SAT Math Level 1 Subject Test Practice Paper

1. If $3^{4x} = 81$, then $x =$

- A. $\frac{3}{4}$
- B. 1
- C. 3
- D. $\frac{9}{4}$
- E. 9

2. If $\frac{a}{b} = 0.625$, then $\frac{b}{a}$ is equal to which of the following?

- A. 1.6
- B. 2.67
- C. 2.7
- D. 3.33
- E. 4.25

3. If $x - 3 = 3(1 - x)$, then what is the value of x ?

- A. 0.33
- B. 0.67
- C. 1.5
- D. 1.67
- E. 2.25

4. Points *A, B, C*, and *D* are arranged on a line in that order. If $AC = 13$, $BD = 14$, and $AD = 21$, then $BC =$

- A. 12
- B. 9
- C. 8
- D. 6
- E. 3

5. The distance between the points (-3, 5) and (-3, -12) is

- A. $\sqrt{17}$
- B. 7
- C. 9

D. 17

E. $\sqrt{60}$

6. At what coordinates does the graph of $3y + 5 = x - 1$ intersect the y-axis?

A. (0, -2)

B. (0, -1)

C. $\left(0, \frac{1}{3}\right)$

D. (-2, 0)

E. (-6, 0)

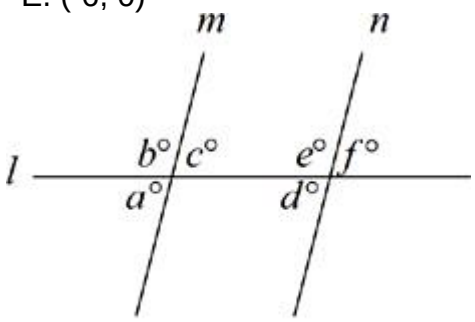


Figure 1

7. In Figure 1, if $m \| n$ and $b = 125$, then $d + f =$

A. 50°

B. 55°

C. 110°

D. 130°

E. 180°

8. If the cube root of the square root of a number is 2, what is the number?

A. 16

B. 64

C. 128

D. 256

E. 1,024

9. If $7a + 2b = 11$ and $a - 2b = 5$, then what is the value of a ?

A. -2.0

B. -1.5

C. -0.5

D. 1.4

E. 2

10. If $f(x) = x^2 - 3x$, then $f(-3)$ =

A. 0

B. 3.3

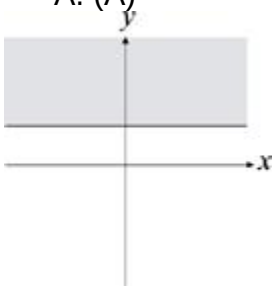
C. 6

D. 9.9

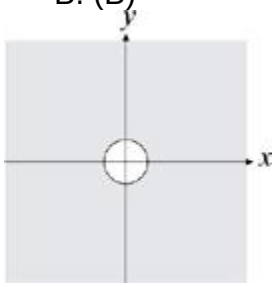
E. 18

11. Which of the following could be the graph of $|y \geq 3$?

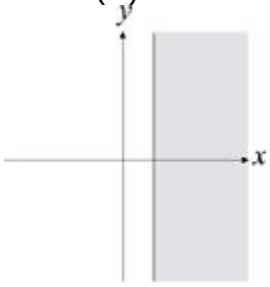
A. (A)



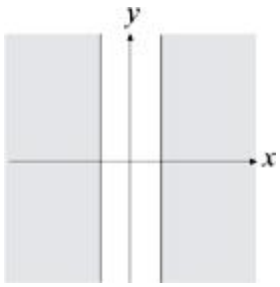
B. (B)



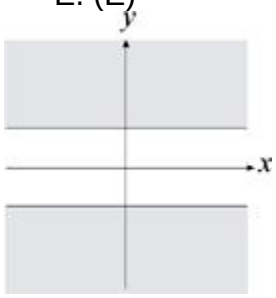
C. (C)



