Math

27 QUESTIONS

DIRECTIONS

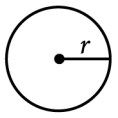
The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

NOTES

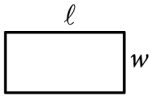
Unless otherwise indicated:

- 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.

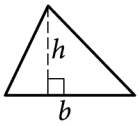
REFERENCE



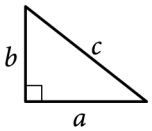
$A = \pi r^2$
$C = 2\pi r$



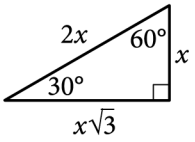
$A = \ell w$

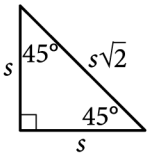


$A = \frac{1}{2}bh$

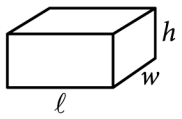


$c^2 = a^2 + b^2$

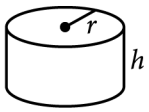




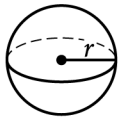
Special Right Triangles



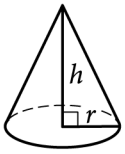
$V = \ell wh$



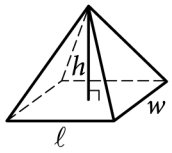
$V = \pi r^2 h$



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



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



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

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.

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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.

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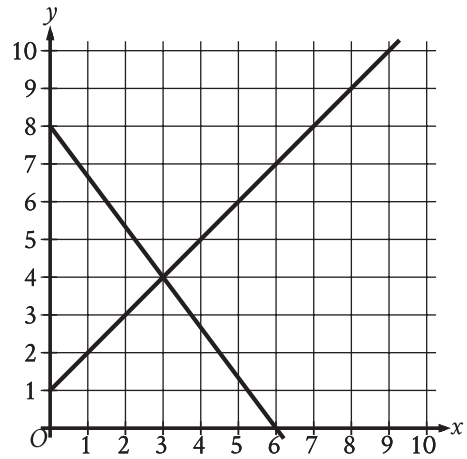
1



The graph of a system of linear equations is shown. What is the solution (x, y) to the system?

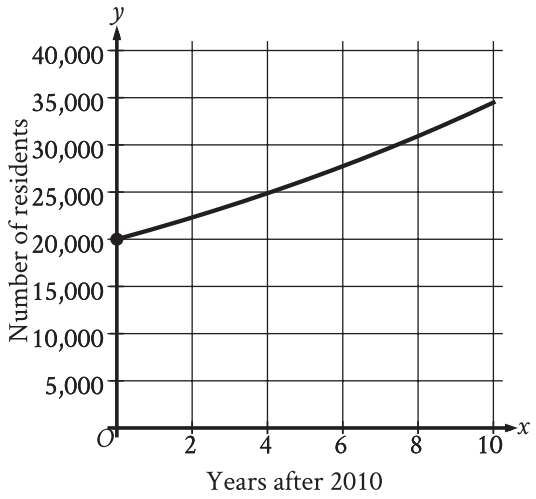
A) $(2, 3)$

B) $(3, 4)$

C) $(4, 5)$

D) $(5, 6)$

2



The graph shown models the number of residents of a certain city x years after 2010. How many residents does this model estimate the city had in 2010?

A) 0

B) 2,000

C) 20,000

D) 25,000

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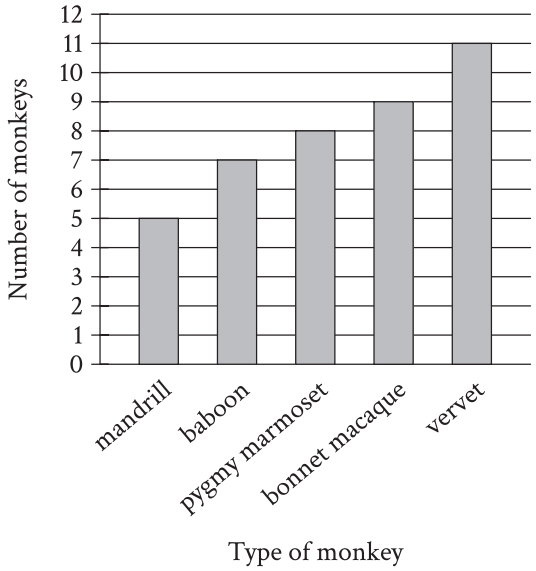
3

The bar graph shows the number of each type of monkey in a sanctuary.



How many more vervets are in this sanctuary than mandrills?

A) 11

B) 6

C) 5

D) 3

4

$$3x + 5(x + 4) = 76$$

What value of x is the solution to the given equation?

A) 7

B) 8

C) 56

D) 72

5

The function f is defined by $f(x) = \frac{16}{x}$. What is the value of $f(x)$ when $x = 17$?

