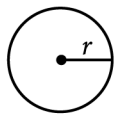# Math
27 QUESTIONS

DIRECTIONS

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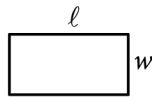
NOTES

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.
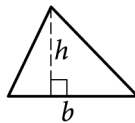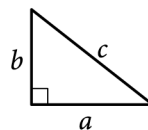
REFERENCE

$A = \pi r^2$
$C = 2\pi r$
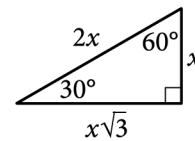
$A = \ell w$
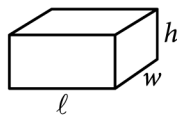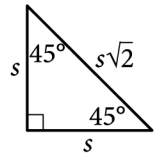
$A = \frac{1}{2}bh$
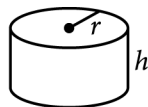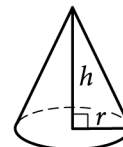
$c^2 = a^2 + b^2$

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.

CONTINUE

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31

CONTINUE

1

What is 10% of 470?

A) 37

B) 47

C) 423

D) 460

2

$$4x + 6 = 18$$

Which equation has the same solution as the given equation?

A) $4x = 108$

B) $4x = 24$

C) $4x = 12$

D) $4x = 3$

3

The total cost, in dollars, to rent a surfboard consists of a $25 service fee and a $10 per hour rental fee. A person rents a surfboard for t hours and intends to spend a maximum of $75 to rent the surfboard. Which inequality represents this situation?

A) $10t \leq 75$

B) $10 + 25t \leq 75$

C) $25t \leq 75$

D) $25 + 10t \leq 75$

4

The function g is defined by $g(x) = x^2 + 9$. For which value of x is $g(x) = 25$?

A) 4

B) 5

C) 9

D) 13

5

Each face of a fair 14-sided die is labeled with a number from 1 through 14, with a different number appearing on each face. If the die is rolled one time, what is the probability of rolling a 2?

A) $\dfrac{1}{14}$

B) $\dfrac{2}{14}$

C) $\dfrac{12}{14}$

D) $\dfrac{13}{14}$

6

A printer produces posters at a constant rate of 42 posters per minute. At what rate, in posters per <u>hour</u>, does the printer produce the posters?

CONTINUE

7

The function f is defined by the equation $f(x) = 7x + 2$. What is the value of $f(x)$ when $x = 4$?

8

A teacher is creating an assignment worth 70 points. The assignment will consist of questions worth 1 point and questions worth 3 points. Which equation represents this situation, where x represents the number of 1-point questions and y represents the number of 3-point questions?

A) $4xy = 70$

B) $4(x + y) = 70$

C) $3x + y = 70$

D) $x + 3y = 70$

9

Right triangles LMN and PQR are similar, where L and M correspond to P and Q, respectively. Angle M has a measure of 53°. What is the measure of angle Q ?

A) 37°

B) 53°

C) 127°

D) 143°

10

$$y = -3x$$
$$4x + y = 15$$

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

11

Which of the following equations is the most appropriate linear model for the data shown in the scatterplot?

A) $y = -1.9x - 10.1$

B) $y = -1.9x + 10.1$

C) $y = 1.9x - 10.1$

D) $y = 1.9x + 10.1$

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33

CONTINUE

12

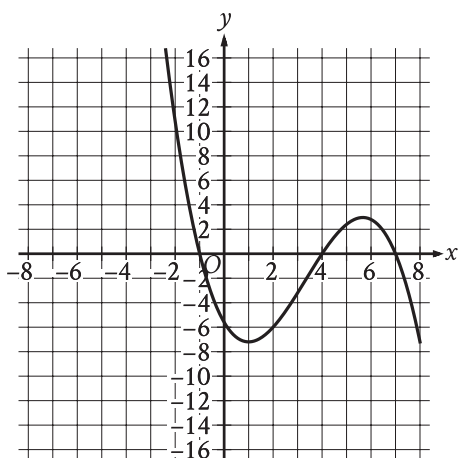The graph of $y = f(x)$ is shown, where the function f is defined by $f(x) = ax^3 + bx^2 + cx + d$ and a, b, c, and d are constants. For how many values of x does $f(x) = 0$?