D. (D)



E. (E)



12. If *m* varies directly as *n* and $\frac{m}{n}$ = 5, then what is the value of *m* when *n* = 2.2 ?

A. 0.44

B. 2.27

C. 4.1

D. 8.2

E. 11

13. What is the slope of the line given by the equation 3*y* - 5 = 7 - 2*x* ?

A. -2

B. $-\frac{2}{3}$

C. $\frac{3}{2}$

D. 2

E. 6

14. $\frac{\left(n^3\right)^6 \times \left(n^4\right)^5}{n^2}$

A. n^9

B. n^{16}

C. n^{19}

D. n^{36}

E. n^{40}

15. If $f(x) = 5 - 2x$ and $g(x) = x^2 + 7$, then $f(g(2)) =$

- A. -17
- B. -8
- C. 8
- D. 17
- E. 24

16. Students in a certain research program are either engineers or doctoral candidates; some students graduate each year. In a certain year, no doctoral candidates graduate. Which of the following statements must be true?

- A. The program then contains more engineers than doctoral candidates.
- B. Doctoral candidates are poorer students than engineers.
- C. More doctoral candidates will graduate in following years.
- D. Every student graduating in that year is an engineer.
- E. All engineers in the program graduate in that year.

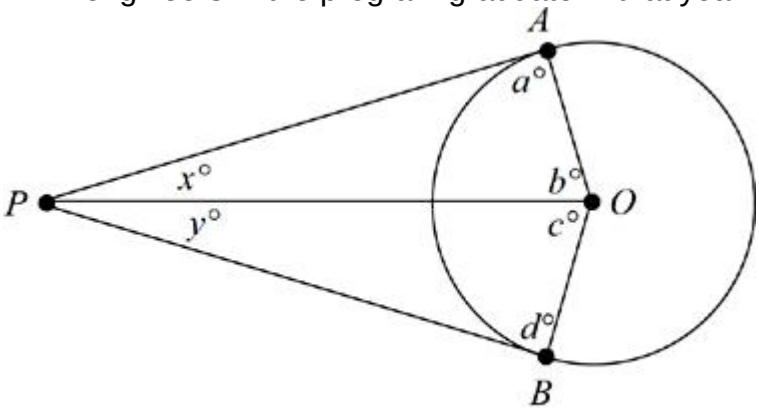


Figure 2

17.

In Figure 2, if segments *PA* and *PB* are tangent to the circle with center *O* at *A* and *B*, respectively, then which of the following must be true?

I. $PB > PO$

II. $x = y$

III. $x + y + b + c = a + d$

- A. I only
- B. II only
- C. I and II only
- D. II and III only
- E. I, II, and III

18. Rodney is starting a small business selling pumpkins. If he spends $200 on supplies and sells his pumpkins for $4 each, which of the following functions correctly shows the amount of money Rodney has gained or lost when he has sold x pumpkins?

- A. $f(x) = 800x$
- B. $f(x) = 200x + 4$
- C. $f(x) = 200x - 4$
- D. $f(x) = 4x + 200$
- E. $f(x) = 4x - 200$

19. If the perimeter of a square is 60, what is the area of the square?

- A. $15\sqrt{2}$
- B. $20\sqrt{3}$
- C. 80
- D. 150
- E. 225

20. If $0 < n < 1$, then all of the following must be true EXCEPT

- A. $n^2 < n$
- B. $n < \sqrt{n}$
- C. $|n| < n$
- D. $-n < n$
- E. $n < \frac{1}{n}$

21. Which of the following lines is perpendicular to the line $3x - 2y = 16$?

- A. $3x - 2y = 25$
- B. $3x + 2y = 16$
- C. $2x - 3y = 7$
- D. $6x + 9y = 16$
- E. $6x - 9y = 32$

22. Where defined, $\left(\frac{x^2-4}{4}\right)\left(\frac{8}{2x+4}\right) =$

- A. 1
- B. x
- C. $x - 2$
- D. $x + 2$
- E. $2x^2 - 8$

23. The surface area of a sphere is 75 square centimeters. What is the volume of the sphere, in cubic centimeters?

- A. 2.443
- B. 5.968
- C. 14.581
- D. 18.75
- E. 61.075

24. If $\angle A$ and $\angle B$ are acute angles, then $\angle A$ and $\angle B$ CANNOT be

- A. vertical angles
- B. complementary angles
- C. supplementary angles
- D. congruent angles
- E. adjacent angles

