Math

27 QUESTIONS

DIRECTIONS

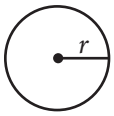
The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

NOTES

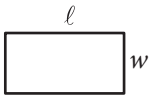
Unless otherwise indicated:

- 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.

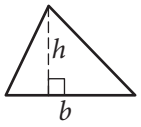
REFERENCE



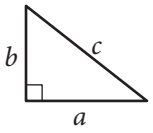
$A = \pi r^2$
$C = 2\pi r$



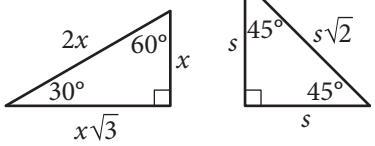
$A = \ell w$



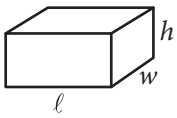
$A = \frac{1}{2}bh$



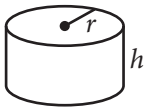
$c^2 = a^2 + b^2$



Special Right Triangles

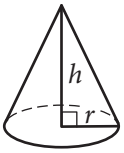


$V = \ell wh$

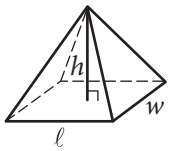


$V = \pi r^2 h$

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



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



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

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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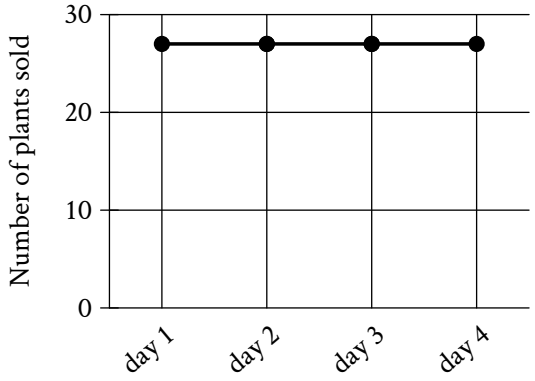
CONTINUE

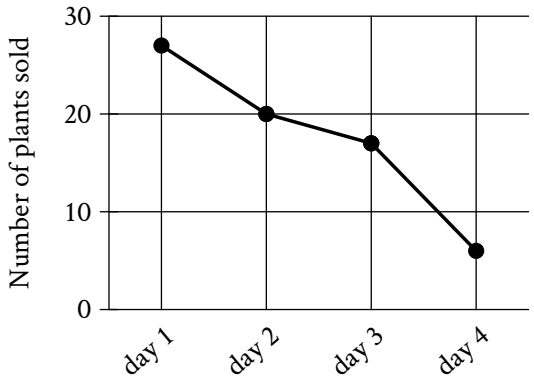
1

The owner of a plant store recorded the number of plants sold each day during a four-day period in the spring. If the number of plants sold increased each day, which of the following line graphs could represent the number of plants sold during this four-day period?

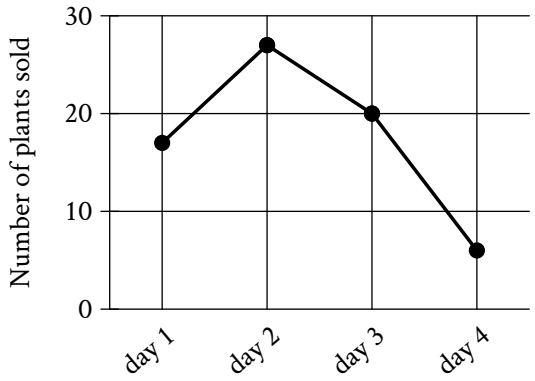
A)



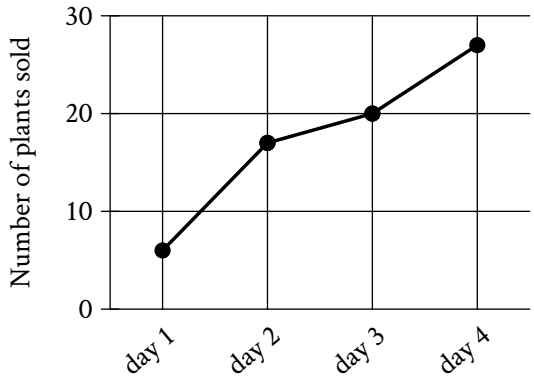
B)



