is a 3-4-5 right triangle, and  $\overline{OC} = 3$ .

- 32) **⇒** 50

Increase = \$40

$$\% \text{ increase} = \frac{\$40}{\$80} \times 100\% = 50\%$$

- 33) **⇒** 67.4

$$\text{Oxygen saturation} = \frac{\text{Dissolved oxygen}}{\text{Oxygen capacity}} \times 100\%$$

$$\text{Oxygen saturation} = \frac{6.4 \frac{\text{mg } O_2}{L}}{9.5 \frac{\text{mg } O_2}{L}} \times 100\% = 67.4\%$$

- 34) **⇒** 144

Let  $x$  be the interest, in dollars, earned on \$1800:

$$\frac{104}{1300} = \frac{x}{1800}$$

$$x = 144$$

- 35) **⇒** 22

$$(k+10)^2 = 2$$
$$k+10 = 2^2$$
$$k+10 = 32$$
$$k = 22$$

- 36) **⇒** 130

Let  $x$  be the selling price, in dollars, of the coat:

$$x = 91 + 0.2x + 0.1x$$

$$0.7x = 91$$

$$x = 130$$

- 37) **⇒** 2,813

The cost of one truck making a one-way trip is:

Cost of one trip

$$= \frac{250 \text{ miles}}{10 \frac{\text{miles}}{\text{gallon}}} \times \frac{\$2.50}{\text{gallon}} = \$62.50$$

For five trucks to deliver 25 containers, they need to take a combined 45 trips (the fleet goes back and forth once to deliver 5 containers, amounting to 10 trips for 5 containers and 40 trips for 20 containers, but the trucks do not return after delivering the final 5 containers). The total cost to deliver all 25 containers is:

$$\text{Total cost} = 45 \text{ trips} \times \frac{\$62.50}{\text{trip}} = \$2,813$$

- 38) **⇒** 4

It takes two days to make a one way trip, and four days to make a round trip.

With five trucks:

4 round trips = 16 days (20 containers)

1 one way trip = 2 days (5 containers)

Total time with 5 trucks = 18 days

With eight trucks:

3 round trips = 12 days (24 containers)

1 one way trip = 2 days (1 container)

Total time with 8 trucks = 14 days

It takes four days less to deliver the containers with eight trucks than it does with five.

## Essay Test

### Sample Response: Score 2/1/1

The passage "The Other Side of American Football" it talks a lot about the negative outcomes that can occur playing the three different levels of football. Things like concussions, broken bones, and diseases like CTE.

"In the 2005/2006 season more than 500,000 injuries happened in just high school." This means that as young as these kids are they are damaging their brains and bodies. Some kids after high school play college. At this level they are stronger so if they keep getting injured their injuries could be chronic or can lead to death because of the damage to the brain. This passage talks about how the damage of the brain is caused by hard tackles and the lack of protection to the players. Players after death have show CTE which is a disease to the brain by bruising it, some players at early ages have shown the brain of an elderly person such as 80 - 90 years old.

The author uses facts from people who had brain damaged or people who died from playing football. This author used lots of facts and true history to support his claim of banning football.

### Evaluation

#### Reading: 2

The student starts with a nice summary of the author's evidence, and does a good job of restating the text's factual information. The reading score would have been higher if the response had focused on describing the author's purpose before the last line.

#### Analysis: 1

The student needs to practice analyzing rather than summarizing. The student is on the right track by pointing out at the end of the response that the author

"used a lot of facts and true history," but in order to get a higher score, the student must expand upon and explain the effects of the strategy on the reader.

#### Writing: 1

Reading the response, one cannot help but feel that the student simply wrote summarizing sentences while reading through the source text. But the College Board is looking for more organization, such as a "central claim" at the beginning of a student response, followed by a "discernible progression of ideas." In other words, students must begin by describing the author's goal, and then think up two or three topic sentences for the beginning of distinct paragraphs.

### Sample Response: Score 4/4/4

Joseph Stalin famously claimed, "The death of one man is a tragedy. The death of millions is a statistic," implying that tragedy relies on being able to connect a name, a face, or a list of accomplishments to the deceased. In the article "The Other Side of American Football" Meyer ensures that the reader sees the tragedy of football-related mental illnesses by recounting the admirable achievements and bright futures of football players only to reveal that their premature deaths are linked to football-related injuries. Meyer's appeals to statistics and medical diagnoses serve to underscore his appeals to the reader's emotion, which are conveyed via multiple accounts of premature deaths.

Meyer's central claim, that "America must ban high school football, restrict it in college, and must radically change the professional game," would seem extreme if not for the damning evidence presented throughout his article. The information in paragraph 1 alone is enough to raise alarm in even the staunchest football advocate. Moreover, the way Meyer presents the information hints at the severity and pervasiveness of football-related head injuries: five deaths are recounted in as many sentences. The brevity of the deceased players' lives is highlighted by the brevity of Meyer's accounts.

Meyer does not just rely on tragic personal accounts to drive home his central claim. He invokes statistics and medical diagnoses to heighten the emotional impact of the deaths

discussed throughout the article. Even if the tragic personal anecdotes were absent from the article, fact alone would appall the reader. In paragraph 2, Meyer reveals that CTE, a pervasive football-related head injury, does not just kill the players it affects, it also drives them to insanity. Symptoms of CTE include “depression,” “violent outbursts,” and “dementia.” And the tragic consequences of these symptoms are revealed throughout the article. Meyer’s account of Dave Duerson’s death highlights the insidious manifestation of CTE’s symptoms, which ruined Duerson’s life and likely led to his death.

The multiple accounts of football player deaths because of CTE would raise concern in any compassionate reader, yet the staggering statistics relayed in paragraph 4 horrify. These statistics cause the reader to question how a sport can be condoned if it kills approximately ten high school students and causes 50,000 serious injuries each year. These statistics recall Meyer’s rhetorical question, “What kind of country sacrifices the lives of young athletes so it can watch a game?” Based on the evidence he presents, the answer is resoundingly, “America.”

Ultimately, Meyer’s use of tragic accounts, horrifying medical diagnoses, and shocking statistics brings attention to the issue of football-related head injuries. Moreover, these same elements, conveyed persuasively by the author, justify his central claim—football must undergo radical changes to better ensure the safety and mental wellbeing of its players. After all, no rational modern society should trade human life for entertainment.

## Evaluation

### Reading: 4

This response demonstrates a clear understanding of the prompt. The student correctly describes the author’s main point, which is that the toll that football takes on people’s lives is too dear and that America’s relationship with the sport must change. The student pulls relevant quotes from the prompt when needed (“America must ban high school football, restrict it in college, and must radically change the professional game”), and follows the author’s argument across the different forms of evidence—statistical, medical, and personal—he presents in support of his assertions.

### Analysis: 4

The student displays mastery of the analytic task. Not only does he follow the author’s argument over different forms of evidence, as noted above, he correctly assesses the impact of each type of evidence (Meyer does not just rely on tragic personal accounts; He invokes statistics and medical diagnoses to heighten the emotional impact). The student also makes note of sophisticated stylistic elements (The brevity of the deceased players’ lives is highlighted by the brevity of Meyer’s accounts) and persuasive rhetorical techniques (These statistics recall Meyer’s rhetorical question) employed by the author to really drive home his point.

### Writing: 4

Nevertheless, it is an ideal for which students can strive. The essay begins with a powerful and (more importantly) relevant outside quote (Joseph Stalin famously claimed) and strong introductory paragraph, and concludes with another strong paragraph which both summarizes the analysis and reinforces the author’s central point in light of this analysis (Moreover, these same elements, conveyed persuasively by the author, justify his central claim). Sentence structures are sophisticated and varied, as is the use of vocabulary (staunchest; insidious manifestation; resoundingly).

## SAT Practice Test 6: Answers &amp; Explanations

## Reading Test

1. (C)	6. (A)	11. (D)	16. (A)	21. (D)	26. (B)	31. (A)	36. (D)	41. (B)	46. (A)	51. (C)
2. (B)	7. (A)	12. (D)	17. (A)	22. (B)	27. (A)	32. (A)	37. (B)	42. (B)	47. (A)	52. (A)
3. (B)	8. (D)	13. (B)	18. (C)	23. (C)	28. (A)	33. (D)	38. (C)	43. (C)	48. (C)	
4. (C)	9. (C)	14. (C)	19. (B)	24. (D)	29. (C)	34. (B)	39. (C)	44. (A)	49. (D)	
5. (A)	10. (A)	15. (B)	20. (C)	25. (D)	30. (B)	35. (C)	40. (A)	45. (C)	50. (D)	

1) **⇒** C

Choice (C) is correct because the character is claiming that secrecy can make life “mysterious” and “marvelous,” and even the “commonest thing” can be enjoyable if hidden; for example, going out without telling anyone where he is going. (A) is incorrect because “sublime” is closer in meaning to “glorious” or “majestic.” (B) is incorrect because “alluring” means powerfully attractive, which would not make sense in the context. (D) is incorrect because “distracting” can mean “amusing” but more often has a negative connotation.

2) **⇒** B

Choice (B) is correct because Basil says in lines 7–8 that he enjoys withholding names of friends: “When I like people immensely, I never tells their names to anyone. It is like surrendering a part of them.” Choices (A) and (C) are incorrect because there is no implication of a sense of shame or concerns about jealousy in the excerpt. (D) is incorrect because the reader can infer from the rest of the passage that Basil usually shares personal news with Lord Henry.

3) **⇒** B

Choice (B) is correct because Lord Henry begins talking about his marriage in order to assure Basil that he empathizes with his need to keep secrets: “The one charm of marriage is that it makes a life of deception absolutely necessary for both parties.” (A) is incorrect because there is no indication that Lord Henry does not want to discuss Dorian Gray. (C) and (D) are incorrect because Lord Henry does not provide a description of his wife

or suggest that Basil should get married.

4) **⇒** C

Choice (C) is correct because Lord Henry explains that his wife is much better at the “absurd stories” they tell each other about where they have been and does not get confused about her own lies. Thus, clearly she is a skillful liar. (A) is incorrect because there is no indication that Lord Henry’s wife is truly cruel; Lord Henry says that when she catches him in his lies, she “makes no row at all,” and merely laughs at him. (B) and (D) are incorrect because there are no indications of how Lord Henry’s wife is regarded by her peers or how she truly regards Lord Henry.

5) **⇒** A

Choice (A) is correct because Basil tells Lord Henry, “You never say a moral thing, and you never do a wrong thing. Your cynicism is simply a pose” (lines 39–41). (B) is incorrect because Basil does not claim that Lord Henry is predictable. (C) is incorrect because Lord Henry does not lie about having adventures, except as a kind of game with his wife. Furthermore, Basil does not comment on whether his friend is adventurous or tries new things. (D) is incorrect because the topic of self-confidence does not appear in the passage.