25. If $i^2 = -1$, then $\frac{(3-i)^2}{2}$

- A. 3 - 2*i*
- B. 4 - 3*i*
- C. 7 + 2*i*
- D. 8 - 6*i*
- E. 9 + 6*i*

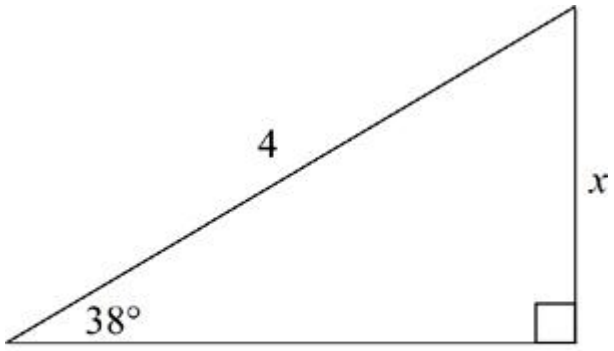


Figure 3

26.
In Figure 3, what is the value of *x* ?

- A. 0.62
- B. 0.79
- C. 2.46

D. 3.13

E. 3.15

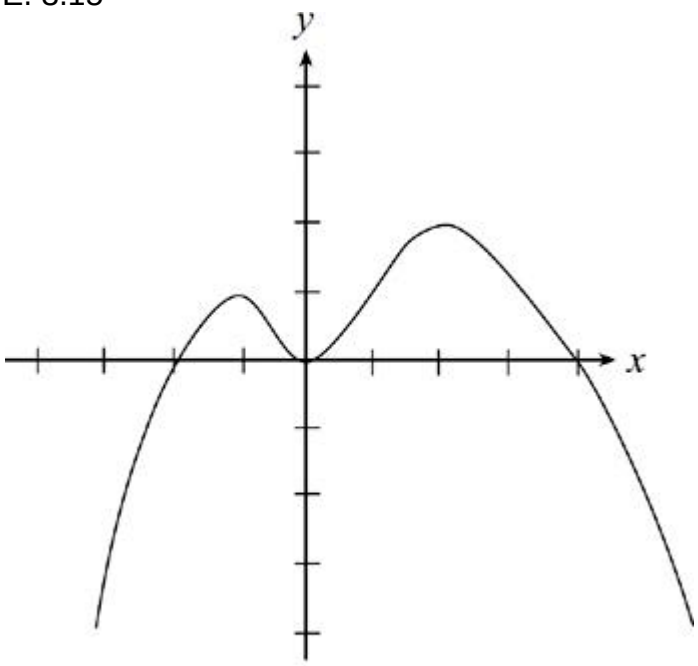


Figure 4

27. If Figure 4 shows part of the graph of $y = f(x)$, then which of the following could be the range of $f(x)$?

A. $\{y: y \leq 2\}$

B. $\{y: y = -2, 3\}$

C. $\{y: y = 1, 2\}$

D. $\{y: -2 \leq y \leq 3\}$

E. $\{y: 1 \leq y \leq 2\}$

28. Joan and Grant are shopping at the deli for lunchmeat. If Joan buys 3 pounds of bologna for $2.80 per pound, and Grant buys 2 pounds of pastrami for $1.80 per pound, then what is the average (arithmetic mean) price per pound of all the lunchmeat they buy?

A. $2.30

B. $2.40

C. $3.60

D. $4.60

E. $8.40

29. If a cube and a sphere intersect at exactly eight points, then which of the following must be true?

- A. The sphere is inscribed in the cube.
- B. The cube is inscribed in the sphere.
- C. The diameter of the sphere is equal in length to an edge of the cube.
- D. The sphere and the cube have equal volumes.
- E. The sphere and the cube have equal surface areas.

