SAT MATHS Practice Paper 6

Question 1: Calculator permitted, grid-in response

$$y \leq -15x + 3000$$
$$y \leq 5x$$

In the xy-plane, if a point with coordinates (a, b) lies in the solution set of the system of inequalities above, what is the maximum possible value of b ?

Question 2: Calculator permitted, multiple choice

Dreams Recalled during One Week

	None	1 to 4	5 or more	Total
Group X	15	28	57	100
Group Y	21	11	68	100
Total	36	39	125	200

The data in the table above were produced by a sleep researcher studying the number of dreams people recall when asked to record their dreams for one week. Group X consisted of 100 people who observed early bedtimes, and Group Y consisted of 100 people who observed later bedtimes. If a person is chosen at random from those who recalled at least 1 dream, what is the probability that the person belonged to Group Y ?

A) $\dfrac{68}{100}$

B) $\dfrac{79}{100}$

C) $\dfrac{79}{164}$

D) $\dfrac{164}{200}$

Question 3: Calculator not permitted, multiple choice

If $3x - y = 12$, what is the value of $\dfrac{8^x}{2^y}$?

A) 2^{12}

B) 4^4

C) 8^2

D) The value cannot be determined from the information given.

Question 4: Calculator not-permitted, multiple choice

If $x > 3$, which of the following is equivalent

to $\dfrac{1}{\dfrac{1}{x+2} + \dfrac{1}{x+3}}$?

A) $\dfrac{2x+5}{x^2+5x+6}$

B) $\dfrac{x^2+5x+6}{2x+5}$

C) $2x+5$

D) x^2+5x+6

Question 5: Calculator permitted, grid-in response (see note)

Jessica opened a bank account that earns 2 percent interest compounded annually. Her initial deposit was $100, and she uses the expression $100(x)^t$ to find the value of the account after t years.

Jessica's friend Tyshaun found an account that earns 2.5 percent interest compounded annually. Tyshaun made an initial deposit of $100 into this account at the same time Jessica made a deposit of $100 into her account. After 10 years, how much more money will Tyshaun's initial deposit have earned than Jessica's initial deposit? (Round your answer to the nearest cent and ignore the dollar sign when gridding your response.)

Question 6: Calculator not-permitted, multiple choice

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Which of the following complex numbers is

equivalent to $\dfrac{3 - 5i}{8 + 2i}$? (Note: $i = \sqrt{-1}$)

A) $\dfrac{3}{8} - \dfrac{5i}{2}$

B) $\dfrac{3}{8} + \dfrac{5i}{2}$

C) $\dfrac{7}{34} - \dfrac{23i}{34}$

D) $\dfrac{7}{34} + \dfrac{23i}{34}$

Question 7: Calculator permitted, multiple choice

$$x^2 + y^2 + 4x - 2y = -1$$

The equation of a circle in the xy-plane is shown above. What is the radius of the circle?

A) 2

B) 3

C) 4

D) 9

Question 8: Calculator not-permitted, multiple choice

$$R = \frac{F}{N+F}$$

A website uses the formula above to calculate a seller's rating, R, based on the number of favorable reviews, F, and unfavorable reviews, N. Which of the following expresses the number of favorable reviews in terms of the other variables?

A) $F = \dfrac{RN}{R-1}$

B) $F = \dfrac{RN}{1-R}$

C) $F = \dfrac{N}{1-R}$

D) $F = \dfrac{N}{R-1}$

Question 9: Calculator permitted, multiple choice

The 22 students in a health class conducted an experiment in which they each recorded their pulse rates, in beats per minute, before and after completing a light exercise routine. The dot plots below display the results.

Beats per minute before exercise

Beats per minute after exercise
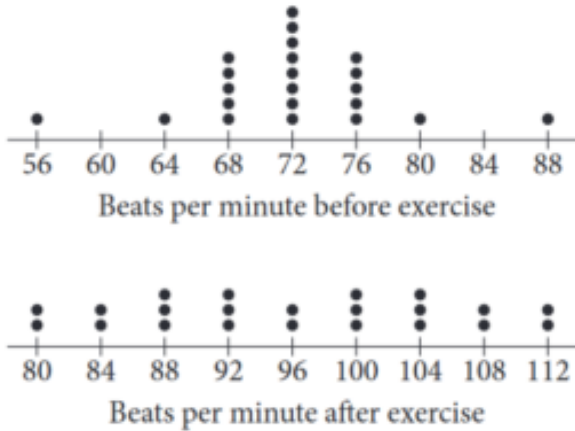
Let s_1 and r_1 be the standard deviation and range, respectively, of the data before exercise, and let s_2 and r_2 be the standard deviation and range, respectively, of the data after exercise. Which of the following is true?

A) $s_1 = s_2$ and $r_1 = r_2$

B) $s_1 < s_2$ and $r_1 < r_2$

C) $s_1 > s_2$ and $r_1 > r_2$

D) $s_1 \neq s_2$ and $r_1 = r_2$

Question 10: Calculator not-permitted, multiple choice

$$x = 2y + 5$$
$$y = (2x - 3)(x + 9)$$

How many ordered pairs (x, y) satisfy the system of equations shown above?