6) **⇒** A

Choice (A) is correct because the way that Lord Henry presents himself is “simply a pose;” this is similar to the meaning of a “pretense”—an attempt to make something appear true when it is not. (B), (C), and (D) are incorrect because none of them implies deception, as does (A).

- 7) **➡ A**  
Choice (A) is correct because Basil explains in the last paragraph that when portraits are painted with feeling, they reveal the artist's true self; he says he may have disclosed "the secret of my own soul" (line 73) with his portrait of Dorian Gray. (B), (C), and (D) are incorrect because the passage does not address how often Basil paints portraits, what challenges he faces when painting, nor the reason that he decided to become an artist.
- 8) **➡ D**  
Choice (D) is correct because it most directly expresses the personal nature of Basil's portrait of Dorian Gray, saying that the painter reveals himself on the canvas. (A) is incorrect because its focus is on Lord Henry, not on Basil's artwork. (B) is incorrect because it is a request for Basil's explanation, not the explanation itself. (C) is incorrect because it describes what the artwork is not, rather than what it is.
- 9) **➡ C**  
Choice (C) is correct because Basil says that he had not intended to reveal the name of the subject of his painting, and he does not want to exhibit the painting. Lord Henry pretends to be worse than he is; for him it is normal to keep secrets through deception. (A) and (B) are incorrect because no mention is made of nature, city life, or social interaction. (D) is incorrect because Lord Henry's opinions on subjectivity do not appear in the passage.
- 10) **➡ A**  
Choice (A) is correct because there are several indications that the two characters are old friends: they call each other by their first names, "Basil" and "Harry;" they each share details of their inner lives; and they seem to have known each other for a long time. (B) is incorrect because they do not discuss business matters in the passage. (C) and (D) are incorrect because there is no indication that the two are quarreling or that they are enemies; rather, they speak in a friendly manner and sit down together on a garden bench (lines 45–46).
- 11) **➡ D**  
Choice (D) is correct because the "romantic image" in question is brides and grooms in their early 20s;

the author states that such an image is "now largely a myth;" in other words, it contradicts reality. (A) is incorrect because the "romantic image" is meant to contradict actual circumstances, not serve as an analogy for them. (B) is incorrect because the point of the "romantic image" is that it is not realistic. (C) is incorrect because the author uses the term "romantic" to describe how people tend to see marriage rather than how it is. The author does not imply that there is an ideal approach to marriage.

- 12) **➡ D**  
Choice (D) is correct because the author uses the word "crop" in its metaphorical sense to refer to a generation or a cohort of people. (A) and (C) are incorrect because they both indicate a more literal sense of the word—a season's agricultural planting, as in "this year's crop of corn." These meanings do not make sense in the context of the passage. (B) is incorrect because a coalition is a set of cooperating groups with a shared goal; this meaning does not make sense in reference to young adults as a whole.
- 13) **➡ B**  
Choice (B) is correct because in paragraph 2 the author says that older generations might worry that their adult children are putting off marriage "seemingly forever." (A) is incorrect because the passage does not precisely address whether older generations are advising younger generations not to move home. (C) is incorrect because the passage addresses parents' specific feelings and expectations regarding their adult children or grandchildren becoming independent, not their general feelings about supporting their children. (D) is incorrect because the passage does not imply that parents want their adult children to stay home, but the opposite—that older generations may be impatient for their adult children to move out and establish their own homes and families.
- 14) **➡ C**  
Choice (C) is correct because paragraph 3 begins with the claim that "a major factor" of marriage at older ages is that incomes are not high enough. To show that the phenomenon is real and widespread, the author then describes two cultural terms that describe it in two different countries. Rather

than data, the terms serve as anecdotal evidence. (A) is incorrect because the author does not provide logical analysis of the claim that people cannot afford to marry and establish homes. (B) is incorrect because the phenomenon is not presented as a problem, and popular terms such as “kangaroo generation” serve as descriptions, not solutions. (D) is incorrect because there is no “overall conclusion” about not being able to afford to establish a household.

15) **⇒ B**

Choice (B) is correct. In paragraph 4, the author states that the popular perceptions of the “Satori Generation” are “even darker” than the Korean perception of having lost the chance to ever marry. The author’s use of the word “supposedly” implies doubt that the extreme attitude is actually pervasive in Japan. (A) is incorrect because the author only mentions the popular term, and does not back it up with facts. (C) is incorrect because though the stereotype of the “Satori Generation” may be exaggerated, it is also unlikely that it describes no one. Finally, (D) is incorrect because the author mentions the “Satori Generation” term only briefly, and does not analyze the societal factors behind it.

16) **⇒ A**

Choice (A) is correct because the author uses “standard” here to indicate a means of measuring, a different way of deciding what is normal. (B) is incorrect because the author is not seeking to argue against statistical evidence, but rather to draw different conclusions from it. (C) and (D) are incorrect because the author’s tone is neutral; she does not attempt to argue for a new set of ideals or to encourage particular life choices.

17) **⇒ A**

The correct choice is (A). The graph shows that for both men and women in the United States, age at first marriage dipped in the 1950s and 1960s. Therefore, it makes sense to say that the age of first marriage during those decades is not the norm. (B) is incorrect because the graph does not indicate the number of adult children living with their parents. (C) is incorrect because the graph does not provide information about economic

conditions in any of the time periods. (D) is incorrect because it describes the graph’s objective but does not make a claim based on its data.

18) **⇒ C**

Choice (C) is correct because the graph indicates that average lifespan for men and women in the U.S. has grown continually since 1890, and that average age at first marriage has stayed more consistent over time. (A) is incorrect for the same reason: the graph indicates that age of first marriage is not catching up to increased lifespan. (B) is incorrect because the graph shows that average lifespan has been increasing over the entire time period documented by the graph, so it is not reasonable to predict that it will level off. Finally, (D) is incorrect because there is no pattern established by the graph from which we can infer that average age at first marriage will drop lower in the future. Rather, the dip in the 1950s and 1960s appears to be an anomaly.

19) **⇒ B**

Choice (B) is correct. In the preceding paragraph, the author says that “Census experts say...people are marrying earlier in their expected lifespan than ever before,” and provides an example. After the example, the direct quotation serves to summarize and restate the conclusion drawn from the data. (A) is incorrect because the quotation does not provide a new perspective. (C) is incorrect because there is no attempt to persuade the reader that the data is accurate. (D) is incorrect because the quotation is not restating information from the beginning of the passage. Rather, the quotation describes the U.S. average from the perspective of average lifespan.

20) **⇒ C**

The correct choice is (C). The author suggests that a strong economy may have lowered the age of first marriage in the 1950s and 1960s, and a weaker economy may be raising it now. However, she also suggests that the real cause may be a longer expected lifespan, as people now may “feel that they simply have more time.” (A), (B), and (D) are incorrect because the author makes no mention of varied opportunities, maturity, or the quality of relationships.

21) **➡ D**

Choice (D) is correct because a "configuration" is a specific arrangement of a group of elements—in this case, how the face looks in terms of nose, eyes, mouth, and so on. (A) is incorrect because "confluence" refers to the merger of two things, which does not make sense in the context of the sentence. (B) is incorrect because "geometries" does not include the concept of "arrangement" which is central to "configuration. Finally, (C), "alignments" is incorrect because an alignment refers to an arrangement that is in a straight line, which does not fit the meaning in this case.

22) **➡ B**

Choice (B) is correct because the researchers suggest that neighboring monkey species' different appearances are "an adaptation that helps prevent hybridization between species" (lines 11 – 12). (A) is incorrect because the author does not claim that species' different appearances help them form social bonds, although it is implied that it makes it possible for them to live together in social groups. (C) is incorrect because the passage does not address the effect of appearance on raising offspring. Finally, (D) is incorrect because the passage does not speculate about whether different appearances provide an adaptive advantage gained from living in mixed-species groups.

23) **➡ C**

The correct choice is (C). The author is reporting on the researchers' interpretation of their findings. They state that differing appearances between species that live near each other makes sense because otherwise, there would be "a risk of hybridization." (A), (B), and (D) are incorrect because none of them describes the study's findings in terms of the prevention of interbreeding; (A) is an introduction, (B) is a factual statement about the study results, and (D) is an extended discussion of the implications.

24) **➡ D**

Choice (D) is correct. In line 7, the author says that the researchers looked at "specific features like eyebrow patches and nose-spots;" she is using the word "features" in the sense of "parts of the face," making "characteristics" the best answer. Choices (A) and (B) are incorrect because it would not make

sense to refer to eyebrow patches and nose-spots as "presentations" or "secrets." (C) is incorrect because a "highlight" is a main or outstanding feature; the author does not indicate that eyebrow patches and nose-spots are highlights of the face.

25) **➡ D**

The correct choice is (D) because the method used in the study involves programming a computer to discern facial features; it is analogous to training a dog to pinpoint the smell of contraband among other smells. (A) is incorrect because training a mouse to memorize a pathway through a maze is not complex enough to be an analogy for training a computer to recognize and distinguish between configurations. (B) is incorrect because the goal of the study is not to reproduce single images, but to recognize and categorize different images. (C) is incorrect because the study is not analogous to teaching a pattern, such as forming words with letters on blocks.

26) **➡ B**

Choice (B) is correct because in lines 34 – 35, the author reports that the computer was able to "reliably categorize species and individuals." (A) is incorrect because the passage does not discuss the social status of monkeys within their groups. (C) and (D) are incorrect because lines 35 – 36 say that the computer was *not* able to determine an individual guenon's age or sex based on its facial features.

27) **➡ A**

The correct choice is (A). In lines 15 – 19, the author says that the study "examined the performance of a machine learning algorithm" to see if it could classify monkeys based on particular facial traits. In lines 74 – 82, the researchers are quoted as concluding that algorithms and machine learning can help researchers study the evolution of visual signals in animals. (B) is incorrect because the study did not address monkey or human behaviors. (C) is incorrect because, while the researchers clearly have an interest in the evolution of visual communication in species, it is not their primary interest. (D) is incorrect because the study in the passage did not focus on mating behaviors, but rather on facial recognition abilities.



28) **⇒** A

The correct choice is (A) because the author uses the term “trade-off” to indicate that selective pressures favor guenon faces looking distinctive in terms of species, yet still uniquely individual. The term “trade-off” therefore simplifies a more complex set of processes within evolution. (B), (C), and (D) are incorrect because the passage does not address economics, humor, or the relationship between scientists and non-scientists.

