Name _____ SAT Prep Homework

Date _____

Write your answers on this sheet. Only turn this sheet in. Do not turn in a copy of the test.

Math Module 2: Higher Difficulty – 35 minutes

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Math

22 QUESTIONS

DIRECTIONS

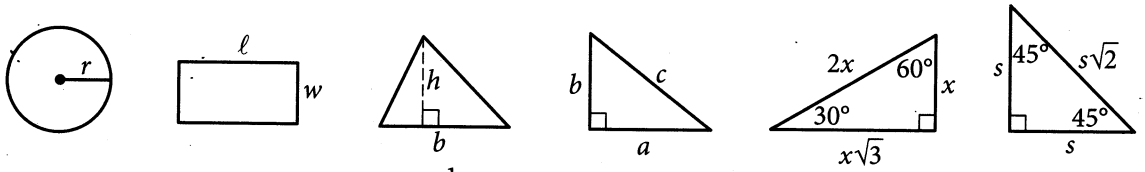
The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

NOTES

Unless otherwise indicated:

- All variables and expressions represent real numbers.
- Figures provided are drawn to scale.
- All figures lie in a plane.
- The domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE



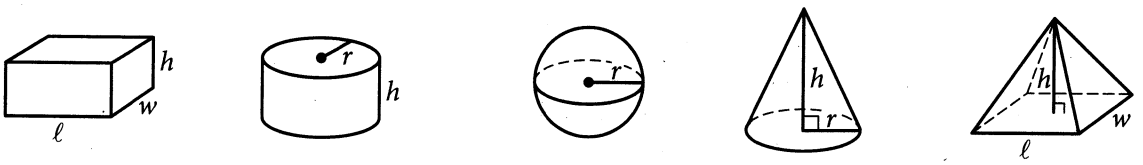
$A = \pi r^2$
$C = 2\pi r$

$A = \ell w$

$A = \frac{1}{2}bh$

$c^2 = a^2 + b^2$

Special Right Triangles



$V = \ell wh$

$V = \pi r^2 h$

$V = \frac{4}{3}\pi r^3$

$V = \frac{1}{3}\pi r^2 h$

$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π.

The sum of the measures in degrees of the angles of a triangle is 180.

CONTINUE

For multiple-choice questions, solve each problem, choose the correct answer from the choices provided, and then circle your answer in this book. Circle only one answer for each question. If you change your mind, completely erase the circle. You will not get credit for questions with more than one answer circled, or for questions with no answers circled.

For student-produced response questions, solve each problem and write your answer next to or under the question in the test book as described below.

- Once you've written your answer, circle it clearly. You will not receive credit for anything written outside the circle, or for any questions with more than one circled answer.
- If you find **more than one correct answer**, write and circle only one answer.
- Your answer can be up to 5 characters for a **positive** answer and up to 6 characters (including the negative sign) for a **negative** answer, but no more.
- If your answer is a **fraction** that is too long (over 5 characters for positive, 6 characters for negative), write the decimal equivalent.
- If your answer is a **decimal** that is too long (over 5 characters for positive, 6 characters for negative), truncate it or round at the fourth digit.
- If your answer is a **mixed number** (such as $3\frac{1}{2}$), write it as an improper fraction (7/2) or its decimal equivalent (3.5).
- Don't include **symbols** such as a percent sign, comma, or dollar sign in your circled answer.

CONTINUE

1

An airplane descends from an altitude of 9,500 feet to 5,000 feet at a constant rate of 400 feet per minute. What type of function best models the relationship between the descending airplane's altitude and time?

A) Decreasing exponential
B) Decreasing linear
C) Increasing exponential
D) Increasing linear

2

Line k is defined by $y = \frac{17}{7}x + 4$. Line j is parallel to line k in the xy-plane. What is the slope of line j?

A) $\frac{7}{17}$
B) $\frac{17}{7}$
C) 4
D) 17

3

Caleb used juice to make popsicles. The function $f(x) = -5x + 30$ approximates the volume, in fluid ounces, of juice Caleb had remaining after making x popsicles. Which statement is the best interpretation of the y-intercept of the graph of $y = f(x)$ in the xy-plane in this context?

A) Caleb used approximately 5 fluid ounces of juice for each popsicle.
B) Caleb had approximately 5 fluid ounces of juice when he began to make the popsicles.
C) Caleb had approximately 30 fluid ounces of juice when he began to make the popsicles.
D) Caleb used approximately 30 fluid ounces of juice for each popsicle.

4

A physics class is planning an experiment about a toy rocket. The equation $y = -16(x - 5.6)^2 + 502$ gives the estimated height y, in feet, of the toy rocket x seconds after it is launched into the air. Which of the following is the best interpretation of the vertex of the graph of the equation in the xy-plane?

A) This toy rocket reaches an estimated maximum height of 502 feet 16 seconds after it is launched into the air.
B) This toy rocket reaches an estimated maximum height of 502 feet 5.6 seconds after it is launched into the air.
C) This toy rocket reaches an estimated maximum height of 16 feet 502 seconds after it is launched into the air.
D) This toy rocket reaches an estimated maximum height of 5.6 feet 502 seconds after it is launched into the air.

5

The function f is defined by $f(x) = 4x + k(x - 1)$, where k is a constant, and $f(5) = 32$. What is the value of $f(10)$?

6

Triangles ABC and DEF are congruent, where A corresponds to D, and B and E are right angles. The measure of angle A is 18°. What is the measure of angle F?