A) One

B) Two

C) Three

D) Four

13

Vivian bought party hats and cupcakes for $71. Each package of party hats cost $3, and each cupcake cost $1. If Vivian bought 10 packages of party hats, how many cupcakes did she buy?

14

$$z^2 + 10z - 24 = 0$$

What is one of the solutions to the given equation?

15

Bacteria are growing in a liquid growth medium. There were 300,000 cells per milliliter during an initial observation. The number of cells per milliliter doubles every 3 hours. How many cells per milliliter will there be 15 hours after the initial observation?

A) 1,500,000

B) 2,400,000

C) 4,500,000

D) 9,600,000

16
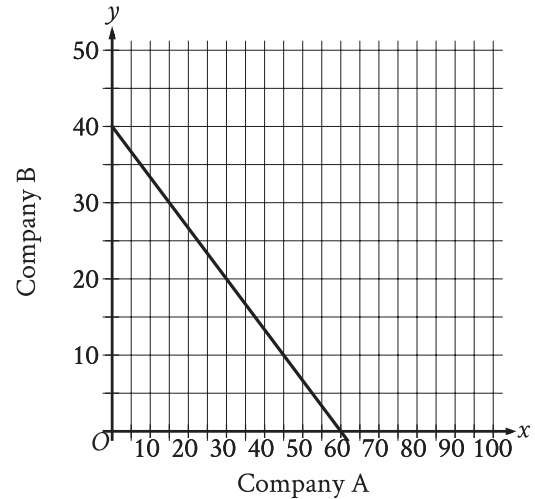
Which expression is equivalent to $6x^8y^2 + 12x^2y^2$?

A) $6x^2y^2(2x^6)$

B) $6x^2y^2(x^4)$

C) $6x^2y^2(x^6 + 2)$

D) $6x^2y^2(x^4 + 2)$

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34

CONTINUE

17

A neighborhood consists of a 2-hectare park and a 35-hectare residential area. The total number of trees in the neighborhood is 3,934. The equation $2x + 35y = 3,934$ 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 park

B) The average number of trees per hectare in the residential area

C) The total number of trees in the park

D) The total number of trees in the residential area

18

The graph shows the relationship between the number of shares of stock from Company A, x, and the number of shares of stock from Company B, y, that Simone can purchase. Which equation could represent this relationship?

A) $y = 8x + 12$

B) $8x + 12y = 480$

C) $y = 12x + 8$

D) $12x + 8y = 480$

19

Circle A has a radius of $3n$ and circle B has a radius of $129n$, where n is a positive constant. The area of circle B is how many times the area of circle A?

A) 43

B) 86

C) 129

D) 1,849

20

Data value	Frequency
6	3
7	3
8	8
9	8
10	9
11	11
12	9
13	0
14	6

The frequency table summarizes the 57 data values in a data set. What is the maximum data value in the data set?

21

A circle in the xy-plane has a diameter with endpoints $(2, 4)$ and $(2, 14)$. An equation of this circle is $(x - 2)^2 + (y - 9)^2 = r^2$, where r is a positive constant. What is the value of r ?

22

The measure of angle R is $\dfrac{2\pi}{3}$ radians. The measure of angle T is $\dfrac{5\pi}{12}$ radians greater than the measure of angle R. What is the measure of angle T, in <u>degrees</u>?

A) 75

B) 120

C) 195

D) 390

23

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

A) 404

B) 7,674

C) 710,459

D) 13,505,536

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CONTINUE ▶

24

x	y
18	130
23	160
26	178

For line h, the table shows three values of x and their corresponding values of y. Line k is the result of translating line h down 5 units in the xy-plane. What is the x-intercept of line k?

A) $\left(-\dfrac{26}{3}, 0\right)$

B) $\left(-\dfrac{9}{2}, 0\right)$

C) $\left(-\dfrac{11}{3}, 0\right)$

D) $\left(-\dfrac{17}{6}, 0\right)$

25

In the xy-plane, the graph of the equation $y = -x^2 + 9x - 100$ intersects the line $y = c$ at exactly one point. What is the value of c?

A) $-\dfrac{481}{4}$

B) -100

C) $-\dfrac{319}{4}$

D) $-\dfrac{9}{2}$

26

$$2x + 3y = 7$$
$$10x + 15y = 35$$

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

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

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

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

27

The perimeter of an equilateral triangle is 624 centimeters. The height of this triangle is $k\sqrt{3}$ centimeters, where k is a constant. What is the value of k?