29) **⇒** C

The correct choice is (C) because the author reports that Allen and Higham found that guenon monkeys can recognize other individual monkeys by their faces and can discern members of their own species. The researchers interpret the recognition ability as “an evolutionary adaptation that helps prevent hybridization between species” (line 17). (A) is incorrect because there is no indication within the passage that the authors assume there are more Old-World monkey species to be discovered. (B) is incorrect because the passage does not mention unhealthy offspring or any other reason that selective pressures would favor the prevention of interbreeding with other species. (D) is incorrect because the author does not report that the researchers expected the computer program to “perfectly mimic” biological recognition processes. Rather, the researchers wanted to design a program that could “do something as similar as possible” (lines 20 – 22) to what an actual guenon could do in terms of recognition.

30) **⇒** B

The correct choice is (B). In lines 74 – 83, the author reports that Higham and Allen believe that machine learning approaches “have a really big future” in the study of animal visual communication; machine learning approaches such as the one they tested in the study will help researchers understand “the informational content” of signals. Thus, their study may unlock information about the nature of the signals that animals send and receive, and how the signals developed. (A) is incorrect because the study does not attempt to produce data regarding “all species.” (C) and (D) are incorrect because the author does not mention either topic in the passage.

31) **⇒** A

The correct choice is (A) because in lines 21 – 22, the author says that “wild orangutans struggle to remain in existence today” due to the destruction of their natural habitat; in other words, they could become extinct. (B) is incorrect because the author does not imply that the problem of logging the rainforests for timber has disappeared, only that it has been overshadowed as “forests are cleared completely” for palm-oil plantations (line 32). (C) is incorrect; in line 34 the author does contrast the “tidy rows” of palm plantations with wild forests, but the implication is that the tidiness is not beneficial to wild species. (D) is incorrect because there is no indication that the UN is helping to enforce laws in Indonesia.

32) **⇒** A

The correct choice is (A) because it refers directly to extinction when it describes orangutans as a species that is “threatened” by habitat destruction. (B), (C), and (D) are incorrect because, although they each address habitat destruction, the connection to species loss is only indirect.

33) **⇒** D

Choice (D) is correct because the third paragraph serves as a transition from the opening paragraphs’ focus on orangutans in zoos to the plight of wild orangutans in the rainforests of Indonesia and Malaysia, and to the passage’s main topic of palm oil production. (A) is incorrect because the third paragraph does not contain or support information about zoo orangutans, the topic of the first two paragraphs. (B) is incorrect because the third paragraph describes general facts, and does not present a specific example. (C) is incorrect because, while the third paragraph does provide background information—i.e., the location of the habitat, the conditions that support palm oil—its purpose is to transition between the passage’s introductory paragraphs and its main topic.

34) **⇒** B

Choice (B) is correct. The author says that palm trees are “stable sources of income” because they produce palm fruits for about 25 years; in other words, they are not subject to the ups and downs of annual crops. Thus for growers, the trees are “reliable.” (A), (C), and (D) are incorrect because although presumably the trees are “settled” in

their spots, and are somewhat “inflexible” and “sturdy,” these words do not quite make sense when placed with “sources of income.”

35) **➡ C**

The correct choice is (C) because the author says in lines 47 – 49 that palm trees have a much higher yield per acre than other vegetable oil crops; it follows that if growers wanted to get similar yields from a different vegetable oil crop, they would need to use more land. (A) is incorrect because, although the author states that palm oil plantations are profitable, she does not imply that there are no other possible uses of the land that could generate a comparable profit. (B) is incorrect because in paragraph 5 the author mentions that palm oil plantations have the potential to lift many poor people out of poverty. The reader can infer that this “potential” has not yet been realized. Finally, (D) is incorrect because the author does not address the issue of land use in the passage.

36) **➡ D**

The correct choice is (D). In paragraph 5, the author explains that palm oil plantations are profitable, reliable, and efficient, and that there are many poor people in the region, so it is “not surprising” that local governments approve plantations to help ease poverty. (A) is incorrect because the author does not attempt to persuade the reader to support palm oil. (B) is incorrect because the author does not make general comments about jobs and the environment. (C) is incorrect because the author does not address the question of how best to meet the food needs of the region’s population.

37) **➡ B**

The correct choice is (B). In line 75 – 76, the author reports claims that the palm oil plantations are “enriching a small elite” group of people. In contrast, the people who actually work on the plantations have small wages and suffer from abusive labor practices. (A) is incorrect because the paragraph does not mention growers’ responses. (C) is incorrect because the author does not refer to conflicts between laborers and villagers. (D) is incorrect because the paragraph does not focus on contrasting “lifestyles.”

38) **➡ C**

The correct choice is (C). In line 82, the author refers to a quotation from the “Inter-Press Service,” and in line 86, the author refers to the palm oil industry getting “bad press.” The reader can infer that “press” here refers to media reports, and that the “Inter-Press Service” must be a news publisher. Choices (A), (B), and (D) are incorrect because it would not make sense in the context for the industry to suffer from bad “weights,” “crowds,” or “machinery.”

39) **➡ C**

The correct choice is (C) because the author introduces the concept of the RSPO by saying that “the bad press has created a niche market for palm oil that is grown in a more responsible manner.” By this, she implies that some consumers are demanding “sustainable” palm oil, creating a market force that is changing the practices of some companies. (A) is incorrect because the author does not claim that the RSPO certification process cannot be trusted. (B) is incorrect because, while some companies may be more transparent than others about ingredient sources and other matters, such discrepancies are not the author’s main focus. (D) is incorrect because the author does not describe the RSPO as a government organization, but rather, a private cooperative. Therefore, it is not concerned with creating laws.

40) **➡ A**

Choice (A) is correct because it provides the most direct support for the author’s main point about palm oil certification—when consumers learned about the effects of palm oil production through the media (i.e., the industry got “bad press,”) some formed a consumer base (“niche market”) for differently produced oil. (B) is incorrect because it simply describes the participants in the certification system and does not mention the role of consumers. (C) is incorrect because it describes the effects of the RSPO on the industry—changes in about 15 percent of the market—but again, it does not mention consumers. (D) is incorrect because it describes the urgent need for market pressures to halt clear-cutting, but does not refer directly to the role that consumers can play.

41) **➡ B**

The correct choice is (B). The graph shows that since 1970, the demand for palm oil has more than doubled during every 10-year period. (A) is incorrect because while demand did grow more quickly between 2000 and 2010 than during previous decades, the term "increased substantially" is a vague description of its rise. (C) is incorrect because it raises a question that is not relevant to supporting the author's characterization of demand for palm oil. (D) is incorrect because it presents a subjective interpretation of a word but does not support it convincingly. "Rising steadily" is not necessarily incompatible with "skyrocketing."

42) **➡ B**

The correct choice is (B) because Lamarck claims in lines 6–9 that animals' changing habits cause "the use of one member rather than another," and that some "members" might cease to be useful at all. Thus, the reader can infer that the author was using diction more common to his era (1809) for "limb" or "appendage." (A), (C), and (D) are incorrect because they would not make sense in the context of discussing physical development in animals.

43) **➡ C**

Choice (C) is correct. Lamarck states that since the ground in "the interior of Africa" is "scorched and destitute of grass," the giraffe has to eat leaves from trees. The leaves have made "continual stretching" necessary "over a great space of time in all the individuals of the race" (lines 23–25). Thus, Lamarck says that the distribution of resources has evoked the behavior of stretching the neck. (A) is incorrect because the author does not claim that the conditions cause the giraffe to relocate, but rather to reach up. (B) and (D) are incorrect because the author does not imply that the giraffes must compete with each other or establish dominance.

44) **➡ A**

Choice (A) is correct because it most directly supports Lamarck's use of "scorched" bare ground as an example of a "changed circumstance," that produces wants and needs that in turn produce "changed actions," such as the behavior of reaching up to the trees to eat leaves. (B), (C),

and (D) are incorrect because in them, the author elaborates upon his theory. (A) is the only choice that focuses solely on distribution of resources changing animals' behaviors.

45) **➡ C**

Choice (C) is correct. In lines 38–41, Darwin mentions "the structure...of the woodpecker, with its feet, tail, beak, and tongue, so admirably adapted to catch insects under the bark of trees." Thus by "structure," Darwin is referring to composition or "anatomy" of the woodpecker's body. (A) is incorrect because "organization" connotes the way that various parts are arranged, not how they are formed and adapted. (B) is incorrect because a "design" is a plan or blueprint for something, whereas Darwin is referring to actual birds. (D) is incorrect because "edifice" refers to buildings, not animals.

46) **➡ A**

The correct choice is (A). In lines 58–64, Darwin says that because of the "struggle for life," individuals tend to survive if they have variations that are "in any way profitable" in their environments. Based on the examples Darwin uses in lines 38–42, the reader can infer that obtaining food is "profitable" to an animal and is a major part of the "struggle for life." (B) and (C) are incorrect because neither makes sense as a component of the "struggle for life." (D) is incorrect because the "struggle for life" in organisms would not generally include a struggle for parental affection.

47) **➡ A**

The correct choice is (A) because it provides two examples of obtaining food that Darwin uses to introduce the term "struggle for life." Choices (B), (C), and (D) are incorrect because they do not directly connect the Darwinian "struggle for life" with "competition among individuals for food."

48) **➡ C**

Choice (C) is correct. In lines 75–79, Darwin explains that people have been able to "produce great results" in adapting organisms (such as "dog breeds") to become more useful to them ("fill practical roles"). Darwin says that people have achieved these results by accumulating variations provided by "the hand of Nature;" i.e., selectively

breeding plants or animals to emphasize various traits. (A) is incorrect because it refers to humanity's overuse of natural resources, not its manipulation of natural selection. (B) is incorrect because hunting an animal to the point of extinction destroys it, rather than adapts it for human uses. (D) is incorrect because the use of rats and mice in cancer research refers to observing individuals subjected to certain conditions, not to selective breeding.

49)  D

Because the graphs include only three unnamed species, the reader can infer that the graphs are meant to convey basic concepts rather than precise information. The correct answer is (D) because the graph depicting Lamarck's theory shows species being generated spontaneously over time, while Darwin's theory shows species branching out from one origin in time. (A), (B), and (C) are incorrect because the graphs do not supply information regarding the two theories' stance on these topics.

50)  D

The correct choice is (D) because the author of Passage 2 (Darwin) would most likely claim that his predecessor (Lamarck) misinterpreted the way in which conditions influence the development of organisms. Lamarck writes that changes in organisms come about when they change their habits in response to changing conditions; Darwin criticizes such an interpretation when he says it is "preposterous" to think that animals and plants decide to change their habits based on external conditions (lines 33–51). (A) is incorrect because there is no indication that Lamarck is relying on casual observations. (B) is incorrect because neither Darwin nor Lamarck mentions predation in the passages. (C) is incorrect because Lamarck indicates that the function of the giraffe's long neck is to enable it to browse on tree leaves; it is unlikely that Darwin would disagree.

