

Math

27 QUESTIONS

DIRECTIONS

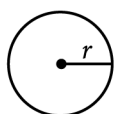
The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

NOTES

Unless otherwise indicated:

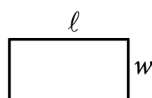
- All variables and expressions represent real numbers.
- Figures provided are drawn to scale.
- All figures lie in a plane.
- The domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

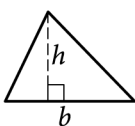


$$A = \pi r^2$$

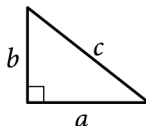
$$C = 2\pi r$$



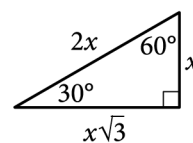
$$A = \ell w$$



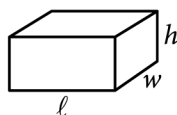
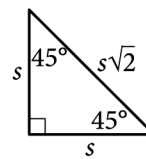
$$A = \frac{1}{2}bh$$



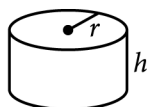
$$c^2 = a^2 + b^2$$



Special Right Triangles



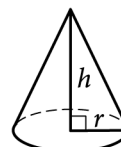
$$V = \ell wh$$



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



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



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



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

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

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

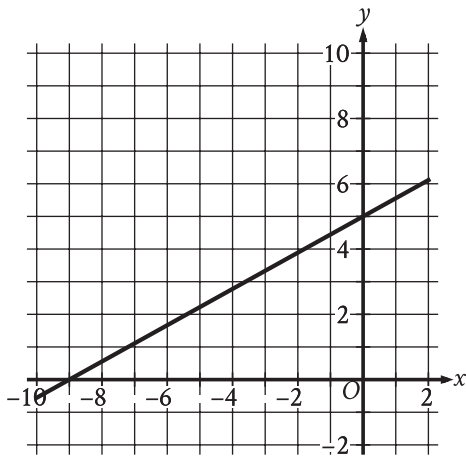
The sum of the measures in degrees of the angles of a triangle is 180.

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



What is the y -intercept of the line graphed?

- A) $(-5, 0)$
- B) $(0, 0)$
- C) $(0, 5)$
- D) $(0, 9)$

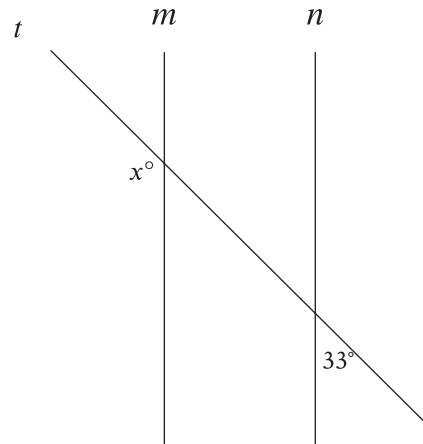
2

Type of store	Average number of employees
Warehouse store	365
Department store	213
Supermarket	130

For a certain region, the table shows the average number of store employees in 2016 by type of store. Based on the table, how much greater was the average number of store employees in warehouse stores than in supermarkets?

- A) 83
- B) 152
- C) 235
- D) 495

3



Note: Figure not drawn to scale.

In the figure, line m is parallel to line n , and line t intersects both lines. What is the value of x ?

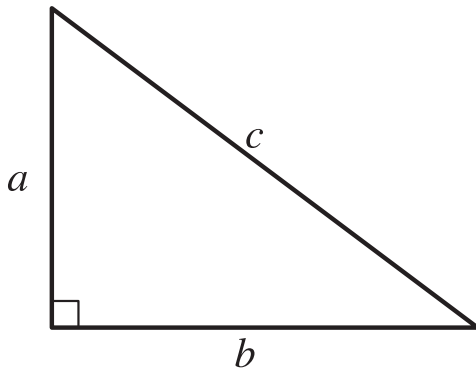
- A) 33
- B) 57
- C) 123
- D) 147

4

Sean rents a tent at a cost of \$11 per day plus a onetime insurance fee of \$10. Which equation represents the total cost c , in dollars, to rent the tent with insurance for d days?

- A) $c = 11(d + 10)$
- B) $c = 10(d + 11)$
- C) $c = 11d + 10$
- D) $c = 10d + 11$

5



Note: Figure not drawn to scale.

For the right triangle shown, $a = 4$ and $b = 5$. Which expression represents the value of c ?

- A) $4 + 5$
- B) $\sqrt{(4)(5)}$
- C) $\sqrt{4 + 5}$
- D) $\sqrt{4^2 + 5^2}$

6

The function g is defined by $g(x) = 6x$. For what value of x is $g(x) = 54$?

7

The function f is defined by $f(x) = 8x^3 + 4$. What is the value of $f(2)$?

8

The function f is defined by $f(x) = \frac{1}{10}x - 2$. What is the y -intercept of the graph of $y = f(x)$ in the xy -plane?

- A) $(-2, 0)$
- B) $(0, -2)$
- C) $\left(0, \frac{1}{10}\right)$
- D) $\left(\frac{1}{10}, 0\right)$

9

A producer is creating a video with a length of 70 minutes. The video will consist of segments that are 1 minute long and segments that are 3 minutes long. Which equation represents this situation, where x represents the number of 1-minute segments and y represents the number of 3-minute segments?