A) 0

B) 1

C) 2

D) Infinitely many

Question 11: Calculator permitted, grid-in response

$$q = \frac{1}{2}nv^2$$

The dynamic pressure q generated by a fluid moving with velocity v can be found using the formula above, where n is the constant density of the fluid. An aeronautical engineer uses the formula to find the dynamic pressure of a fluid moving with velocity v and the same fluid moving with velocity $1.5v$. What is the ratio of the dynamic pressure of the faster fluid to the dynamic pressure of the slower fluid?

Question 12: Calculator not-permitted, grid-in response

In triangle ABC, the measure of $\angle B$ is $90°$,

$BC = 16$, and $AC = 20$. Triangle DEF is similar to

triangle ABC, where vertices D, E, and F

correspond to vertices A, B, and C, respectively, and

each side of triangle DEF is $\frac{1}{3}$ the length of the

corresponding side of triangle ABC. What is the

value of $\sin F$?

Question 13: Calculator permitted, multiple choice

Roberto is an insurance agent who sells two types of policies: a $50,000 policy and a $100,000 policy. Last month, his goal was to sell at least 57 insurance policies. While he did not meet his goal, the total value of the policies he sold was over $3,000,000. Which of the following systems of inequalities describes x, the possible number of $50,000 policies, and y, the possible number of $100,000 policies, that Roberto sold last month?

A) $x + y < 57$

   $50{,}000x + 100{,}000y < 3{,}000{,}000$

B) $x + y > 57$

   $50{,}000x + 100{,}000y > 3{,}000{,}000$

C) $x + y < 57$

   $50{,}000x + 100{,}000y > 3{,}000{,}000$

D) $x + y > 57$

   $50{,}000x + 100{,}000y < 3{,}000{,}000$

Question 14: Calculator permitted, multiple choice

In order to determine if treatment X is successful in improving eyesight, a research study was conducted. From a large population of people with poor eyesight, 300 participants were selected at random. Half of the participants were randomly assigned to receive treatment X, and the other half did not receive treatment X. The resulting data showed that participants who received treatment X had significantly improved eyesight as compared to those who did not receive treatment X. Based on the design and results of the study, which of the following is an appropriate conclusion?

A) Treatment X is likely to improve the eyesight of people who have poor eyesight.

B) Treatment X improves eyesight better than all other available treatments.

C) Treatment X will improve the eyesight of anyone who takes it.

D) Treatment X will cause a substantial improvement in eyesight.

Question 15: Calculator not-permitted, grid-in response
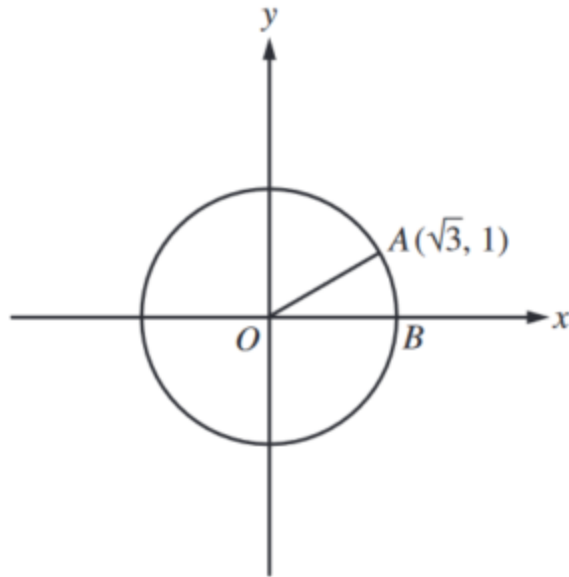
In the *xy*-plane above, O is the center of the circle, and the measure of $\angle AOB$ is $\dfrac{\pi}{a}$ radians. What is the value of a ?

Question 16

If $\dfrac{x-1}{3} = k$ and $k = 3$, what is the value of x ?

A) 2

B) 4

C) 9

D) 10

Question 17

For $i = \sqrt{-1}$, what is the sum $(7 + 3i) + (-8 + 9i)$?

A) $-1 + 12i$

B) $-1 - 6i$

C) $15 + 12i$

D) $15 - 6i$

Question 18

On Saturday afternoon, Armand sent m text messages each hour for 5 hours, and Tyrone sent p text messages each hour for 4 hours. Which of the following represents the total number of messages sent by Armand and Tyrone on Saturday afternoon?

A) $9mp$

B) $20mp$

C) $5m + 4p$

D) $4m + 5p$

Question 19

Kathy is a repair technician for a phone company. Each week, she receives a batch of phones that need repairs. The number of phones that she has left to fix at the end of each day can be estimated with the equation $P = 108 - 23d$, where P is the number of phones left and d is the number of days she has worked that week. What is the meaning of the value 108 in this equation?

A) Kathy will complete the repairs within 108 days.

B) Kathy starts each week with 108 phones to fix.