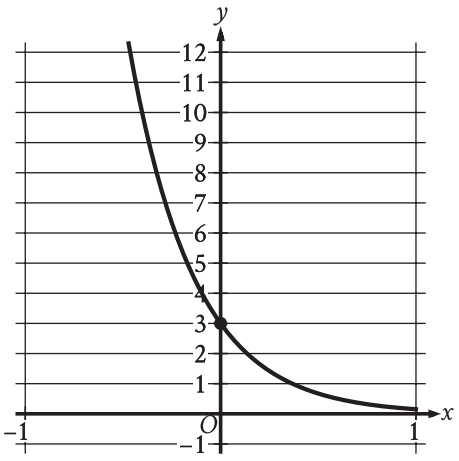
A) $\frac{16}{17}$

B) $\frac{17}{16}$

C) 16

D) 17

6



The graph of the exponential function f is shown, where $y = f(x)$. The y-intercept of the graph is $(0, y)$. What is the value of y ?

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7

For a party, 50 dinner rolls are needed. Dinner rolls are sold in packages of 12. What is the minimum number of packages that should be bought for the party?

8

21 is 21% of what number?

A) 0
B) 1
C) 42
D) 100

9

To repair a refrigerator, a technician charges \$60 per hour for labor plus \$120 for parts. Which function f represents the total amount, in dollars, the technician will charge for this job if it takes x hours?

A) $f(x) = x + 120$
B) $f(x) = 60x$
C) $f(x) = 60x + 120$
D) $f(x) = 60x - 120$

10

The function f is defined by $f(x) = 80 - 6x$. What is the value of $f(7)$?

A) 13
B) 38
C) 74
D) 81

11

Naomi bought both rabbit snails and nerite snails for a total of \$52. Each rabbit snail costs \$8 and each nerite snail costs \$6. If Naomi bought 2 nerite snails, how many rabbit snails did she buy?

A) 5
B) 12
C) 14
D) 50

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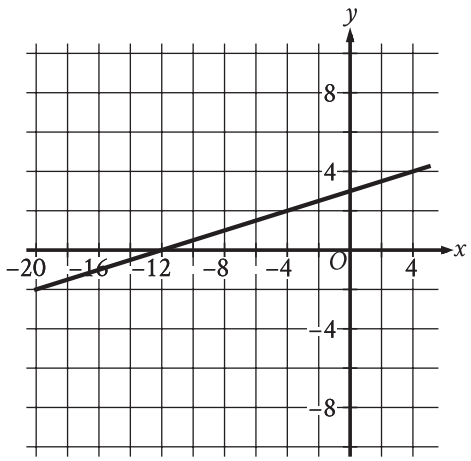
12



The graph of the linear function f is shown, where $y = f(x)$. What is the x-intercept of the graph of f ?

A) $(-12, 0)$

B) $(0, 0)$

C) $\left(\frac{1}{4}, 0\right)$

D) $(12, 0)$

13

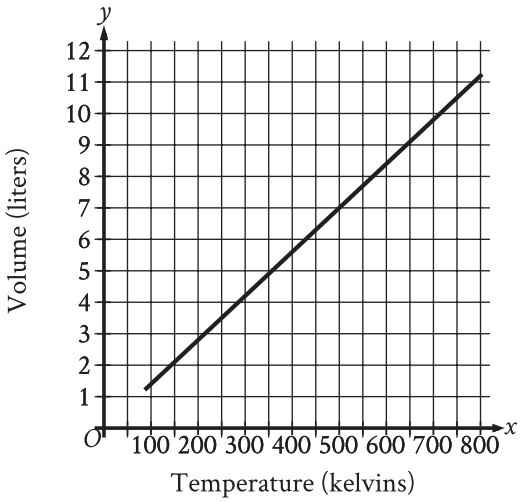
A triangle has a base length of 40 centimeters and a height of 90 centimeters. What is the area, in square centimeters, of the triangle?

14

A participant in a bicycle race completes the race with an average speed of 24,816 yards per hour. What is this average speed, in miles per hour? (1 mile = 1,760 yards)

15

Hydrogen is placed inside a container and kept at a constant pressure. The graph shows the estimated volume y, in liters, of the hydrogen when its temperature is x kelvins.



What is the estimated volume, in liters, of the hydrogen when its temperature is 500 kelvins?

A) 0

B) $\frac{7}{500}$

C) 7

D) $\frac{500}{7}$

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16

$$p + 34 = q + r$$

The given equation relates the variables p, q, and r. Which equation correctly expresses p in terms of q and r ?

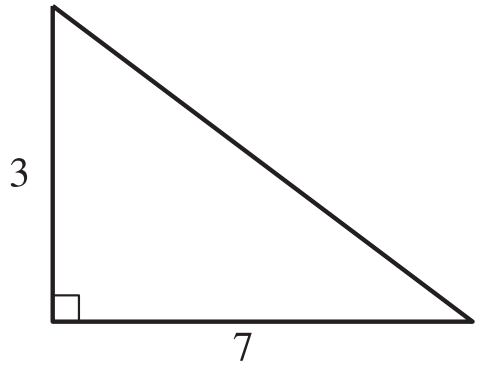
A) $p = q + r + 34$

B) $p = q + r - 34$

C) $p = -q - r + 34$

D) $p = -q - r - 34$

17



Note: Figure not drawn to scale.

