

Math

27 QUESTIONS

DIRECTIONS

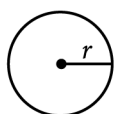
The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

NOTES

Unless otherwise indicated:

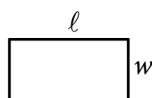
- All variables and expressions represent real numbers.
- Figures provided are drawn to scale.
- All figures lie in a plane.
- The domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

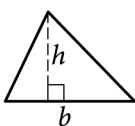


$$A = \pi r^2$$

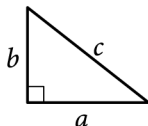
$$C = 2\pi r$$



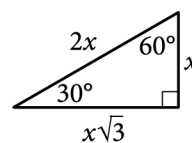
$$A = \ell w$$



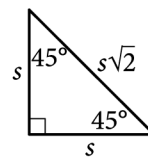
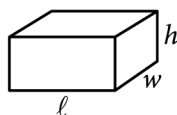
$$A = \frac{1}{2}bh$$



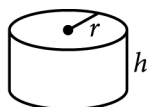
$$c^2 = a^2 + b^2$$



Special Right Triangles



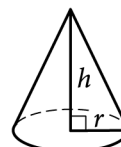
$$V = \ell wh$$



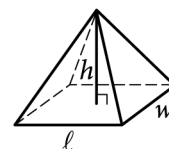
$$V = \pi r^2 h$$



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



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



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

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.

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 ($\frac{7}{2}$) or its decimal equivalent (3.5).
- Don't include **symbols** such as a percent sign, comma, or dollar sign in your circled answer.

1

There are 20 buttons in a bag: 8 white buttons, 2 orange buttons, and 10 brown buttons. If one of these buttons is selected at random, what is the probability of selecting a white button?

- A) $\frac{2}{20}$
- B) $\frac{8}{20}$
- C) $\frac{10}{20}$
- D) $\frac{12}{20}$

2

An employee at a restaurant prepares sandwiches and salads. It takes the employee 1.5 minutes to prepare a sandwich and 1.9 minutes to prepare a salad. The employee spends a total of 46.1 minutes preparing x sandwiches and y salads. Which equation represents this situation?

- A) $1.9x + 1.5y = 46.1$
- B) $1.5x + 1.9y = 46.1$
- C) $x + y = 46.1$
- D) $30.7x + 24.3y = 46.1$

3

In a box of pens, the ratio of black pens to red pens is 8 to 1. There are 40 black pens in the box. How many red pens are in the box?

- A) 5
- B) 8
- C) 40
- D) 320

4

The function f is defined by the equation $f(x) = 100x + 2$. What is the value of $f(x)$ when $x = 9$?

- A) 111
- B) 118
- C) 900
- D) 902

5

The length, y , of a white whale was 162 centimeters (cm) when it was born and increased an average of 4.8 cm per month for the first 12 months after it was born. Which equation best represents this situation, where x is the number of months after the whale was born and y is the length, in cm, of the whale?

- A) $y = 162x$
- B) $y = 162x + 162$
- C) $y = 4.8x + 4.8$
- D) $y = 4.8x + 162$

6

The perimeter of an isosceles triangle is 83 inches. Each of the two congruent sides of the triangle has a length of 24 inches. What is the length, in inches, of the third side?

7

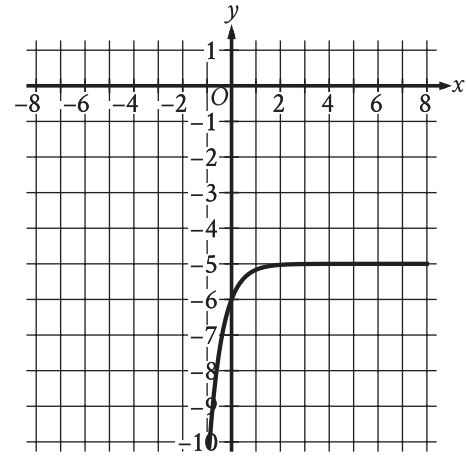
If $2 + x = 60$, what is the value of $16 + 8x$?

8

The population density of Worthington is 290 people per square mile. Worthington has a population of 92,800 people. What is the area, in square miles, of Worthington?

- A) 102,400
- B) 93,090
- C) 320
- D) 32

9

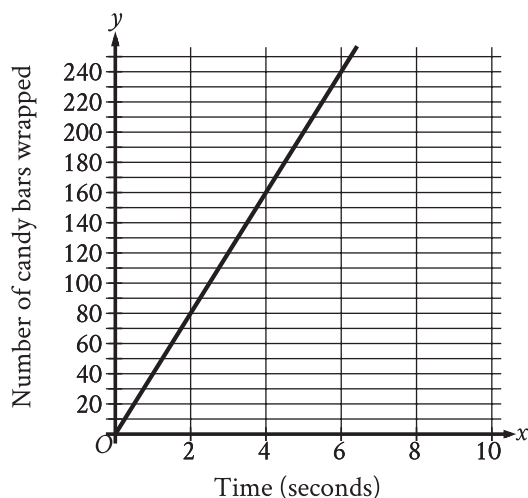


What is the y -intercept of the graph shown?

- A) $(0, -6)$
- B) $(-6, 0)$
- C) $(0, 0)$
- D) $(-5, -5)$

10

The graph shown models the number of candy bars a certain machine wraps with a label in x seconds.



According to the graph, what is the estimated number of candy bars the machine wraps with a label per second?

- A) 2
- B) 40
- C) 78
- D) 80

11

In a right triangle, the measure of one of the acute angles is 51° . What is the measure, in degrees, of the other acute angle?