C)



D)



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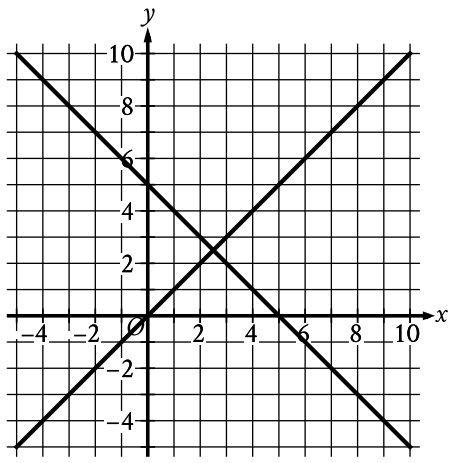
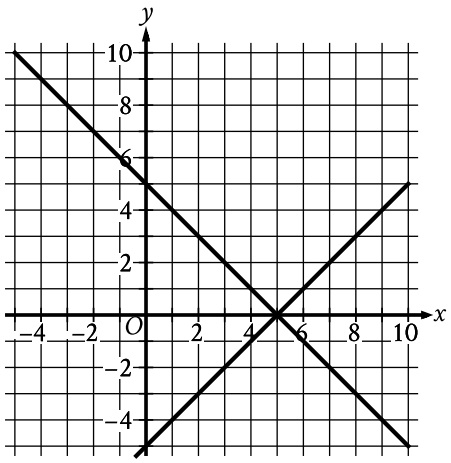
2

The solution to a system of linear equations is (5, 5). Which of the following could be the graph of the equations in the system?

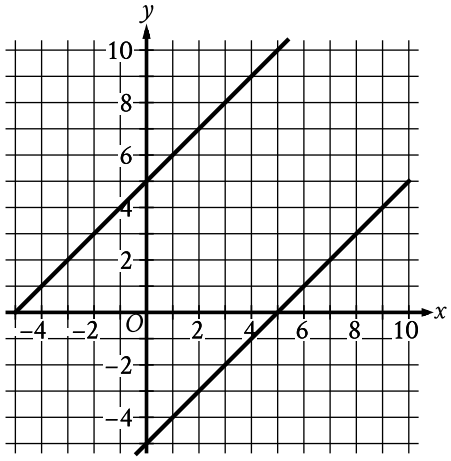
A)



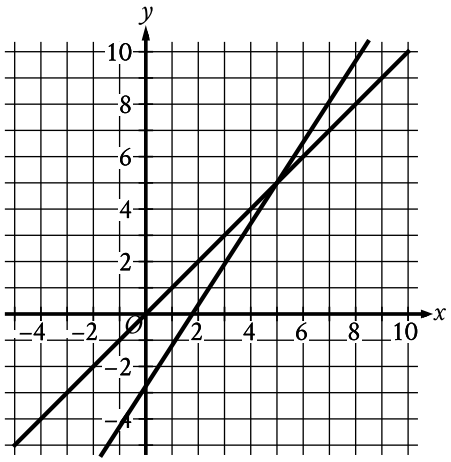
B)



C)



D)



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3

During a race, a bicyclist's speed was 37 feet per second. What is this speed in feet per **minute**?

A) 67
B) 97
C) 1,110
D) 2,220

4

$$y = 4x - 13$$

$$y = ax - 13$$

In the given system of equations, a is a constant. The system has infinitely many solutions. What is the value of a?

A) 4
B) -9
C) -13
D) -17

5

$$y - 38 = mx$$

The given equation relates the distinct positive numbers m, x, and y. Which equation correctly expresses y in terms of m and x?

A) $y = mx + 38$
B) $y = 38x + m$
C) $y = 38m + x$
D) $y = 38mx$

6

Mara has read 120 pages of a 160-page research paper. On average, she reads 1 page every minute. At this rate, how much time, in minutes, will she spend reading the remaining pages of the research paper?

7

The table shown summarizes the distribution of 58 homes based on the number of years since they were designed by a certain architecture firm.

Number of years	Number of homes
0 to 5	8
6 to 10	4
11 to 15	14
16 to 20	5
21 to 25	6
26 to 30	12
31 to 35	9

How many of the 58 homes were designed by the architecture firm 21 or more years ago?

