Math

27 QUESTIONS

DIRECTIONS

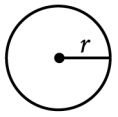
The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

NOTES

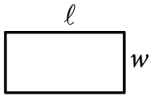
Unless otherwise indicated:

- 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.

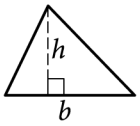
REFERENCE



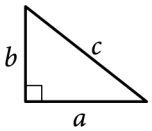
$A = \pi r^2$
$C = 2\pi r$



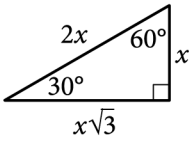
$A = \ell w$

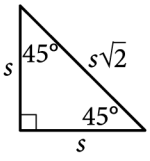


$A = \frac{1}{2}bh$

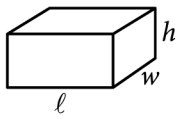


$c^2 = a^2 + b^2$

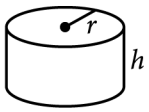




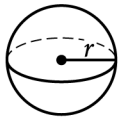
Special Right Triangles



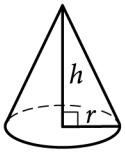
$V = \ell wh$



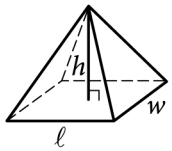
$V = \pi r^2 h$



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



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



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

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

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.

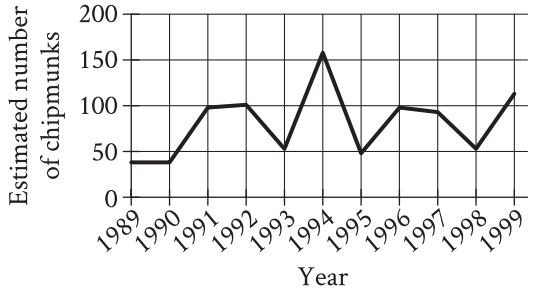
For student-produced response questions, solve each problem and write your answer next to or under the question in the test book as described below.

- 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.

CONTINUE

1

The line graph shows the estimated number of chipmunks in a state park on April 1 of each year from 1989 to 1999.



Based on the line graph, in which year was the estimated number of chipmunks in the state park the greatest?

A) 1989

B) 1994

C) 1995

D) 1998

2

A fish swam a distance of 5,104 yards. How far did the fish swim, in miles? (1 mile = 1,760 yards)

A) 0.3

B) 2.9

C) 3,344

D) 6,864

3

Which expression is equivalent to $12x^3 - 5x^3$?

A) $7x^6$

B) $17x^3$

C) $7x^3$

D) $17x^6$

4

$$x + y = 18$$
$$5y = x$$

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

A) (15, 3)

B) (16, 2)

C) (17, 1)

D) (18, 0)

CONTINUE

5

The point $(8, 2)$ in the xy-plane is a solution to which of the following systems of inequalities?

A) $x > 0$
$y > 0$

B) $x > 0$
$y < 0$

C) $x < 0$
$y > 0$

D) $x < 0$
$y < 0$

6

$$|x - 5| = 10$$

What is one possible solution to the given equation?

7

$$f(x) = 7x + 1$$

The function gives the total number of people on a company retreat with x managers. What is the total number of people on a company retreat with 7 managers?

8

$$h(x) = x^2 - 3$$

Which table gives three values of x and their corresponding values of $h(x)$ for the given function h?

A)

x	1	2	3
$h(x)$	4	5	6

B)

x	1	2	3
$h(x)$	−2	1	6

C)

x	1	2	3
$h(x)$	−1	1	3

D)

x	1	2	3
$h(x)$	−2	1	3

9

The function f is defined by $f(x) = 270(0.1)^x$. What is the value of $f(0)$?

A) 0
B) 1
C) 27
D) 270

CONTINUE

10

To estimate the proportion of a population that has a certain characteristic, a random sample was selected from the population. Based on the sample, it is estimated that the proportion of the population that has the characteristic is 0.49, with an associated margin of error of 0.04. Based on this estimate and margin of error, which of the following is the most appropriate conclusion about the proportion of the population that has the characteristic?

A) It is plausible that the proportion is between 0.45 and 0.53.

B) It is plausible that the proportion is less than 0.45.

C) The proportion is exactly 0.49.

D) It is plausible that the proportion is greater than 0.53.

11

A moving truck can tow a trailer if the combined weight of the trailer and the boxes it contains is no more than 4,600 pounds. What is the maximum number of boxes this truck can tow in a trailer with a weight of 500 pounds if each box weighs 120 pounds?

A) 34

B) 35

C) 38

D) 39

12

$$-4x^2 - 7x = -36$$

What is the positive solution to the given equation?

A) $\frac{7}{4}$

B) $\frac{9}{4}$

C) 4

D) 7

13

The table summarizes the distribution of color and shape for 100 tiles of equal area.

	Red	Blue	Yellow	Total
Square	10	20	25	55
Pentagon	20	10	15	45
Total	30	30	40	100

If one of these tiles is selected at random, what is the probability of selecting a red tile? (Express your answer as a decimal or fraction, not as a percent.)