- A) 6
- B) 39
- C) 49
- D) 51

12

2, 9, 14, 23, 32

What is the mean of the data shown?

- A) 14
- B) 16
- C) 17
- D) 32

13

The function f is defined by $f(x) = 6 + \sqrt{x}$. What is the value of $f(36)$?

14

$$x + 3y = 29$$

$$3y = 11$$

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

15

On a car trip, Rhett and Jessica each drove for part of the trip, and the total distance they drove was under 220 miles. Rhett drove at an average speed of 35 miles per hour (mph), and Jessica drove at an average speed of 40 mph. Which of the following inequalities represents this situation, where r is the number of hours Rhett drove and j is the number of hours Jessica drove?

- A) $35r + 40j > 220$
- B) $35r + 40j < 220$
- C) $40r + 35j > 220$
- D) $40r + 35j < 220$

16

$$b = 42cf$$

The given equation relates the positive numbers b , c , and f . Which equation correctly expresses c in terms of b and f ?

- A) $c = \frac{b}{42f}$
- B) $c = \frac{b - 42}{f}$
- C) $c = 42bf$
- D) $c = 42 - b - f$

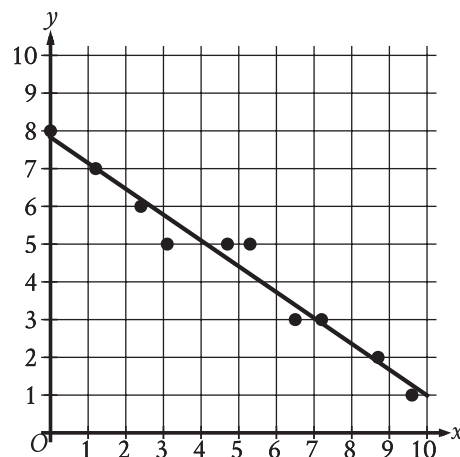
17

Davio bought some potatoes and celery. The potatoes cost \$0.69 per pound, and the celery cost \$0.99 per pound. If Davio spent \$5.34 in total and bought twice as many pounds of celery as pounds of potatoes, how many pounds of celery did Davio buy?

- A) 2
- B) 2.5
- C) 2.67
- D) 4

18

In the given scatterplot, a line of best fit for the data is shown.



Which of the following is closest to the slope of this line of best fit?

- A) 7
- B) 0.7
- C) -0.7
- D) -7

19

Scientists collected fallen acorns that each housed a colony of the ant species *P. ohioensis* and analyzed each colony's structure. For any of these colonies, if the colony has x worker ants, the equation $y = 0.67x + 2.6$, where $20 \leq x \leq 110$, gives the predicted number of larvae, y , in the colony. If one of these colonies has 58 worker ants, which of the following is closest to the predicted number of larvae in the colony?

- A) 41
- B) 61
- C) 83
- D) 190

20

What number is 40% greater than 115?

21

For the values j and k , the ratio of j to k is 11 to 12. If j is multiplied by 17, what is k multiplied by in order to maintain the same ratio?

22

Immanuel purchased a certain rare coin on January 1. The function $f(x) = 65(1.03)^x$, where $0 \leq x \leq 10$, gives the predicted value, in dollars, of the rare coin x years after Immanuel purchased it. What is the best interpretation of the statement " $f(8)$ is approximately equal to 82" in this context?

- A) When the rare coin's predicted value is approximately 82 dollars, it is 8% greater than the predicted value, in dollars, on January 1 of the previous year.
- B) When the rare coin's predicted value is approximately 82 dollars, it is 8 times the predicted value, in dollars, on January 1 of the previous year.
- C) From the day Immanuel purchased the rare coin to 8 years after Immanuel purchased the coin, its predicted value increased by a total of approximately 82 dollars.
- D) 8 years after Immanuel purchased the rare coin, its predicted value is approximately 82 dollars.

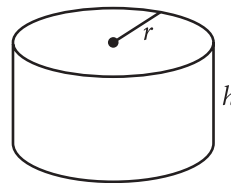
23

x	y
-6	$n + 184$
-3	$n + 92$
0	n

The table shows three values of x and their corresponding values of y , where n is a constant, for the linear relationship between x and y . What is the slope of the line that represents this relationship in the xy -plane?

- A) $-\frac{92}{3}$
- B) $-\frac{3}{92}$
- C) $\frac{n + 92}{-3}$
- D) $\frac{2n - 92}{3}$

24



The figure shown is a right circular cylinder with a radius of r and height of h . A second right circular cylinder (not shown) has a volume that is 392 times as large as the volume of the cylinder shown. Which of the following could represent the radius R , in terms of r , and the height H , in terms of h , of the second cylinder?

- A) $R = 8r$ and $H = 7h$
- B) $R = 8r$ and $H = 49h$
- C) $R = 7r$ and $H = 8h$
- D) $R = 49r$ and $H = 8h$

25

Each side of a 30-sided polygon has one of three lengths. The number of sides with length 8 centimeters (cm) is 5 times the number of sides n with length 3 cm. There are 6 sides with length 4 cm. Which equation must be true for the value of n ?

- A) $5n + 6 = 30$
- B) $6n + 6 = 30$
- C) $8n + 3n + 4n = 30$
- D) $8(5n) + 3n + 4(6) = 30$

26

Data set F consists of 55 integers between 170 and 290. Data set G consists of all the integers in data set F as well as the integer 10. Which of the following must be less for data set F than for data set G?

- I. The mean
- II. The median

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

27

A right circular cone has a height of 22 centimeters (cm) and a base with a diameter of 6 cm. The volume of this cone is $n\pi \text{ cm}^3$. What is the value of n ?

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.**

No Test Material On This Page