30. If Set *S* consists of ten distinct positive integers, which of the following could be a member of *S* ?

I. The mean of the members of *S*
II. The median of the members of *S*
III. The mode of the members of *S*

- A. None
- B. I only
- C. II only
- D. I and III
- E. II and III

31. If $f(x) = 2x^2 + 2$, then what is the value of $f(x + 4)$?

- A. $2x^2 + 4$
- B. $2x^2 + 6$
- C. $2x^2 + x + 6$
- D. $2x^2 + 16x + 32$
- E. $2x^2 + 16x + 34$

32. If $\frac{9\left(\sqrt{x}-2\right)^2}{4} = 6.25$, then *x* could equal which of the following?

- A. 0.11
- B. 2.42
- C. 9
- D. 10.24
- E. 13.76

33. If $0° < \theta < 90°$, then $\left(\frac{1}{\cos\theta} - \frac{\sin\theta}{\tan\theta}\right)(\cos\ °) =$

- A. $\cos\theta$
- B. $\sin\theta$

C. $\tan \theta$

D. $\sin^2 \theta$

E. $\tan^2 \theta$

34. If $f(x) = 2x^5$, then which of the following must be true?

I. $f(x) = f(-x)$

II. $f(-x) = -f(x)$

III. $\frac{1}{2} f(x) = f(\frac{1}{2}x)$

A. I only

B. II only

C. I and III only

D. II and III only

E. I, II, and III

35. What is the domain of $f(x) = \frac{(x-3)^2}{5x\sqrt{x+10}}$?

A. All real numbers

B. All real numbers less than 2

C. All real numbers between -10 and 0

D. All real numbers greater than -7

E. All real numbers greater than -10 except 0

36. How many distinct 3-digit numbers contain only nonzero digits?

A. 909

B. 899

C. 789

D. 729

E. 504

37. At what points does the circle given by the equation $(y - 3)^2 + (x - 2)^2 = 16$ intersect the y-axis?

A. (0, -5.66) and (0, 5.66)

B. (0, -0.46) and (0, 6.46)

C. (0, -1.00) and (0, 7.00)

D. (-0.65, 0) and (4.65, 0)

E. (-2.00, 0) and (6.00, 0)

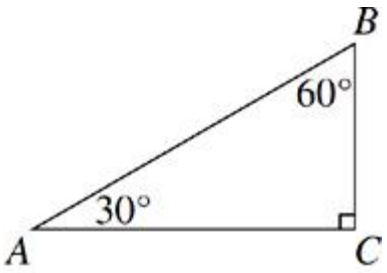


Figure 5

38.

In Figure 5, $\angle ABC$ can be rotated around either leg to form a cone. Which of the following could be the ratio of the volumes of these cones?

- A. $|n| : 1$
- B. 2:01
- C. 3:01
- D. 4:01
- E. 9:01

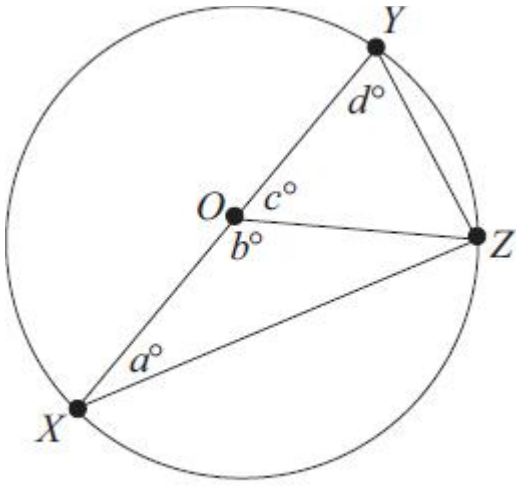


Figure 6

39.

In Figure 6, in the circle with center O, which of the following is equal to c ?

- A. $\frac{b}{2}$
- B. d
- C. $2a$
- D. $\frac{a+d}{2}$
- E. $b - 90$

40. A researcher finds that an ant colony's population increases by exactly 8% each month. If the colony has an initial population of 1,250 insects, which of the following is the nearest approximation of the population of the colony 2 years later?