51)  C

Choice (C) is correct. In lines 6–13, Lamarck claims that, if an organism uses a part of its body more, it will become larger and more powerful. Darwin most clearly refutes this hypothesis in lines 58–65, where he explains the principle

of Natural Selection—that certain variations in individuals tend to help them survive, and that their offspring will be more likely to possess the same variations. Darwin's explanation of the mechanism for acquiring different traits thus undermines Lamarck's. (A) and (B) are incorrect because they are not precise claims. (D) is incorrect because it focuses on how humans have altered the development of some organisms to become more useful to them; it does not explain how differences among organisms develop.

52)  A

The correct choice is (A). In the first paragraph of Passage 2, Darwin describes as "preposterous" the belief that "mere external conditions" cause differences among organisms. He points to both a bird and a plant that have unique abilities for getting food from trees. Darwin argues that the two species could not have developed such complicated adaptations simply by means of habitual practice. (B) is incorrect; Darwin mentions the woodpecker and mistletoe not to compare the two organisms to each other, but to give two examples of complexity. (C) and (D) are incorrect because Darwin does not mention either giraffes or the struggle for life in the first paragraph of Passage 2.

## SAT Practice Test 6: Answers &amp; Explanations

## Writing and Language Test



1. (B)	5. (B)	9. (A)	13. (D)	17. (C)	21. (D)	25. (C)	29. (C)	33. (C)	37. (C)	41. (C)
2. (C)	6. (A)	10. (B)	14. (A)	18. (C)	22. (A)	26. (H)	30. (D)	34. (D)	38. (C)	42. (C)
3. (C)	7. (D)	11. (D)	15. (C)	19. (B)	23. (A)	27. (B)	31. (A)	35. (A)	39. (D)	43. (B)
4. (D)	8. (C)	12. (A)	16. (D)	20. (C)	24. (D)	28. (D)	32. (B)	36. (B)	40. (A)	44. (A)

1) **⇒ B**

The first paragraph is about anticipating the trends and buying practices of the public. A good opening sentence would make a general statement to this effect, and so (B) is the correct choice. (A) is incorrect because the paragraph does not primarily focus on risks, but rather on the art of prediction. (C) is incorrect because, although the author mentions sales in fashion and electrical appliances, the paragraph then discusses more general points. Finally, (D) is incorrect because the author does not mention research analysts until the very end of the paragraph.

2) **⇒ C**

The correct choice to a Writing and Language Test question will generally be the most concise, grammatically correct choice available. Here choices (A), (B), and (C) convey approximately the same information, yet (C) presents the information in the most concise way, so (C) is the correct choice. Choice (D) is incorrect because it is awkward and confusing. It is not clear who would be undertaking the "data usage."

3) **⇒ C**

The pronoun at the underlined portion is showing possession over the economy's "effect on buying power," so we must use the possessive form of the pronoun "it," which is "its." Thus, (B) and (D) are incorrect because they use the contracted form of "it is" (it's) instead of the possessive pronoun "its." Furthermore, (A) is incorrect because "affect" is a verb, and we must use the noun "effect" to convey the relationship between "the current economy" and "buying power." Choice (C) is correct because it fulfills the conditions.

4) **⇒ D**

In sentence 2 of paragraph 2, the author states that "these processes" give market analysts a sense of who will buy a product. The succeeding sentences mention several data-collection techniques. Sentence 2 should be placed after the sentences that mention the techniques—the processes—that market researchers use. Sentence 2 should go after sentence 5, making (D) correct. (A), (B), and (C) are incorrect because they leave "these processes" undefined.

5) **⇒ B**

Generally, it is preferable to write using the active voice. In other words, the subject of a clause or sentence should be introduced first, then the action performed by the subject, and then the object receiving the action. Only choice (B) establishes and maintains the active voice, making it the correct choice. (A) and (C) switch from active voice ("Analysts collect relevant data") to passive voice ("a report is written") unnecessarily, convoluting the relationship between analysts and the reports they write, so these choices can be eliminated. (D) is incorrect because it is written entirely in the passive voice and does not include a subject.

6) **⇒ A**

If the information that follows "who" in a sentence is not essential to the meaning of the sentence (if the sentence would make perfect sense without that information), then the clause beginning with "who" should begin and end with commas. But if the information is necessary to the coherence of the sentence, no commas are necessary. Here, knowing that the ice cream producer is "planning to launch a line of ice cream cakes" is crucial to the sentence's meaning, so no commas are necessary.

Thus, (A) is the correct choice. Other choices are incorrect because they add unnecessary commas.

7) **⇒** D

Whenever the answer choices contain different forms of the same verb ("are" versus "is" in this case), it is a good idea to check the underlined portion for subject-verb agreement. In other words, make sure the verb expresses the same number as the noun to which it corresponds. In this case, the verb *are/is* refers to "the typical American home," which is a singular noun phrase. "Is" refers to singular third-person nouns, and since (D) is the only choice that uses "is," it is the correct choice. Other choices incorrectly use "are" to refer to a third-person singular noun.

8) **⇒** C

Choice (C) is correct because the sentence about frosting does not fit well within the context of the discussion, which focuses on the size of ice cream cakes. Thus, the sentence should be deleted. (A), (B), and (D) are incorrect because they do not articulate the paragraph's focus.

9) **⇒** A

The sentence beginning at 9 abruptly transitions from a discussion about tasks to a discussion of the academic training of market analysts. Thus, an appropriate opening sentence would introduce the relevance of education, and so (A) is correct. (B) is incorrect because it is vague and begins with the inappropriate adverb "Certainly." (C) is incorrect because it is too specific: it focuses only on math, while the rest of the paragraph focuses more broadly on general academic training. Finally, (D) is incorrect because it focuses on the style of thinking that is essential for market research analysts, not on education, which is the main focus of the paragraph.

10) **⇒** B

The underlined portion at 10 conveys the idea that the job outlook for *all* market research analysts looks favorable. Thus, the plural noun phrase "market research analysts" needs to show possession over "job outlook," which is accomplished by adding an apostrophe (') at the end of "analysts." Only (B) does this, making it the correct choice. Other choices fail to show possession [(A) and (C)] or show singular

possession (D), making them incorrect.

11) **⇒** D

According to the title of the graph, the data depicted is the percent change projected from 2012 to 2022. (D) is the correct choice because the percent growth mentioned in this choice (32 percent) corresponds with the percent growth listed in the graph. All other choices state information that cannot be supported by the graph.

12) **⇒** A

The phrase "and that any risk is outweighed" corresponds with "policies requiring," which comes earlier in the sentence. It is grammatically correct to say "policies requiring...that any risk is outweighed..." and doing so connects "policies" to "risks," making (A) the correct answer. Although (B) is grammatically correct, the inclusion of a period muddies the relationship between "policies" and "any risk," meaning (B) can be eliminated. Similarly, the lack of "that" in (C) disassociates the phrase that begins "any risk is outweighed" from the "policies" to which it refers. (D) is grammatically incorrect because the phrase that follows the semicolon is not an independent clause.

13) **⇒** D

As written, the claim that researchers can and do disagree about "both qualities" is too vague, as the reader cannot determine which specific qualities is the author talking about. The answer has to be explicitly related to what the author says in the previous sentence. Only choice (D) mentions the specific qualities that cause disagreement among researchers: defining what is safe and what is meaningful. (B) is incorrect because it does not specify what the two judgments in question are, and (C) is incorrect because it is far too broad and vague. Academic writing should be clear and concise, and that often means being specific as well.

14) **⇒** A

The underlined noun is showing possession over "immune systems." Because immune systems is plural, we can conclude that we need to use the plural form of person, which is people. We can eliminate (B) and (D) because they fail to use

this plural form. Generally, a plural possessive is formed by adding an apostrophe to the end of the word, but in the case of plural nouns that do not already end in "s," the possessive is formed by adding an 's to the end of the plural noun. Thus, the possessive form of "people" is "people's," making (A) the correct choice.

15) **➡ C**

Choice (C) is correct because the graph shows the number of deaths in the U.S. that resulted from various flu outbreaks, and only (C) describes the number of deaths related to these flu outbreaks. (A) and (B) incorrectly assume that the graph displays the number of deaths as a proportion of the U.S. population, which it does not. (D) is incorrect because the graph shows that many people died from these outbreaks, but it does not suggest that these outbreaks were the *leading* causes of death. There is simply not enough information in the graph to make this assumption.

16) **➡ D**

Because the sentence begins with "Ideally," we can conclude that it is describing a desirable, hypothetical situation. Thus, we must use a conditional auxiliary verb to show that this is an ideal yet nonexistent situation. (A) and (C) are incorrect because both of these imply that the situation exists, which conflicts with the word "Ideally." (B) is incorrect because saying "scientists *would have* identified" implies that something in the past has prevented them from identifying, which we cannot confirm based on the context of the passage. Thus, (D) is correct because "could" suggests possibility, which is also suggested by the adverb "Ideally."

17) **➡ C**

The sentence containing 17 mentions that scientists produce new strains of the flu virus that have gained abilities, or functions. Thus, an appropriate combination of both sentences would include a term that indicates the transition from a general explanation to a more detailed one. Only (C) accomplishes this by including the word "specifically;" in addition, since the two sentences can stand alone, a semicolon is needed to separate them. (A) is incorrect because the author is adding new information, not rewording. (B) is incorrect because it would create a run-on sentence.

Finally, (D) is incorrect because "but" indicates a contrast; yet the information contained in the two sentences does not contrast.

18) **➡ C**

The tone of the passage is academic and informative, so the underlined portion at 18 should maintain this academic tone. The correct choice is (C) because it conveys the same information as the other choices but uses a more academic tone while remaining clear and concise. Choice (A) is incorrect because it uses colloquial diction ("got more"), and it contains a redundancy (in the context of the sentence, *capable* and *efficient* mean nearly the same). (B) can be eliminated because the phrase "a lot" is rarely, if ever, used in academic English writing, as the term fails to add useful, quantifiable information. (D) is incorrect because the phrase "do a better job" is too colloquial for the tone of the passage as a whole.

19) **➡ B**

The phrase "by knowing...evolve" interrupts the main idea of the sentence, which is that "researchers claim that...scientists may be able to prevent pandemics." Generally, interruptions are separated from the rest of a sentence with a pair of commas. Thus, (B) is the most appropriate choice because it places a single comma at the end of the interjection, signaling the interjection's end.