The lengths of the legs of a right triangle are shown. Which of the following is closest to the length of the triangle's hypotenuse?

A) 3.2

B) 5

C) 7.6

D) 20

18

The number of coins in a collection increased from 9 to 90. What was the percent increase in the number of coins in this collection?

A) 10%

B) 81%

C) 90%

D) 900%

19

$$2x + y = 37$$

In triangle QRS, sides QR and RS each have a length of x centimeters and side SQ has a length of y centimeters. The given equation represents this situation. Which of the following is the best interpretation of 37 in this context?

A) The difference, in centimeters, between the lengths of sides QR and SQ

B) The difference, in centimeters, between the lengths of sides QR and RS

C) The sum of the lengths, in centimeters, of the three sides of the triangle

D) The length, in centimeters, of one of the two sides of equal length

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CONTINUE

20

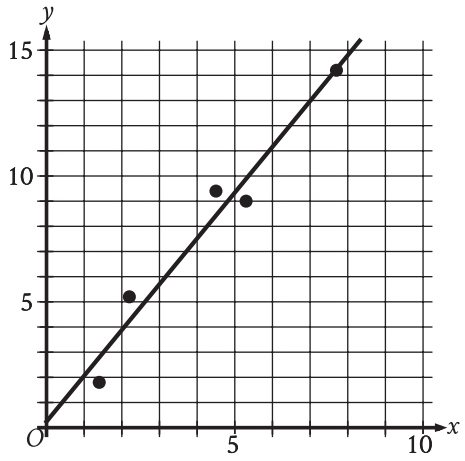
What is the slope of the graph of $y = \frac{5x}{13} - 23$ in the xy-plane?

21

To study fluctuations in composition, samples of pumice were taken from 29 locations and cut in the shape of a cube. The length of the edge of one of these cubes is 3.000 centimeters. This cube has a density of 0.230 grams per cubic centimeter. What is the mass of this cube, in grams?

22

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



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

A) 0.2

B) 0.7

C) 1.8

D) 2.6

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23

The length of a rectangle is 50 inches and the width is x inches. The perimeter is at most 210 inches. Which inequality represents this situation?

A) $2x + 100 \leq 210$

B) $2x + 100 \geq 210$

C) $2x + 50 \leq 210$

D) $2x + 50 \geq 210$

24

Which of the following expressions is equivalent to $8x^{10} - 8x^9 + 88x$?

A) $x(7x^{10} - 7x^9 + 87x)$

B) $x(8^{10} - 8^9 + 88)$

C) $8x(x^{10} - x^9 + 11x)$

D) $8x(x^9 - x^8 + 11)$

25

$$\frac{3}{5}x + \frac{3}{4}y = 7$$

Which table gives three values of x and their corresponding values of y for the given equation?

A)

x	y
1	$\frac{113}{20}$
2	$\frac{101}{20}$
4	$\frac{77}{20}$

B)

x	y
1	$\frac{47}{5}$
2	$\frac{44}{5}$
4	$\frac{38}{5}$

C)

x	y
1	$\frac{148}{15}$
2	$\frac{136}{15}$
4	$\frac{112}{15}$

D)

x	y
1	$\frac{128}{15}$
2	$\frac{116}{15}$
4	$\frac{92}{15}$

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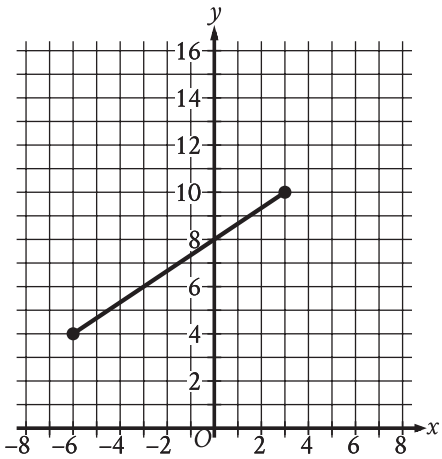
26



The line segment shown in the *xy*-plane represents one of the legs of a right triangle. The area of this triangle is $36\sqrt{13}$ square units. What is the length, in units, of the other leg of this triangle?

A) 12

B) 24

C) $3\sqrt{13}$

D) $18\sqrt{13}$

27

The solutions to $x^2 + 6x + 7 = 0$ are r and s, where $r < s$. The solutions to $x^2 + 8x + 8 = 0$ are t and u, where $t < u$. The solutions to $x^2 + 14x + c = 0$, where c is a constant, are $r + t$ and $s + u$. What is the value of c ?

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.

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