- A. 7,926
- B. 5,832
- C. 3,650
- D. 2,400
- E. 1,458

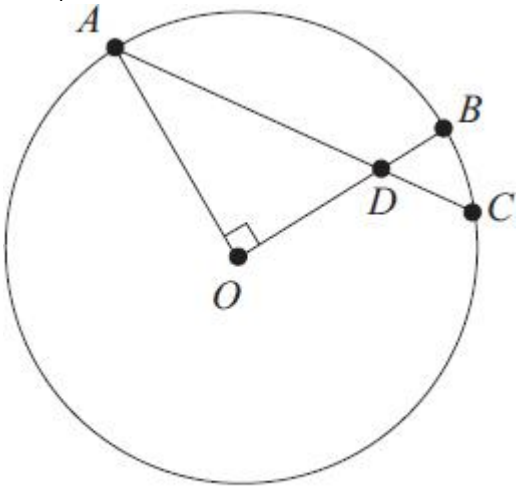


Figure 7

41. In Figure 7, if the circle with center O has a radius of 4 and $OD = 3DB$, then $\sin \angle A =$

- A. 0.6
- B. 0.71
- C. 0.8
- D. 0.87
- E. 1

42. Which of the following represents the solution set of $|x^3 - 8| \leq 5$

- A. $-1.71 \leq x \leq 1.71$
- B. $0 \leq x \leq 3.21$
- C. $0.29 \leq x \leq 3.71$
- D. $1.44 \leq x \leq 2.35$
- E. $6.29 \leq x \leq 9.71$

43. Six congruent circles are arranged so that each circle is externally tangent to at least two other circles. The centers of these six circles are then connected to form a polygon. If each circle has a radius of 2, then what is the perimeter of this polygon?

- A. 6
- B. 12
- C. 24
- D. 36
- E. 48

44. What is the distance between the *x*-intercept and the *y*-intercept of the line given by the equation $2y = 6 - x$?

- A. 3.67
- B. 6.32
- C. 6.71
- D. 7.29
- E. 8.04

45. The point (5, -10) is at a distance of 26 from point *Q*, and the point (2, -10) is at a distance of 25 from *Q*. Which of the following could be the coordinates of *Q* ?

- A. (-5, 14)
- B. (-3, 18)
- C. (-1, 19)
- D. (0, 21)
- E. (2, 16)

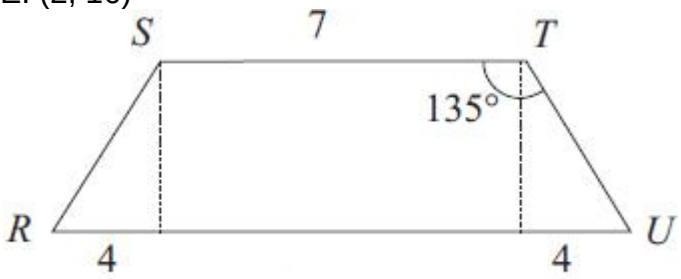


Figure 8

46.

Note: Figure not drawn to scale.

In Figure 8, what is the area of isosceles trapezoid *RSTU* ?

- A. 12
- B. 18
- C. 24
- D. 44
- E. 56

47. Which of the following has the greatest value?

- A. 1.73^{999}
- B. 2^{799}
- C. 3^{500}
- D. 4^{400}
- E. 250^{100}

48. If $f(x) = 4x^2 + 4x + 4$, which of the following is equal to $f(-3.5)$?

- A. $f(-14)$
- B. $f(-7)$
- C. $f(-0.5)$
- D. $f(0.5)$
- E. $f(2.5)$

49. A fair cube is one that is labeled with the numbers 1, 2, 3, 4, 5, and 6, such that there is an equal probability of rolling each of those numbers. If Jade rolls two fair cubes at the same time, then what is the probability that the product of the two numbers she rolls will be greater than 18 ?

- A. 0.222
- B. 0.278
- C. 0.5
- D. 0.6
- E. 0.778

50. If $z = \log_x (y^x)$, then $x^z =$

- A. x^x
- B. y^x
- C. xy^x
- D. y^{2x}
- E. x^2y