20) **➡ C**

Choice (C) is correct because it places sentence 2 logically between sentences 4 and 5. Sentence 2 describes one lab's creation of a flu strain that humans cannot "neutralize." That explains sentence 4's "more lethal" strain. Sentence 5 begins with "That is," and reiterates the information about the human immune system. (A), (B), and (D) do not create a logical flow.

21) **➡ D**

An appropriate supporting claim for the sentence at 21 would clearly state a reason or example showing why the different strains of flu should not be kept. Since the sentence as written does not do this, (A) is incorrect. (B) is incorrect because it includes the mere speculative possibility that the flu virus could escape and cause a pandemic. (C) is stronger than (B), but it does not specify any concrete negative effects of the labs having

accidentally released the most dangerous pathogens. Only (D) clearly indicates that there are real dangers to genetically modifying flu viruses, since an outbreak of the flu virus in China actually did cause a pandemic that made many people ill.

22) **⇒** A

The passage as a whole has represented the pros and cons of creating “gain of function” flu viruses. The sentence at 22 includes a fitting general summation by noting that supporters and opponents of this research continue to disagree strongly. It is not necessary to substitute another sentence, so (A) is the correct answer. (B) is incorrect because it advocates one side of the debate, whereas the author’s tone is neutral throughout the passage. (C) will not work as a conclusion because it adds new information to the discussion. Finally, (D) is incorrect because it is vague and unsupported by evidence. The reader has no information about the influence of either side on the scientific community. Overall, (D) fails to conclude the issue in a neutral tone.

23) **⇒** A

The clauses to either side of the semicolon are independent clauses. Because these independent clauses contain closely related ideas, a semicolon is the appropriate punctuation, making (A) the correct choice. (B) is incorrect because a comma alone is not sufficient to separate independent clauses. (A comma must be followed by a coordinating conjunction to do so.) (C) can be eliminated because it lacks any punctuation, forming a run-on sentence. Like (B), (D) is incorrect because it replaces the semicolon with a comma without adding a conjunction. Moreover, the comma after “besides” is unnecessary.

24) **⇒** D

The sentence containing the underlined portion expresses the idea that “mancala” (to transfer) is appropriate because it accurately reflects the goal of the game. Thus, the transition word at 24 should show that the rest of the sentence emphasizes the validity of the previous sentence. (D) is the correct choice because “Indeed,” when used as a transition, serves to strengthen or validate a previous claim. (A) is incorrect because the rules of the game are not likely a consequence

of the game’s name. “Concurrently” means that two things take place at the same time. Because the chronology of mancala is not discussed in these two sentences, (B) must be incorrect. The transition word “Significantly” serves to emphasize that the information that follows is of greater importance than previous statements. Because there is no indication that the sentence containing the underlined portion is any more important than preceding or following sentences, (C) can be eliminated.

25) **⇒** C

Choices (A) and (B) can be eliminated because the passage is written using an academic and somewhat formal tone, and the terms “a ton” and “a lot” are generally avoided in academic writing because these terms add little in the way of useful, quantifiable information. Choice (D) is incorrect because, as used in the sentence, “maximum” has no clear meaning: the reader is not told what this “maximum” is. Usually, one should avoid unclear or ambiguous terms. Thus, (C) is the correct choice because “multiple” and “many” are acceptable replacements for “a lot” in academic writing.

26) **⇒** B

If the information that follows “who” in a sentence is not essential to the meaning of the sentence (if the sentence would make perfect sense without that information), then the clause beginning with “who” should begin and end with commas. But if the information is necessary to the coherence of the sentence, no commas are necessary. Here, the information “who collects the most pieces” is necessary to understanding *how* to win the game. Thus, the “who” clause contains necessary information and should not be set aside using commas, making (B) the correct choice. Other choices add superfluous commas, making the sentence choppy, unclear, and ungrammatical.

27) **⇒** B

The correct answer to a SAT Writing and Language Test question will always be the clearest, most concise choice. We can eliminate (A) because it contains a redundancy: “diffusion” and “spreading across” mean the same thing. (B) is the most concise, so it is the correct choice. (C) is not as concise as (B), and it contains overly colloquial terms such as “ended up all over,” so



it is incorrect. (D) can be eliminated because, like (A), it contains redundancies.

28) **➡ D**

The correct choice is (D) because it is the only choice that explicitly states *who* is trying to determine how the pits were used. Although the term “it is” is an acceptable way to begin a phrase, clause, or sentence, it should only be used when the subject is unknown or nonexistent. But (D) tells us that archaeologists are performing the action, making it the choice containing the most relevant information.

29) **➡ C**

Although (A) is concise, it leaves out information that helps connect the previous sentence to the sentence containing the underlined portion; we can eliminate (A). Only (C) adds necessary information that reveals that archaeological evidence has provided clues as to mancala’s development, linking it to the previous sentence. Thus, (C) is the correct choice. Like (A), choices (B) and (D) fail to mention the archaeological evidence of “pottery shards.”

30) **➡ D**

The sentences comprising the paragraph establish a pattern of contrasts using “but.” To maintain this sentence structure, the sentence at 30 should contain a “but” as well. Only sentence (D) does, by indicating that playing pieces can be jewels, *but* dried beans will serve equally well. Each of (A), (B), and (C) are incorrect because do not follow the established pattern.

31) **➡ A**

An appropriate transition sentence for the paragraph beginning at 31 would likely acknowledge and sum up the general characteristics that make mancala so attractive, but would also note that there are additional features that draw people to play it. Choice (A) does this effectively, by pointing out that, in addition to the features mentioned in the previous paragraph, mancala has an additional draw. (B) is incorrect because it is too wordy, and it refers to the preceding features vaguely as “that.” (C) is incorrect because it contains a question that is not answered by the paragraph at 31, which describes additional reasons why mancala is attractive, without stating why people

should pass it on to their children. Finally, (D) is incorrect because the paragraph at 31 does not specifically discuss or mention the social aspects of mancala, but only the continual challenges that the game presents.

32) **➡ B**

A personal pronoun should always *clearly* refer to a specific noun, noun phrase, or pronoun mentioned elsewhere in a sentence or paragraph. (A) is incorrect because it is unclear whether “they” refers to “Mancala games,” “people,” or “challenges.” The correct choice is (B), as it clarifies the meaning of the sentence. Choices (C) and (D) are incorrect because they substitute inaccurate nouns for the pronoun.

33) **➡ C**

The sentence containing the underlined portion states that mancala helps people “evaluate visual information,” so the word at the underlined portion should demonstrate that mancala helps people process visual information. Because “patterns” is the only choice that suggests a visual element, we can infer that (C) is the correct choice. (A) is incorrect because “circumstances” relate to situations, not generally to visual information. Similarly, contexts usually refer to the information surrounding something, making (B) inappropriate. (D) is incorrect because “generalizations” are thoughts or statements, and therefore not directly related to mancala.

34) **➡ D**

Generally, when a term is elaborated on with descriptions or examples, the descriptions or examples should come immediately after the term they describe. Choices (A), (B), and (C) can be eliminated because they separate mention of Shakespeare’s “last few plays” from a list of the plays themselves. Only (D) places the phrase “Shakespeare’s last few plays” immediately before a list of these plays. Doing so is the clearest and most concise way to illustrate the relationship between the “last few plays” and the list of plays provided in the sentence.

35) **➡ A**

As it is written, the sentence containing 35 is acceptable because “their ambiguous mood” clearly identifies a specific feature of the plays that makes them difficult to appreciate

and understand. The rest of the paragraph appropriately develops and expands upon this point. (B), (C), and (D) are incorrect because the author does not state or imply that the plays are tedious, outdated, or have too many characters. It is rather the emotional dynamics of the plays that make them difficult to appreciate.

36) **⇒** B

Based on the context of the sentence, the verb at the underlined portion should convey the idea that the plays *begin*, or *progress* as tragedies before ending happily. To precede means to come before, which does not make sense based on the sentence, making (A) incorrect. To proceed means to progress or begin, so (B) works well in the context of the sentence and is the correct choice. To prevaricate is to stall or evade, making (C) incorrect. And (D) can be eliminated because to propel is to push something forward, which does not make sense in the context of the sentence.

37) **⇒** C

The preceding sentence discusses the unusual shared structure of Shakespeare's "problem plays," which begin as tragedies, but end happily. The most appropriate choice provides some historical context for the odd structure of these plays. Only choice (C) does so, as England's "reconciliation with former enemies" implies that England was transitioning away from conflict (tragedy) and toward cooperation (a happy ending). Thus, (C) suggests a connection between historical events and the plays' shared structure. Other choices provide accurate historical information, but the information does not obviously relate to the shared structure of Shakespeare's problem plays.

38) **⇒** C

An example of the tragicomedies' unusual structures would be an outcome or set of events that we normally would not anticipate happening in the course of a play. Simply giving a speech is not an example of something unusual or unexpected, and so (A) is incorrect. (B) is incorrect because it is not unusual to expect that characters would go back to their routines after the action depicted in the play. (D) is incorrect because if "nearly everyone lives," we would expect that the lead characters would, too. Only (C) expresses

an unusual occurrence: cruel characters become reformed. The fact that they do likely contributes to the lack of a single overarching mood in the plays.

39) **⇒** D

The SAT Writing and Language Test may test your understanding of the literary present tense: use the present tense when describing the events of a literary work, such as a book, play, or movie. Thus, even though Shakespeare's plays were written in and take place in the past, people refer to the events of the play using present-tense verbs. For this reason, (D) is the correct choice. Although (C) uses a form of the present tense, this choice's structure is incorrect because it makes it seem as though the plays are *currently in the process of following convoluted plots*, which is inaccurate. (A) and (B) are in past-perfect or future tenses, not the literary present tense, making these choices incorrect.

40) **⇒** A

The paragraph itself provides few clues as to the most appropriate choice, except that the princess must travel to find her husband. Therefore, we can infer that her husband has been exiled (forced to leave for political reasons), making (A) correct. (B) and (D) are incorrect because they describe specific processes that would have been elaborated on by the author were they true of the play. To excommunicate someone is to exclude that person from participation in a church; to extradite someone is to hand him or her over to the authorities of a foreign state for a crime committed in that state. (C) is incorrect because to be expatriated is to be sent out of one's native country altogether, and the princess would have had to travel much farther than the local forest.

41) **⇒** C

Here, "princess" must show ownership, or possession, over "enemies" in order to establish that they are, in fact, her enemies. There are two ways to make a singular noun that ends in "s" show possession: add an apostrophe to the end of the word, or add an apostrophe and then an "s," as you would for other singular possessive nouns. (C) is the only choice that follows one of these rules, making it the correct choice. (A) is incorrect because "princesses" is the plural of

"princess" and is not inflected to show possession. (B) can be eliminated because the context of the paragraph makes it clear that the underlined portion is discussing the princess's actions, not those of a prince. And (D) is incorrect because the underlined portion must show possession, not state of being, as is the case with (D).