C) Kathy repairs phones at a rate of 108 per hour.

D) Kathy repairs phones at a rate of 108 per day.

Question 20

$$(x^2y - 3y^2 + 5xy^2) - (-x^2y + 3xy^2 - 3y^2)$$

Which of the following is equivalent to the expression above?

A) $4x^2y^2$

B) $8xy^2 - 6y^2$

C) $2x^2y + 2xy^2$

D) $2x^2y + 8xy^2 - 6y^2$

Question 21

$$h = 3a + 28.6$$

A pediatrician uses the model above to estimate the height h of a boy, in inches, in terms of the boy's age a, in years, between the ages of 2 and 5. Based on the model, what is the estimated increase, in inches, of a boy's height each year?

A) 3

B) 5.7

C) 9.5

D) 14.3

Question 22

$$m = \frac{\left(\dfrac{r}{1,200}\right)\left(1 + \dfrac{r}{1,200}\right)^{N}}{\left(1 + \dfrac{r}{1,200}\right)^{N} - 1} P$$

The formula above gives the monthly payment m needed to pay off a loan of P dollars at r percent annual interest over N months. Which of the following gives P in terms of m, r, and N ?

A) $P = \dfrac{\left(\dfrac{r}{1,200}\right)\left(1 + \dfrac{r}{1,200}\right)^{N}}{\left(1 + \dfrac{r}{1,200}\right)^{N} - 1} m$

B) $P = \dfrac{\left(1 + \dfrac{r}{1,200}\right)^{N} - 1}{\left(\dfrac{r}{1,200}\right)\left(1 + \dfrac{r}{1,200}\right)^{N}} m$

C) $P = \left(\dfrac{r}{1,200}\right) m$

D) $P = \left(\dfrac{1,200}{r}\right) m$

Question 23

If $\dfrac{a}{b} = 2$, what is the value of $\dfrac{4b}{a}$?

A) 0

B) 1

C) 2

D) 4

Question 24

$$3x + 4y = -23$$
$$2y - x = -19$$

What is the solution (x, y) to the system of equations above?

A) $(-5, -2)$

B) $(3, -8)$

C) $(4, -6)$

D) $(9, -6)$

Question 25

$$b = 2.35 + 0.25x$$

$$c = 1.75 + 0.40x$$

In the equations above, b and c represent the price per pound, in dollars, of beef and chicken, respectively, x weeks after July 1 during last summer. What was the price per pound of beef when it was equal to the price per pound of chicken?

A) $2.60

B) $2.85

C) $2.95

D) $3.35

Question 26

A line in the xy-plane passes through the origin and has a slope of $\frac{1}{7}$. Which of the following points lies on the line?

A) $(0, 7)$

B) $(1, 7)$

C) $(7, 7)$

D) $(14, 2)$

Question 27

If $x > 3$, which of the following is equivalent

to $\dfrac{1}{\dfrac{1}{x+2} + \dfrac{1}{x+3}}$?

A) $\dfrac{2x+5}{x^2+5x+6}$

B) $\dfrac{x^2+5x+6}{2x+5}$

C) $2x+5$

D) x^2+5x+6

Question 28

If $(ax+2)(bx+7) = 15x^2 + cx + 14$ for all values of x, and $a+b = 8$, what are the two possible values for c ?
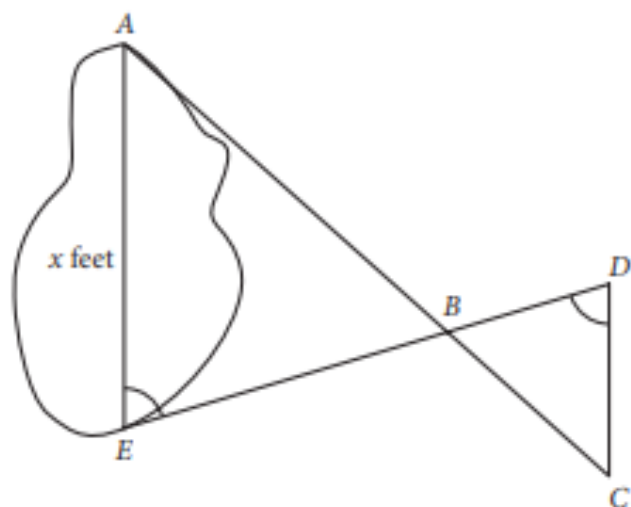
A) 3 and 5
B) 6 and 35
C) 10 and 21
D) 31 and 41

Question 29

If $3x - y = 12$, what is the value of $\dfrac{8^x}{2^y}$?

A) 2^{12}

B) 4^4

C) 8^2

D) The value cannot be determined from the information given.

Question 30

A summer camp counselor wants to find a length, x, in feet, across a lake as represented in the sketch above. The lengths represented by AB, EB, BD, and CD on the sketch were determined to be 1800 feet, 1400 feet, 700 feet, and 800 feet, respectively. Segments AC and DE intersect at B, and $\angle AEB$ and $\angle CDB$ have the same measure. What is the value of x ?