- A) $4xy = 70$
- B) $4(x + y) = 70$
- C) $3x + y = 70$
- D) $x + 3y = 70$

10

The function f is defined by $f(x) = 7x^3$. In the xy -plane, the graph of $y = g(x)$ is the result of shifting the graph of $y = f(x)$ down 2 units. Which equation defines function g ?

- A) $g(x) = \frac{7}{2}x^3$
- B) $g(x) = 7x^{\frac{3}{2}}$
- C) $g(x) = 7x^3 + 2$
- D) $g(x) = 7x^3 - 2$

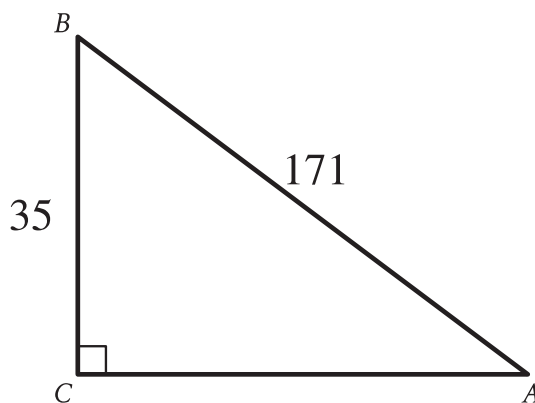
11

$$\begin{aligned}y &= -3x \\ 4x + y &= 15\end{aligned}$$

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

- A) 1
- B) 5
- C) 15
- D) 45

12



Note: Figure not drawn to scale.

In the right triangle shown, what is the value of $\sin A$?

- A) $\frac{1}{171}$
- B) $\frac{35}{171}$
- C) $\frac{171}{35}$
- D) 171

13

What is the area, in square centimeters, of a rectangle with a length of 34 centimeters (cm) and a width of 29 cm?

14

If $\frac{x}{y} = 4$ and $\frac{24x}{ny} = 4$, what is the value of n ?

15

A bowl contains 20 ounces of water. When the bowl is uncovered, the amount of water in the bowl decreases by 1 ounce every 4 days. If 9 ounces of water remain in this bowl, for how many days has it been uncovered?

- A) 3
- B) 7
- C) 36
- D) 44

16

If $9(4 - 3x) + 2 = 8(4 - 3x) + 18$, what is the value of $4 - 3x$?

- A) -16
- B) -4
- C) 4
- D) 16

17

A certain township consists of a 5-hectare industrial park and a 24-hectare neighborhood. The total number of trees in the township is 4,529. The equation $5x + 24y = 4,529$ represents this situation. Which of the following is the best interpretation of x in this context?

- A) The average number of trees per hectare in the industrial park
- B) The average number of trees per hectare in the neighborhood
- C) The total number of trees in the industrial park
- D) The total number of trees in the neighborhood

18

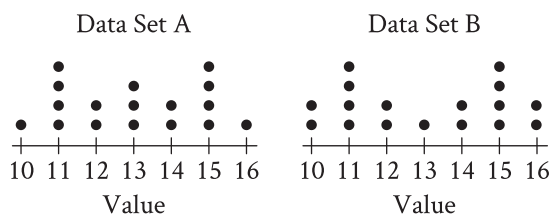
Which expression is equivalent to $a^{\frac{11}{12}}$,

where $a > 0$?

- A) $\sqrt[12]{a^{132}}$
- B) $\sqrt[144]{a^{132}}$
- C) $\sqrt[121]{a^{132}}$
- D) $\sqrt[11]{a^{132}}$

19

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

20

A circle has center O , and points R and S lie on the circle. In triangle ORS , the measure of $\angle ROS$ is 88° . What is the measure of $\angle RSO$, in degrees? (Disregard the degree symbol when entering your answer.)

21

The regular price of a shirt at a store is \$11.70. The sale price of the shirt is 80% less than the regular price, and the sale price is 30% greater than the store's cost for the shirt. What was the store's cost, in dollars, for the shirt? (Disregard the \$ sign when entering your answer. For example, if your answer is \$4.97, enter 4.97)

22

A cube has an edge length of 68 inches. A solid sphere with a radius of 34 inches is inside the cube, such that the sphere touches the center of each face of the cube. To the nearest cubic inch, what is the volume of the space in the cube not taken up by the sphere?

- A) 149,796
B) 164,500
C) 190,955
D) 310,800

23

$$y = 6x + 18$$

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) $-12x + y = 18$

24

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) $(90 - (t - k))^\circ$
- B) $(90 - (t + k))^\circ$
- C) $(90 - t)^\circ$
- D) $(90 + k)^\circ$

25

$$2x + 3y = 7$$

$$10x + 15y = 35$$

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

26

$$\frac{x^2}{\sqrt{x^2 - c^2}} = \frac{c^2}{\sqrt{x^2 - c^2}} + 39$$

In the given equation, c is a positive constant. Which of the following is one of the solutions to the given equation?

- A) $-c$
- B) $-c^2 - 39^2$
- C) $-\sqrt{39^2 - c^2}$
- D) $-\sqrt{c^2 + 39^2}$

27

The quadratic function g models the depth, in meters, below the surface of the water of a seal t minutes after the seal entered the water during a dive. The function estimates that the seal reached its maximum depth of 302.4 meters 6 minutes after it entered the water and then reached the surface of the water 12 minutes after it entered the water. Based on the function, what was the estimated depth, to the nearest meter, of the seal 10 minutes after it entered the water?

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