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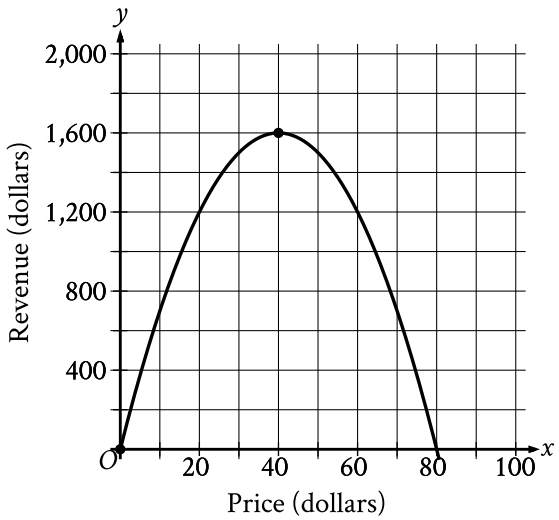
8



The graph gives the estimated revenue, in dollars, for a company when the price of the company's product is x dollars. What does the y-value of the vertex of the graph represent in this context?

A) The price, in dollars, of the company's product

B) The minimum estimated revenue, in dollars

C) The maximum estimated revenue, in dollars

D) The estimated revenue, in dollars, when the price of the company's product is 0 dollars

9

A remote-controlled machine is designed to collect stone and sand samples. During an experiment, the machine moves at a constant velocity on a straight path toward a designated location. The equation $y = 500 - 148x$ gives the machine's distance from the designated location y, in meters, x hours after the start of the experiment. What is the best interpretation of 500 in this context?

A) The number of hours it takes the machine to reach the designated location

B) The machine's velocity, in meters per hour, during the experiment

C) The machine's distance, in meters, from the designated location at the start of the experiment

D) The total distance, in meters, the machine travels in 1 hour

10

$$6x + 6y = 50$$

$$-6x + 2y = 6$$

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

A) -14

B) -7

C) 7

D) 14

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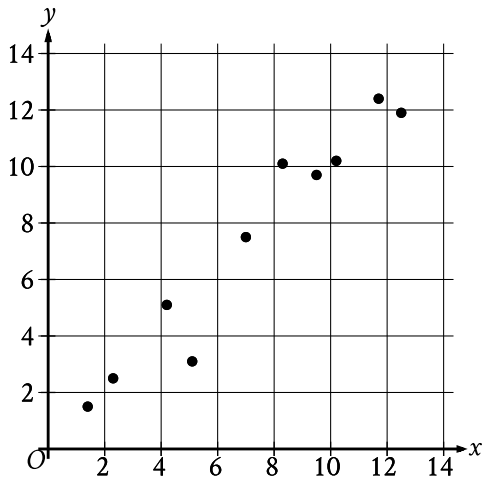
11

The scatterplot shows the relationship between two variables, x and y.



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

A) $y = -2x$
B) $y = -x$
C) $y = x$
D) $y = 2x$

12

$$g(x) = (14 - 2x)(8 + 2x)$$

The function g is defined by the given equation. For what value of x does $g(x)$ reach its maximum?

A) 1.5
B) 3
C) 5.5
D) 11

13

The function f is defined by $f(x) = \frac{12}{11 - x}$. What is the value of $f(x)$ when $x = 5$?

14

The y-intercept of the graph of $5x + 3y = -27$ in the xy-plane is $(0, y)$. What is the value of y?

15

The product of a positive number x and the number that is 1 less than x is equal to 72. What is the value of x?

A) 0.5
B) 9
C) 71
D) 73

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CONTINUE

16

The expression $1.28n$ represents the result of increasing the positive quantity n by p%. What is the value of p?

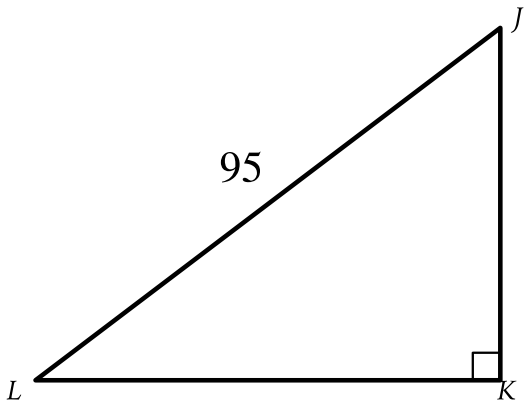
A) 0.72

B) 2.8

C) 28

D) 72

17



Note: Figure not drawn to scale.