STOP

**If you finish before time is called, you may check your work on this module only.
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38

No Test Material On This Page
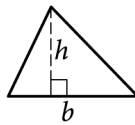
Math

27 QUESTIONS

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$C = 2\pi r$
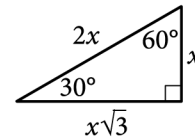
$A = \ell w$
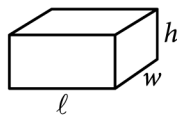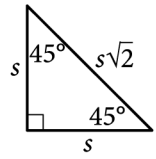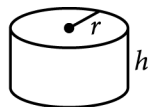
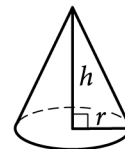$A = \dfrac{1}{2} bh$
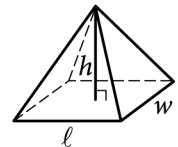
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$V = \ell wh$

$V = \pi r^2 h$

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

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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.

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CONTINUE

1

Tilly earns p dollars for every w hours of work. Which expression represents the amount of money, in dollars, Tilly earns for $39w$ hours of work?

A) $39p$

B) $\dfrac{p}{39}$

C) $p + 39$

D) $p - 39$

2

For a training program, Juan rides his bike at an average rate of 5.7 minutes per mile. Which function m models the number of minutes it will take Juan to ride x miles at this rate?

A) $m(x) = \dfrac{x}{5.7}$

B) $m(x) = x + 5.7$

C) $m(x) = x - 5.7$

D) $m(x) = 5.7x$

3

$$3x = 12$$
$$-3x + y = -6$$

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

A) -3

B) 6

C) 18

D) 30

4

$$s = 40 + 3t$$

The equation gives the speed s, in miles per hour, of a certain car t seconds after it began to accelerate. What is the speed, in miles per hour, of the car 5 seconds after it began to accelerate?

A) 40

B) 43

C) 45

D) 55

5
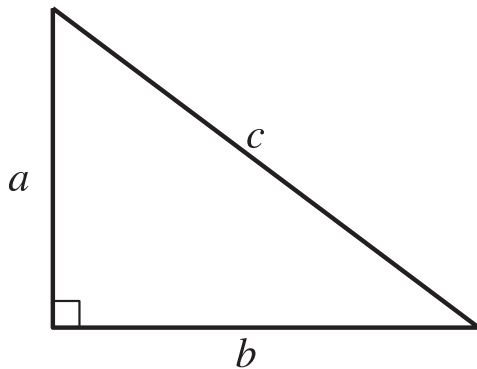
Note: Figure not drawn to scale.

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

$$4x + 5 = 165$$

What is the solution to the given equation?

7
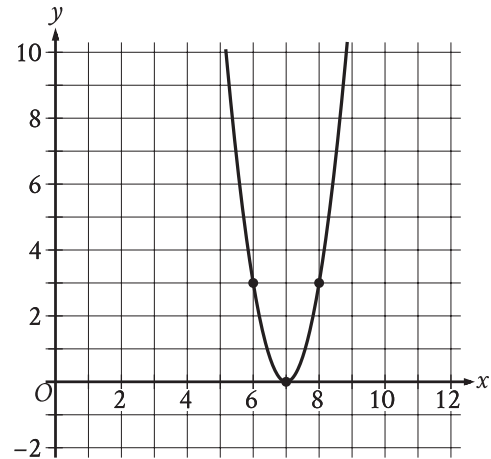
The x-intercept of the graph shown is $(x, 0)$. What is the value of x ?

8

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

A) $(-2, 0)$

B) $(0, -2)$

C) $\left(0, \dfrac{1}{10}\right)$

D) $\left(\dfrac{1}{10}, 0\right)$

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CONTINUE

9

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) $g(x) = \dfrac{7}{2}x^3$

B) $g(x) = 7x^{\frac{3}{2}}$

C) $g(x) = 7x^3 + 2$

D) $g(x) = 7x^3 - 2$

10

$$x + 7 = 10$$
$$(x + 7)^2 = y$$

Which ordered pair (x, y) is a solution to the given system of equations?