42)  C

The underlined portion should compare the audiences' reaction to "her [the princess's] *grief*, unlike [the *grief* of] Juliet." Because no option explicitly mentions Juliet's grief, we must select the choice that suggests it; the choice that most clearly does so is (C), as the pronoun "that" refers to the grief mentioned earlier in the sentence. (A) is incorrect because it compares "grief" to "Juliet." (B) is incorrect because it compares "grief" to a "scene." Although (D) mentions Juliet's "feelings," this choice illogically compares "the princess" to Juliet's feelings.

43)  B

Choice (A) is incorrect because of a pronoun-antecedent disagreement. The pronoun "they" must refer to a plural pronoun, but in (A), it refers to "the audience," a singular pronoun. (C) is incorrect because "all audiences" is too specific in this context. (D) is incorrect because, based on the context of the sentence, the pronoun "it" wants to refer to "one," but "it" refers to non-human nouns whereas "one" refers to a person. Thus, "it" cannot refer to "one," making (D) ungrammatical. Only (B) is grammatically correct, as it uses the plural pronoun "they" to refer to the plural noun "people."

44)  A

The paragraph begins by talking about forgiveness and how its appearance in Shakespeare's plays may signal Shakespeare's own desire for forgiveness. The author then provides a specific example of this in *The Tempest*, when the main character addresses the audience directly. An appropriate concluding sentence would tie in this speech with the earlier focus on Shakespeare's own desire for forgiveness by concluding that the main character represents Shakespeare himself asking for forgiveness. Thus, (A) is correct. (B) is incorrect because it stays focused on *The Tempest* rather than serving as an effective conclusion.

(C) is incorrect because, while it may be true that Shakespeare's character reaches through the "fourth wall," (C) does not explain exactly why the character is doing this and what the significance of his action is. Finally, (D) is incorrect because it makes a statement that is disconnected from the discussion of the deeper meaning of the character's speech, as well as shifting the passage's tone away from neutrality to one of advocacy.

# SAT Practice Test 6: Answers & Explanations

## Math Test



### No Calculator Portion

1. (C) 7. (B) 13. (D) 19. 40
2. (B) 8. (B) 14. (C) 20. 2
3. (A) 9. (B) 15. (C)
4. (D) 10. (C) 16. 1
5. (A) 11. (D) 17. 1
6. (C) 12. (D) 18. 5



### Calculator Portion

1. (B) 7. (D) 13. (C) 19. (C) 25. (A) 31. 290 37. 71
2. (D) 8. (D) 14. (D) 20. (B) 26. (C) 32. 5.20 38. 160
3. (D) 9. (B) 15. (C) 21. (A) 27. (C) 33. 384
4. (B) 10. (B) 16. (C) 22. (D) 28. (A) 34. 4
5. (B) 11. (B) 17. (B) 23. (C) 29. (D) 35. 0.184
6. (C) 12. (D) 18. (B) 24. (C) 30. (B) 36. 240

### No Calculator Portion

- 1)  $\Rightarrow$  C  
 $\frac{x}{2} - 1 \leq 1 - \frac{x}{2} \rightarrow \frac{x}{2} + \frac{x}{2} \leq 1 + 1 \rightarrow x \leq 2$
- 2)  $\Rightarrow$  B  
 Cost of shipping to CA =  $x$   
 Cost of shipping to NY =  $\frac{x}{3}$   
 Total cost =  $3x + 8\left(\frac{x}{3}\right) = \frac{17x}{3}$
- 3)  $\Rightarrow$  A  
 A value of  $a < 0$  for a general quadratic function  $f(x) = ax^2 + bx + c$  indicates that the graph of the function is a parabola that opens downward.  
 NOTE: choices (C) and (D) are the discriminant; (C) indicates that the function has real number solutions, and (D) indicates that the function has no real number solutions.
- 4)  $\Rightarrow$  D  
 Energy =  $3L \times \frac{1000 \text{ mL}}{L} \times \frac{4 J}{\text{mL} \cdot ^\circ\text{C}} \times 8^\circ\text{C}$   
 $= (3)(1000)(4)(8) J$   
 $= 96,000 J$
- 5)  $\Rightarrow$  A  
 Let  $a$ ,  $b$ ,  $c$ , and  $d$  represent four consecutive integers. The next four integers can be represented as  $a+4$ ,  $b+4$ ,  $c+4$ , and  $d+4$ . If the sum  $a+b+c+d=x$ ,

then  
 $(a+4) + (b+4) + (c+4) + (d+4)$   
 $= (a+b+c+d) + 16 = x + 16$

- 6)  $\Rightarrow$  C  
 Let  $x$  be the number of pizzas that Carol orders, and  $y$  be the number of pans of macaroni and cheese:  
 $30 \leq 2x + 6y \leq 60$   
 Because the ratio of one food to another cannot exceed 2 to 1, the most pizzas that Carol can order is:  $\frac{x}{y} \leq 2$ ,  $y \geq \frac{x}{2}$   
 Substitute this relation into the inequality above:  
 $30 \leq 2x + 6\left(\frac{x}{2}\right) \leq 60$   
 $30 \leq 5x \leq 60$   
 $6 \leq x \leq 12$
- 7)  $\Rightarrow$  B  
 Let  $a$  be the cost of one apple, and  $p$  be the cost of one pear. The costs of a small bag and large bag, respectively, are:  
 $3a + 2p = 1.85$   
 $7a + 5p = 4.45$   
 Multiply the equation for the small bag by factor  $\frac{5}{2}$ :  
 $\frac{5}{2}(3a + 2p) = (1.85)\frac{5}{2}$   
 $\frac{15a}{2} + 5p = 4.625$

Subtracting the equation for the large bag from this equation gives:

$$\frac{1}{2}a = 0.175$$

$$a = 0.35$$

To calculate the price of one pear:

$$p = \frac{4.45 - 7a}{5} = \frac{4.45 - 7(0.35)}{5} = 0.4$$

8) **⇒ B**

A population increase of 20% is equivalent to multiplying the current population by a factor of 1.2. As a function of the number of years,  $t$ , then, the population is:  $P(t) = 10,000(1.2)^t$

9) **⇒ B**

$$\frac{5}{x+1} \geq 1$$

$$5 \geq x+1$$

$$x \leq 4$$

$x+1$  must be a positive number, so,

$$x+1 > 0$$

$$x > -1$$

10) **⇒ C**

The participants of a poll must total 100%. 70% for A + 60% for B = 130%, so 30% of those polled must have voted for both. Thus, the numbers of people who chose each or both candidates are:

Candidate A only = 30%

Candidate B only = 40%

Candidate A and B = 30%

Let  $x$  be the total number of people that were polled:

$$0.3x = 900$$

$$x = 3000$$

11) **⇒ D**

The restrictions on the range of the function are:

1. The value of the function must be positive because it is a square root.
2. The value of the function must be less than or equal to 2 because the radicand  $(4-x^2)$  must be less than or equal to 4.

This implies that the range of the function is  $0 \leq y \leq 2$ .

12) **⇒ D**

Choice (D) is not a true statement, as  $a^1$  will always be an odd number if  $a$  is an odd integer and an even number if  $a$  is an even integer. Choices (A), (B), and (C) are all necessary consequences of the fact that  $a$  is a positive integer.

13) **⇒ D**

Calculate the slope of the line:  $m = \frac{-6-3}{-2-4} = \frac{3}{2}$

Because the slope is the same as that in (B), (B) is true and therefore incorrect. Because the slope above is the opposite reciprocal of that in (C), (C) is true and therefore incorrect.

Calculate the  $y$ -intercept using the point  $(-2, -6)$ :

$$y = \frac{3}{2}x + b$$

$$-6 = \frac{3}{2}(-2) + b$$

$$b = -3$$

Choice (D) is not true, and is the correct answer.

To confirm that choice (A) is incorrect:

$$y = \frac{3}{2}x - 3$$

$$0 = \frac{3}{2}x - 3$$

$$\frac{3}{2}x = 3$$

$$x = 2$$

The  $x$ -intercept is  $x = 2$ , which is greater than the slope.

14) **⇒ C**

Since  $f(f(x)) = 10$ , from the table we determine that  $f(x) = 3$ . From the table,  $f(7) = 3$ . Therefore,  $x = 7$ .

15) **⇒ C**

Three laborers together complete one-third of the job in one hour. We represent the work done by each laborer in one hour as:

$$1^{\text{st}} \text{ laborer (fastest)} = \frac{4}{x}$$

$$2^{\text{nd}} \text{ laborer} = \frac{2}{x}$$

$$3^{\text{rd}} \text{ laborer} = \frac{1}{x}$$

The work done in one hour by three laborers together is:

$$\frac{4}{x} + \frac{2}{x} + \frac{1}{x} = \frac{1}{3}$$

$$\frac{7}{x} = \frac{1}{3}$$

$$x = 21$$

The work done by the fastest laborer in one hour is  $\frac{4}{21}$  of the job. To complete the entire job alone, it takes the fastest laborer:

$$\frac{4}{21}t = 1$$

$$t = \frac{21}{4} = 5\frac{1}{4} \text{ hours}$$

16) **⇒** 1

Represent the first number as  $x$ , and the second number as  $y$ .

$$\text{Their sum is: } x + y = \frac{5}{2}$$

This is equivalent to:  $2x + 2y = 5$

The second relation is:  $2x + 3y = 7$

Subtract the last two equations to give:  $y = 2$

Therefore,

$$x = \frac{1}{2} \rightarrow xy = 1$$

17) **⇒** 1

Rewrite the equation of the first line in slope-intercept form:

$$x + 2y = 7$$

$$2y = 7 - x$$

$$y = \frac{7}{2} - \frac{x}{2}$$

The slope of this line is  $-\frac{1}{2}$ , and the line perpendicular to this line will have slope  $m = 2$ . Rewrite the second equation in slope-intercept form:

$$2x - ky = 5$$

$$ky = 2x - 5$$

$$y = \frac{2}{k}x - \frac{5}{k}$$

For  $m = 2$  for this line,  $k = 1$ .