A) 18°
B) 72°
C) 90°
D) 162°

CONTINUE

7

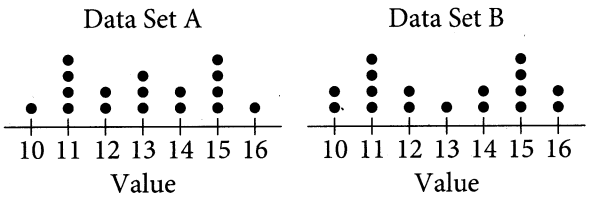
$$y \leq x + 7$$
$$y \geq -2x - 1$$

Which point (x, y) is a solution to the given system of inequalities in the xy-plane?

A) $(-14, 0)$
B) $(0, -14)$
C) $(0, 14)$
D) $(14, 0)$

8

The dot plots represent the distributions of values in data sets A and B.



Which of the following statements must be true?

I. The median of data set A is equal to the median of data set B.

II. The standard deviation of data set A is equal to the standard deviation of data set B.

A) I only
B) II only
C) I and II
D) Neither I nor II

9

A scientist initially measures 12,000 bacteria in a growth medium. 4 hours later, the scientist measures 24,000 bacteria. Assuming exponential growth, the formula $P = C(2)^{rt}$ gives the number of bacteria in the growth medium, where r and C are constants and P is the number of bacteria t hours after the initial measurement. What is the value of r?

A) $\frac{1}{12{,}000}$
B) $\frac{1}{4}$
C) 4
D) 12,000

10

A cube has a volume of 474,552 cubic units. What is the surface area, in square units, of the cube?

11

$$2(8x) + 4(7y) = 12$$
$$-2(8x) + 4(7y) = 12$$

The solution to the given system of equations is (x, y). What is the value of $8x + 7y$?

12

A certain town has an area of 4.36 square miles. What is the area, in square yards, of this town? (1 mile = 1,760 yards)

A) 404
B) 7,674
C) 710,459
D) 13,505,536

CONTINUE

13

Triangles PQR and LMN are graphed in the xy-plane. Triangle PQR has vertices P, Q, and R at (4, 5), (4, 7), and (6, 5), respectively. Triangle LMN has vertices L, M, and N at (4, 5), (4, 7 + k), and (6 + k, 5), respectively, where k is a positive constant. If the measure of $\angle Q$ is $t°$, what is the measure of $\angle N$?

A) $(90 - (t - k))°$

B) $(90 - (t + k))°$

C) $(90 - t)°$

D) $(90 + k)°$

14

A small business owner budgets $2,200 to purchase candles. The owner must purchase a minimum of 200 candles to maintain the discounted pricing. If the owner pays $4.90 per candle to purchase small candles and $11.60 per candle to purchase large candles, what is the maximum number of large candles the owner can purchase to stay within the budget and maintain the discounted pricing?

15

A square is inscribed in a circle. The radius of the circle is $\frac{20\sqrt{2}}{2}$ inches. What is the side length, in inches, of the square?

A) 20

B) $\frac{20\sqrt{2}}{2}$

C) $20\sqrt{2}$

D) 40

16

Which of the following equations represents a circle in the xy-plane that intersects the y-axis at exactly one point?

A) $(x - 8)^2 + (y - 8)^2 = 16$

B) $(x - 8)^2 + (y - 4)^2 = 16$

C) $(x - 4)^2 + (y - 9)^2 = 16$

D) $x^2 + (y - 9)^2 = 16$

17

$$y = 6x + 18$$

One of the equations in a system of two linear equations is given. The system has no solution. Which equation could be the second equation in the system?

A) $-6x + y = 18$

B) $-6x + y = 22$

C) $-12x + y = 36$

D) $-12x + y = 18$

18

Which expression is equivalent to $\frac{y + 12}{x - 8} + \frac{y(x - 8)}{x^2y - 8xy}$?

A) $\frac{xy + y + 4}{x^3y - 16x^2y + 64xy}$

B) $\frac{xy + 9y + 12}{x^2y - 8xy + x - 8}$

C) $\frac{xy^2 + 13xy - 8y}{x^2y - 8xy}$

D) $\frac{xy^2 + 13xy - 8y}{x^3y - 16x^2y + 64xy}$

19

$$\frac{20}{p} = \frac{20}{q} - \frac{20}{r} - \frac{20}{s}$$

The given equation relates the positive variables p, q, r, and s. Which of the following is equivalent to q?

A) $p + r + s$

B) $20(p + r + s)$

C) $\frac{prs}{pr + ps + rs}$

D) $\frac{prs}{20p + 20r + 20s}$

20

$$x(kx - 56) = -16$$

In the given equation, k is an integer constant. If the equation has no real solution, what is the least possible value of k?

21

$$2x + 3y = 7$$

$$10x + 15y = 35$$

For each real number r, which of the following points lies on the graph of each equation in the xy-plane for the given system?

A) $\left(\frac{r}{5} + 7, -\frac{r}{5} + 35\right)$

B) $\left(-\frac{3r}{2} + \frac{7}{2}, r\right)$

C) $\left(r, \frac{2r}{3} + \frac{7}{3}\right)$

D) $\left(r, -\frac{3r}{2} + \frac{7}{2}\right)$

22

A window repair specialist charges $220 for the first two hours of repair plus an hourly fee for each additional hour. The total cost for 5 hours of repair is $400. Which function f gives the total cost, in dollars, for x hours of repair, where $x \geq 2$?

A) $f(x) = 60x + 100$

B) $f(x) = 60x + 220$

C) $f(x) = 80x$

D) $f(x) = 80x + 220$

STOP

If you finish before time is called, you may check your work on this module only. Do not turn to any other module in the test.