A) $(3, 100)$

B) $(3, 3)$

C) $(3, 10)$

D) $(3, 70)$

11

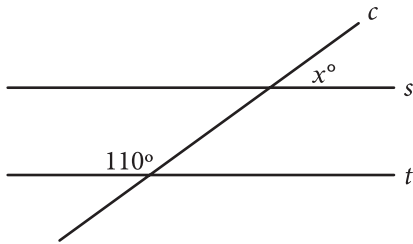Which expression is equivalent to $(7x^3 + 7x) - (6x^3 - 3x)$?

A) $x^3 + 10x$

B) $-13x^3 + 10x$

C) $-13x^3 + 4x$

D) $x^3 + 4x$

12

The function p is defined by $p(n) = 7n^3$. What is the value of n when $p(n)$ is equal to 56?

A) 2

B) $\dfrac{8}{3}$

C) 7

D) 8

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CONTINUE

13

Note: Figure not drawn to scale.

In the figure shown, line c intersects parallel lines s and t. What is the value of x ?

14

A list of 10 data values is shown.

$$6, 8, 16, 4, 17, 26, 8, 5, 5, 5$$

What is the mean of these data?

15

The equation $E(t) = 5(1.8)^t$ gives the estimated number of employees at a restaurant, where t is the number of years since the restaurant opened. Which of the following is the best interpretation of the number 5 in this context?

A) The estimated number of employees when the restaurant opened

B) The increase in the estimated number of employees each year

C) The number of years the restaurant has been open

D) The percent increase in the estimated number of employees each year

16

$$g(x) = x^2 + 55$$

What is the minimum value of the given function?

A) 0

B) 55

C) 110

D) 3,025

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CONTINUE ▶

17

Each year, the value of an investment increases by 0.49% of its value the previous year. Which of the following functions best models how the value of the investment changes over time?

A) Decreasing exponential

B) Decreasing linear

C) Increasing exponential

D) Increasing linear

18

The population of Greenville increased by 7% from 2015 to 2016. If the 2016 population is k times the 2015 population, what is the value of k ?

A) 0.07

B) 0.7

C) 1.07

D) 1.7

19

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) $\sqrt[11]{a^{132}}$

20

An event planner is planning a party. It costs the event planner a onetime fee of $35 to rent the venue and $10.25 per attendee. The event planner has a budget of $200. What is the greatest number of attendees possible without exceeding the budget?

21

If $|4x - 4| = 112$, what is the positive value of $x - 1$?

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 <u>not</u> taken up by the sphere?

A) 149,796

B) 164,500

C) 190,955

D) 310,800

23

What is the diameter of the circle in the xy-plane with equation $(x - 5)^2 + (y - 3)^2 = 16$?

A) 4

B) 8

C) 16

D) 32

24

For the exponential function f, the value of $f(1)$ is k, where k is a constant. Which of the following equivalent forms of the function f shows the value of k as the coefficient or the base?

A) $f(x) = 50(1.6)^{x+1}$

B) $f(x) = 80(1.6)^x$

C) $f(x) = 128(1.6)^{x-1}$

D) $f(x) = 204.8(1.6)^{x-2}$

25

A model estimates that at the end of each year from 2015 to 2020, the number of squirrels in a population was 150% more than the number of squirrels in the population at the end of the previous year. The model estimates that at the end of 2016, there were 180 squirrels in the population. Which of the following equations represents this model, where n is the estimated number of squirrels in the population t years after the end of 2015 and $t \leq 5$?

A) $n = 72(1.5)^t$

B) $n = 72(2.5)^t$

C) $n = 180(1.5)^t$

D) $n = 180(2.5)^t$

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CONTINUE

26

$$5x + 7y = 1$$

$$ax + by = 1$$

In the given pair of equations, a and b are constants. The graph of this pair of equations in the xy-plane is a pair of perpendicular lines. Which of the following pairs of equations also represents a pair of perpendicular lines?

A) $10x + 7y = 1$

   $ax - 2by = 1$

B) $10x + 7y = 1$

   $ax + 2by = 1$

C) $10x + 7y = 1$

   $2ax + by = 1$

D) $5x - 7y = 1$

   $ax + by = 1$

27

$$x^2 - 34x + c = 0$$

In the given equation, c is a constant. The equation has no real solutions if $c > n$. What is the least possible value of n?

STOP

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