18) **⇒** 5

$$\cos C = \frac{\text{adjacent side}}{\text{hypotenuse}}$$

$$\cos C = \frac{1}{2} = \frac{d}{e} = \frac{d}{10}$$

$$d = 5$$

19) **⇒** 40

The solid is a rectangular prism with dimensions  $5 \text{ cm} \times 4 \text{ cm} \times 2 \text{ cm}$ .

$$\text{Volume} = 5 \text{ cm} \times 4 \text{ cm} \times 2 \text{ cm} = 40 \text{ cm}^3$$

20) **⇒** 2

The length of  $\overline{EB}$  is 1. The triangle  $\triangle EBC$  has a base of 1 unit, a height of 2 units, and an area equal to  $\frac{1}{2} \cdot 2 \cdot 1 = 1$ .

The same is true of  $\triangle CDE$ . The area of the shaded region is:

Area of CFAE

$$= \text{Area of ABCD} - (\text{Area of } \triangle EBC + \text{Area of } \triangle CDE)$$

$$= 4 - (1 + 1) = 2$$

### Calculator Portion

1) **⇒** B

The cost to produce CDs can be written as a linear function, with the  $y$ -intercept being cost of recording equipment and the slope being the cost per CD:

The cost per CD is \$0.59.

$$\text{Cost} = 250 + 0.59n$$

2) **⇒** D

A, B, C, and D are considered satisfactory grades:

$$\frac{\text{Number of satisfactory grades}}{\text{Total number of grades}}$$

$$= \frac{3 + 5 + 4 + 3}{3 + 5 + 4 + 3 + 3} = \frac{15}{18} = \frac{5}{6}$$

3) **⇒** D

At the same time of day, the ratio of the height of the man to the length of his shadow will be the same as the height of the pole to the length of its shadow. The ratio of the man's height to his shadow in inches is:

$$\frac{5 \text{ feet } 8 \text{ inches}}{8 \text{ feet}} = \frac{68 \text{ inches}}{96 \text{ inches}}$$

Conveniently, this is the same ratio we encounter

with the pole:

$$\frac{68 \text{ inches}}{96 \text{ inches}} = \frac{\text{height of pole}}{96 \text{ feet}}$$

$$\text{height of pole} = 68 \text{ feet}$$

4) **➡ B**

Let the total number of burgers sold be  $x$ . On Wednesday, 45 burgers, or 25% of burgers were sold:

$$0.25x = 45$$

$$x = 180$$

The number of burgers sold on Thursday is:

*Burgers sold on Thursday*

$$= 180 - (\text{burgers sold on Monday, Tuesday, and Wednesday})$$

$$= 180 - (40 + 50 + 45) = 45$$

5) **➡ B**

$$\frac{x}{12} - \frac{x+2}{4} < 0$$

$$\frac{x - (3x+6)}{12} < 0$$

$$\frac{-2x-6}{12} < 0$$

The denominator is always positive, so,

$$-2x - 6 < 0 \rightarrow -2x < 6 \rightarrow x > -3$$

6) **➡ C**

Convert the equation of the line to slope-intercept form:

$$4x - 2y - 10 = 0 \rightarrow 2y = 4x - 10 \rightarrow y = 2x - 5$$

Only choice (C) has the correct value for the  $y$ -intercept.

7) **➡ D**

$$x + \frac{1}{2}x + \frac{2}{3}x + \frac{1}{7}x = 388$$

$$\frac{42x + 21x + 28x + 6x}{42} = 388$$

$$\frac{97x}{42} = 388$$

$$x = 168$$

8) **➡ D**

$$f(x) = x^2 + ax + a$$

$$f(5) = 5^2 + 5a + a = 25 + 6a$$

9) **➡ B**

If each of the five teams plays every other team once, there are ten matches total:

-Team A plays Teams B, C, D, and E: 4 matches

-Team B plays Teams C, D, and E: 3 matches

-Team C plays Teams D and E: 2 matches

-Team D plays Team E: 1 match

The time per match is:

$$\text{Time per match} = \frac{100 \text{ minutes}}{10 \text{ matches}} = 10 \text{ minutes per match}$$

As each team plays four matches, each team plays for 40 minutes.

10) **➡ B**

As age increases, the growth per week decreases and length approaches a plateau.

11) **➡ B**

Combined average

$$= \frac{\text{Sum of scores in A} + \text{Sum of scores in B}}{\text{Total number of students}}$$

$$= \frac{(25)(86) + (15)(94)}{40} = \frac{3,560}{40} = 89$$

12) **➡ D**

$$\text{Revenue at } \$20 = \left(\frac{\$20}{\text{tour}}\right)(65,000 \text{ tours}) = \$1,300,000$$

$$\text{Revenue at } \$5 = \left(\frac{\$5}{\text{tour}}\right)(120,000 \text{ tours}) = \$600,000$$

The difference is \$700,000.

13) **➡ C**

The cost of 8 pencils is the difference between the totals:

$$\text{Cost of 8 pencils} = 8.45 - 6.05 = 2.40$$

$$\text{Cost of 1 pencil} = 0.30$$

Let  $y$  be the cost of the pen:

$$y = 6.05 - 16(0.30) = 1.25$$

14) **➡ D**

$$A - B = 4, A + B = 16$$

Adding these two equations gives:

$$2A = 20$$

$$A = 10$$

15) **➡ C**

The electrician works 45 hours at 90 minutes per job:

$$\frac{45 \text{ hours}}{1.5 \frac{\text{hours}}{\text{job}}} = 30 \text{ jobs}$$

The minimum commission  $x$  is:

$$(30)(75)x = 950$$

$$x = \frac{950}{2250} = 0.42$$

- 16) **▶▶▶** C

In 2010:

$$\text{Not poor} = \text{Total population} - \text{Number of poor}$$

$$= 305.7 - (15.7 + 22.6 + 3.7 + 3.5) = 260.2 \text{ million}$$

- 17) **▶▶▶** B

In 1995:

% of poor 65 and over:

$$= \frac{\text{Number of poor 65 and over}}{\text{Total number of poor}} \times 100\%$$

$$= \frac{3.3}{14.4 + 16.5 + 2.2 + 3.3} \times 100\% = 9\%$$

- 18) **▶▶▶** B

$$\text{Proportion poor} = \frac{\text{Number of poor}}{\text{Total population}}$$

In 1995:

$$\text{Proportion poor} = \frac{14.4 + 16.5 + 2.2 + 3.3}{263.7} = 0.138$$

In 2000:

$$\text{Proportion poor} = \frac{11.1 + 14.1 + 2.2 + 3.4}{275.9} = 0.112$$

In 2005:

$$\text{Proportion poor} = \frac{12.3 + 18.0 + 2.7 + 3.7}{293.1} = 0.125$$

In 2010:

$$\text{Proportion poor} = \frac{15.7 + 22.6 + 3.7 + 3.5}{305.7} = 0.149$$

- 19) **▶▶▶** C

The total number of wins needed to qualify is:

$$\text{Total wins needed} = (0.6)(30 \text{ games}) = 18 \text{ wins}$$

The season is two-thirds over. The number of games that have been played is:

$$\text{Games played} = \left(\frac{2}{3}\right)(30) = 20 \text{ games}$$

With 10 games remaining, the player must win:

$$\frac{8 \text{ wins}}{10 \text{ games}} \times 100\% = 80\%$$

- 20) **▶▶▶** B

Write the first equation in terms of  $x$ :

$$y - x = 3$$

$$y = x + 3$$

Substitute this equation into the quadratic:

$$x^2 - 7(3 + x) + 31 = 0$$

$$x^2 - 21 - 7x + 31 = 0$$

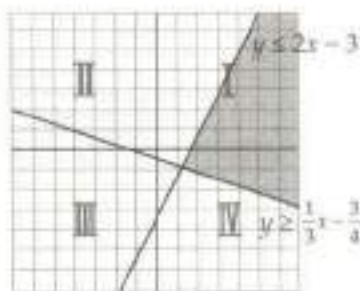
$$x^2 - 7x + 10 = 0$$

$$(x - 5)(x - 2) = 0 \rightarrow x = 5, 2$$

When  $x = 5$ ,  $y = 3 + 5 = 8$ , and when  $x = 2$ ,  $y = 5$

- 21) **▶▶▶** A

Write the inequalities in slope-intercept form and sketch them on a coordinate plane:



- 22) **▶▶▶** D

$$\text{Area of } \triangle ABC = \frac{1}{2} \times \text{base} \times \text{height}$$

$$\frac{1}{2}(AC)(BD) = \frac{1}{2}(AB)(CE)$$

$$(AC)(7) = (8)(9)$$

$$AC = \frac{72}{7} = 10\frac{2}{7}$$

- 23) **▶▶▶** C

The number of rides Connor can ride can be modeled as a linear inequality, with constant 4.50 (the price of admission), slope 0.79 (the price per ride), and  $y$  the maximum amount that can be spent:

$$4.50 + 0.79r \leq y$$

$$4.50 + 0.79r \leq 16$$

To find the maximum value for  $r$ , solve the inequality:

$$4.50 + 0.79r \leq 16$$

$$0.79r \leq 11.5$$

$$r \leq 14.6$$

The maximum number of rides is 14.

- 24) **▶▶▶** C

The  $y$ -intercept is the value of the function when  $x = 0$ :

$$y = (5000)(0.98)^0 = 5000$$

This is the amount in the account before any time has passed.



25) **⇒** A

Pat can inspect  $\frac{1}{5}$  of a case in one hour, and James can inspect  $\frac{1}{3}$  of a case in one hour. After Pat works alone for one hour, there is  $\frac{4}{5}$  of the case remaining. If  $x$  is the number of hours it takes Pat and James, working together, to inspect the remaining portion of the case:

$$x\left(\frac{1}{5} + \frac{1}{3}\right) = \frac{4}{5}$$

$$x\left(\frac{8}{15}\right) = \frac{4}{5}$$

$$x = \frac{3}{2} \text{ or } 1.5 \text{ hours}$$

26) **⇒** C

Convert the quadratic equation to vertex form:

$$y = -4x^2 + 16x + 6$$

$$y = -4x^2 + 16x - 16 + 6 + 16$$

$$y = -4(x^2 - 4x + 4) + 22$$

$$y = -4(x - 2)^2 + 22$$

The vertex is (2, 22). The maximum value for  $y$  is 22.

27) **⇒** C

In January, Peter has \$200 in his account. In May, he has \$400, a positive change of \$200.