14

$$f(x) = 2x + 3$$

For the given function f, the graph of $y = f(x)$ in the xy-plane is parallel to line j. What is the slope of line j?

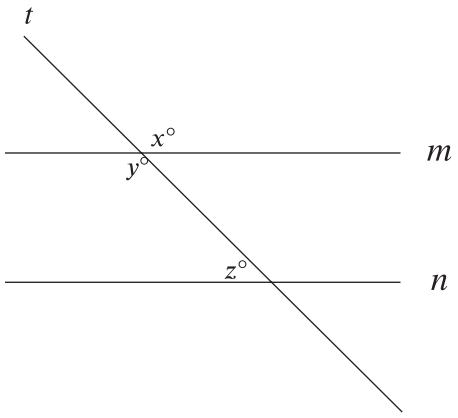
CONTINUE

15

A proposal for a new library was included on an election ballot. A radio show stated that 3 times as many people voted in favor of the proposal as people who voted against it. A social media post reported that 15,000 more people voted in favor of the proposal than voted against it. Based on these data, how many people voted against the proposal?

A) 7,500
B) 15,000
C) 22,500
D) 45,000

16



Note: Figure not drawn to scale.

In the figure, lines m and n are parallel. If $x = 6k + 13$ and $y = 8k - 29$, what is the value of z ?

A) 3
B) 21
C) 41
D) 139

17

$$-3x + 21px = 84$$

In the given equation, p is a constant. The equation has no solution. What is the value of p ?

A) 0
B) $\frac{1}{7}$
C) $\frac{4}{3}$
D) 4

18

$$f(x) = (x - 10)(x + 13)$$

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

A) −130
B) −13
C) $-\frac{23}{2}$
D) $-\frac{3}{2}$

CONTINUE

19

The function $f(x) = \frac{1}{9}(x-7)^2 + 3$ gives a metal ball's height above the ground $f(x)$, in inches, x seconds after it started moving on a track, where $0 \le x \le 10$. Which of the following is the best interpretation of the vertex of the graph of $y = f(x)$ in the xy-plane?

A) The metal ball's minimum height was 3 inches above the ground.
B) The metal ball's minimum height was 7 inches above the ground.
C) The metal ball's height was 3 inches above the ground when it started moving.
D) The metal ball's height was 7 inches above the ground when it started moving.

20

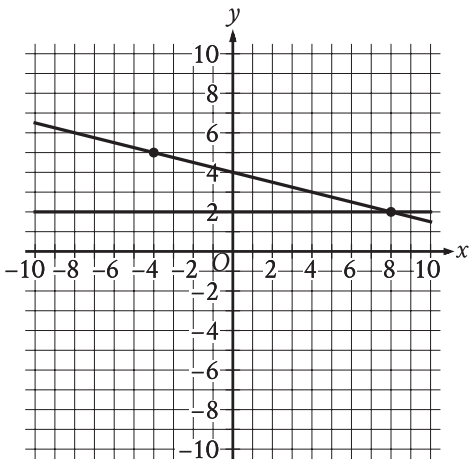
In triangle JKL, $\cos(K) = \frac{24}{51}$ and angle J is a right angle. What is the value of $\cos(L)$?

21

$$-x^2 + bx - 676 = 0$$

In the given equation, b is a positive integer. The equation has no real solution. What is the greatest possible value of b ?

22



If a new graph of three linear equations is created using the system of equations shown and the equation $x + 4y = -16$, how many solutions (x, y) will the resulting system of three equations have?

A) Zero
B) Exactly one
C) Exactly two
D) Infinitely many

CONTINUE

23

$$f(x) = 5{,}470(0.64)^{\frac{x}{12}}$$

The function f gives the value, in dollars, of a certain piece of equipment after x months of use. If the value of the equipment decreases each year by p% of its value the preceding year, what is the value of p ?

A) 4

B) 5

C) 36

D) 64

24

The dot plot represents the 15 values in data set A. Data set B is created by adding 56 to each of the values in data set A. Which of the following correctly compares the medians and the ranges of data sets A and B?

A) The median of data set B is equal to the median of data set A, and the range of data set B is equal to the range of data set A.

B) The median of data set B is equal to the median of data set A, and the range of data set B is greater than the range of data set A.

C) The median of data set B is greater than the median of data set A, and the range of data set B is equal to the range of data set A.

D) The median of data set B is greater than the median of data set A, and the range of data set B is greater than the range of data set A.

CONTINUE

25

The equation $x^2 + (y - 1)^2 = 49$ represents circle A. Circle B is obtained by shifting circle A down 2 units in the xy-plane. Which of the following equations represents circle B?

A) $(x - 2)^2 + (y - 1)^2 = 49$

B) $x^2 + (y - 3)^2 = 49$

C) $(x + 2)^2 + (y - 1)^2 = 49$

D) $x^2 + (y + 1)^2 = 49$

26

Two identical rectangular prisms each have a height of 90 centimeters (cm). The base of each prism is a square, and the surface area of each prism is K cm^2. If the prisms are glued together along a square base, the resulting prism has a surface area of $\frac{92}{47}K$ cm^2. What is the side length, in cm, of each square base?

A) 4

B) 8

C) 9

D) 16

27

210 is p% greater than 30. What is the value of p ?

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.