In right triangle JKL, the tangent of $\angle L$ is $\frac{3}{4}$. What is the length of $\overline{JK}$?

A) $\frac{35}{16}$

B) $\frac{15}{4}$

C) 57

D) 76

18

A rack displays sweatshirts for two sports teams. The table shows the number of sweatshirts on the rack, classified by size and sports team.

	Tigers	Badgers	Total
Small	6	9	15
Medium	24	33	57
Large	18	24	42
Total	48	66	114

One sweatshirt from the rack will be selected at random. What is the probability of selecting a sweatshirt that is medium, given that the sweatshirt is a Tigers sweatshirt?

A) 0.21

B) 0.24

C) 0.42

D) 0.50

19

For the linear function p, $p(c) = -2$, where c is a constant, $p(5) = 22$, and the slope of the graph of $y = p(x)$ in the xy-plane is 4. For the linear function t, $t(c) = -5$ and $t(6) = 44$. What is the slope of the graph of $y = t(x)$ in the xy-plane?

A) -1

B) 2

C) 4

D) 7

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CONTINUE

20

The perimeter of a square can be expressed as $4(85)$ units. What is the length, in units, of a side of this square?

21

$$5x - 6y = x^2$$

$$5x - 6y = 16$$

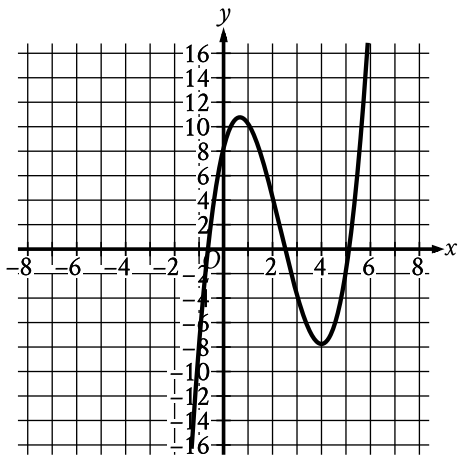
A solution to the given system of equations is (x, y), where x is positive. What is the value of x?

22

The exponential function f is defined by $f(x) = ab^x$, where a and b are positive constants. If $f(n) = p$ and the value of $f(n + 1)$ is 83.00% less than the value of p, where n and p are constants, what is the value of b?

A) 0.17
B) 0.83
C) 1.17
D) 1.83

23



The graph of $y = f(x) - k$ is shown in the xy-plane. If k, a, and b are positive constants, which equation could define f?

A) $f(x) = (x - a)^2(x + b)$
B) $f(x) = (x + a)^2(x - b)$
C) $f(x) = (x - a)^2(x + b)^2$
D) $f(x) = (x + a)^2(x - b)^2$

24

$$\sqrt{(x + 13)^2} = x + 13$$

What is the least value of x that is a solution to the given equation?

A) -14
B) -13
C) 0
D) 13

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CONTINUE

25

$$\frac{36x + 55}{11} = \frac{k}{22}x + n$$

In the given equation, k and n are constants. The equation has infinitely many solutions. What is the value of kn?

A) 180
B) 360
C) 1,980
D) 3,960

26

In triangle ABC and triangle DEF, sides AB and DE each have a side length of 6 inches, and angles A and D each have an angle measure of 65°. Which of the following additional pieces of information is(are) sufficient to prove whether triangle ABC is congruent to triangle DEF?

I. The measures of angles B and C are equal.
II. The lengths of sides AC and DF are equal.
III. The lengths of sides BC and EF are equal.

A) I is sufficient, but II and III are not.
B) II is sufficient, but I and III are not.
C) III is sufficient, but I and II are not.
D) II is sufficient and III is sufficient, but I is not.

27

$$32x + 84y = 360$$

The given equation represents the volume of compost x, in cubic feet, and the volume of soil y, in cubic feet, in a mixture of compost and soil that weighs 360 pounds. If the volume of soil in the mixture is 2 cubic feet, what is the volume of compost in the mixture, in cubic feet?

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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