28) **⇒** A

For the first company:

$$\text{Price} = 100(0.95)^t,$$

where  $t$  is the number of 6-month periods in 5 years:

$$\text{For 5 years, } t = 10:$$

$$\text{Price after 5 years} = 100(0.95)^{10} = 100(.5987) = 59.87$$

For the second company:

$$\text{Price} = 100(0.89)^t,$$

where  $t$  is the number of years.

$$\text{For } t = 5$$

$$\text{Price} = 100(0.89)^5 = 100(.5584) = 55.84$$

The difference is:

$$\text{Price difference} = 59.87 - 55.84 = 4.03$$

29) **⇒** D

Let  $x$  be the length of the sides of the original

square sheet. The volume of the box is the product of the length, height, and width:

$$\text{Volume} = 4(x - 8)(x - 8)$$

$$576 = 4(x - 8)^2$$

$$144 = (x - 8)^2 \rightarrow x - 8 = \pm 12 \rightarrow x = 20, -4$$

The length of the sides is 20 centimeters.

$$\text{Area} = (20\text{cm})(20\text{cm}) = 400 \text{ cm}^2$$

30) **⇒** B

$$\cos \frac{\pi}{3} = \frac{1}{2}$$

$$x - 1 = \frac{1}{2}$$

$$x = \frac{3}{2}$$

31) **⇒** 290

$$f(x) = x^2 + 1$$

$$f(4) = 4^2 + 1 = 17$$

$$f(f(4)) = f(17) = 17^2 + 1 = 290$$

32) **⇒** 5.20

$\overline{PQ}$  is longest when it is the hypotenuse of a triangle with one leg the diagonal of the face of the cube and the other leg an adjacent edge. The length of the diagonal  $d$  is:  $d^2 = 3^2 + 3^2 = 18$

The length of  $\overline{PQ}$  is:

$$\overline{PQ}^2 = d^2 + 3^2$$

$$\overline{PQ}^2 = 18 + 9$$

$$\overline{PQ}^2 = 27$$

$$\overline{PQ} = \sqrt{27} = 5.20$$

33) **⇒** 384

The slope of line  $l$  is  $\frac{2}{3}$  and the  $y$ -intercept is 0 because the line passes through the origin. The equation for line  $l$  is:

$$y = \frac{2}{3}x$$

Line  $l$  intersects the line  $y = \frac{1}{2}x - 4$  when:

$$\frac{2}{3}x = \frac{1}{2}x - 4$$

$$\frac{1}{6}x = -4$$

$$x = -24$$

$$y = \frac{2}{3}(-24) = -16$$

Therefore,  $xy = 384$

34) **⇒** 4

This question can be answered quickly by inspection and substituting small square numbers. We can also determine the answer by manipulation:

$$2\sqrt{x} - \sqrt{2x+1} - 1 = 0$$

$$2\sqrt{x} - 1 = \sqrt{2x+1}$$

Square both sides:

$$4x - 4\sqrt{x} + 1 = 2x + 1$$

$$2x - 4\sqrt{x} = 0$$

$$2(x - 2\sqrt{x}) = 0$$

Therefore,

$$x - 2\sqrt{x} = 0$$

$$x = 2\sqrt{x}$$

$$x^2 = 4x \rightarrow x = 4$$

35) **⇒** 0.184

Let  $P(A)$  be the probability that it snows tomorrow:

$$P(A) = 0.23$$

Let  $P(B)$  be the probability that it snows the day after tomorrow. Then the probability that it will not snow the day after tomorrow is:

$$P(\text{not } B) = 1 - P(B) = 1 - 0.2 = 0.8$$

Therefore,

$$P(A) \cdot P(\text{not } B) = (0.23)(0.8) = 0.184$$

36) **⇒** 240

Let  $x$  be the pre-sale price:

$$[(0.75)x]1.05 = 189$$

$$x = \frac{189}{(0.75)(1.05)}$$

$$x = 240$$

37) **⇒** 71

Let  $x$  be the number of pairs of boots and  $y$  be the number of pairs of shoes:

$$x + y = 500$$

$$10x + 3y = 2000$$

Substitute the first equation into the second:

$$10x + 3(500 - x) = 2000$$

$$7x = 500$$

$$x = 71.4$$

To determine precisely how many pairs of boots can be made, 71 or 72, test these numbers in the original equations:

$$x = 71, y = 429$$

$$10x + 3y = 10(71) + 3(429) = 1997$$

$$\text{If } x = 72, y = 428$$

$$10x + 3y = 10(72) + 3(428) = 2004$$

The number of pairs of boots is 71.

38) **⇒** 160

Boots are sold for \$300 per pair, and require 10 square feet per pair. The returns per pair are:

$$\text{Return per pair of boots} = \frac{\$300}{10 \text{ feet}^2}$$

Shoes are sold for \$75 per pair, and require 3 square feet per pair. The returns per pair are:

$$\text{Return per pair of shoes} = \frac{\$75}{3 \text{ feet}^2}$$

Boots and shoes should be produced according to the ratio:

$$\frac{x}{y} = \frac{6}{5}$$

Substitute this equation into the following equation to determine the number of pairs of boots:

$$10x + 3y = 2000$$

$$10x + 3\left(\frac{5}{6}x\right) = 2000$$

$$12.5x = 2000$$

$$x = 160$$

## SAT Practice Test 6: Answers &amp; Explanations

## Essay Test

## Evaluation

## Sample Response: Score 1/1/1

Chloe Medosch talks about how urbanization is leading to a decline of the older trees. She talks about how 87% of hollow-bearing trees population will decline over the next 300 years. how does she know this, yes it is an average but things can change in the 300 years either for better or worse. Chloe Medosch seems to be like a friendly environmental person because she talks about how she cares about the animals life and the fact that some animals live in trees and if the trees are dying the animals life can be in danger.

She mentions Canberra Australia and how the population is projected to double. She also mentions that due to that terrestrial environment could occur, what does she mean by saying that? Does she say it to notify us that something bad is going to happen or is it to let us know that a good change is going to occur? The author also mentions in the passage that they are getting data about how fast the new trees are growing and how the old trees are being taken down or dying. This is trying to let the reader know that she isn't the only one trying to save the trees and that there are more people concerned about the trees and how urbanization is slowly leading to the cause of trees getting cut down or dying because we as humans want to build more buildings in places where trees are planted so we cut them down without thinking about the damage we are doing to nature.

She mentions how we can save the trees not only for the animals but also for us because we need the oxygen. She talks about how we can develop strategies with the research available on how to protect old trees and how to help trees to grow. The last thing she mentions is that "We are not the only living beings on Earth." She says this because it is easy for us to forget about the animals, but that we should always keep in mind that we need them.

## Reading: 1

The student does show an understanding of the text's overall point, that tree populations are in danger, but does not mention that the author is mainly reporting on a study that predicted tree loss around one city. The student can improve by focusing very carefully on the title and the first few paragraphs of a source text in order to make sense of it.

## Analysis: 1

The response is mostly summary; the student needs to more thoroughly interpret the author's use of techniques. The student begins to do this by mentioning the author's use of data, but ends up summarizing the data rather than analyzing why the author thinks that the data will persuade the reader.

## Writing: 1

The student is "questioning the text," as evidenced by the interior questions in the second paragraph. As the student prepares for the SAT Essay Test, however, he or she must instead write claims and then support those claims with evidence from the text. The student should also work on sentence structure and punctuation in order to avoid run-on sentences.

## Sample Response: Score 4/4/3

People think about saving trees in the forest but sometimes we have to think about our own backyard. Chloe Medosch in her article "Out on a Limb: Dwindling Trees in Cities," uses data, reasoning, and an emotional call to action to give readers more concern about the trees around cities. Medosch is very persuasive that people need to work together on saving trees or planting them.

Medosch uses data from a study in Canberra, Australia where they figured out the average number of trees, and how much they were dying or getting taken out, and how fast the younger ones were growing. Then they predicted what would happen if everything kept going just the same,

Medosch also uses reasoning to make her case about trees. She says that "Only with a combined management strategy, including planting more hollow-bearing trees and forming more hollow-bearing habitats, would the population of trees increase over 250 years..." Medosch wants cities to plan so that they can make sure that they are planting enough trees which seems simple and appeals to the reader's logic. The reader can see that there is a solution. Medosch also brings the concept of innovation into the discussion, saying that "urbanization brings new innovation," such as putting up nesting boxes.

Finally, Medosch uses emotional facts and words to bring the reader on board. At the very beginning she says that we need the old trees for oxygen, but also 180 animal species depend on hollow trees for living. Later she says that losing the trees is "a terrifying thought," and then she mentions that birds, bats, squirrels and others live in the trees. Mentioning these animals, plus ourselves and the oxygen, makes the reader feel that the trees are important and feel anxious about losing them.

Trees are important, not just to birds and animals but to all of us. When our cities grow and take over areas with large, old trees, we need to think about the future. We won't be here, but other people will. Chloe Medosch uses powerful writing strategies to make us want to save trees and plant new ones.

### Evaluation

#### Reading: 4

The student demonstrates a strong understanding of a passage that includes complex numerical concepts such as extrapolation. He or she accurately paraphrases the data and the concepts presented (*Then they predicted what would happen if everything kept going just the same*) while correctly representing the author's central assertion (*Medosch is very persuasive that people need to work together on saving trees*).

#### Analysis: 4

The student successfully accomplishes the analytic task. He or she not only summarizes the use of data as evidence, but also describes their presentation in light of the effect they are intended to have on the reader (*The specific numbers sound really convincing*

*because they don't seem like guesses; seems simple and appeals to the reader's logic*). This response addresses all three important aspects of the argument's delivery—evidence, reasoning, and style—and their emotional and intellectual impact (*makes the reader feel that the trees are important and feel anxious about losing them*).

#### Writing: 3

The essay is clear and well-structured. The various points are helpfully organized into paragraphs, with functional introductory and concluding paragraphs. The concluding paragraph, however, is mostly a restatement of previously made points, and the essay as a whole suffers from repetitive sentence structure (*Medosch uses data; Medosch also uses reasoning; Finally, Medosch uses emotional facts*) and in this respect would be improved by greater variety in syntax. The student could also improve by using more sophisticated diction. For example, saying, "in addition to" rather than "plus" sounds more academic.

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# KALLIS' 2016 REDESIGNED SAT<sup>®</sup> PATTERN STRATEGY

# S



## Plan Your Approach

KALLIS' SAT<sup>®</sup> Pattern Strategy not only tells you what will be tested on the Redesigned SAT<sup>®</sup>, but also how to approach and answer each type of question quickly and confidently.

# A



## Keeping It Simple

Nothing weighs a study guide down more than lengthy descriptions and unnecessary charts and tables. That's why KALLIS' SAT<sup>®</sup> Pattern Strategy provides clear and concise explanations that will help you strengthen your testing skills and improve your score.

# T



## Practice, Practice, Practice

Once you have mastered the test-taking approaches outlined in KALLIS' SAT<sup>®</sup> Pattern Strategy, dive into our six full-length practice tests. Put your skills to the test by completing the hundreds of reading, writing, and mathematics questions included in this study guide.



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