

# Math

## 27 QUESTIONS

### DIRECTIONS

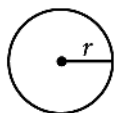
The questions in this section address a number of important math skills. Use of a calculator is permitted for all questions.

### NOTES

Unless otherwise indicated:

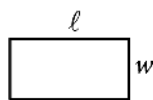
- All variables and expressions represent real numbers.
- Figures provided are drawn to scale.
- All figures lie in a plane.
- The domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

### REFERENCE

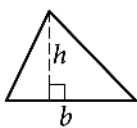


$$A = \pi r^2$$

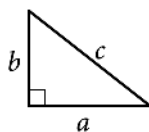
$$C = 2\pi r$$



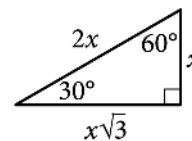
$$A = \ell w$$



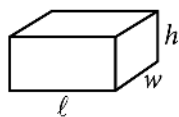
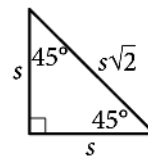
$$A = \frac{1}{2}bh$$



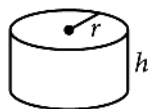
$$c^2 = a^2 + b^2$$



Special Right Triangles



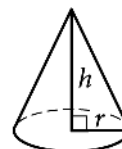
$$V = \ell wh$$



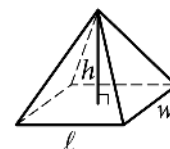
$$V = \pi r^2 h$$



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



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



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

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

The number of radians of arc in a circle is  $2\pi$ .

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

$$k + 12 = 336$$

What is the solution to the given equation?

- A) 28
- B) 324
- C) 348
- D) 4,032

2

The function  $f$  is defined by  $f(x) = x^3 + 15$ . What is the value of  $f(2)$  ?

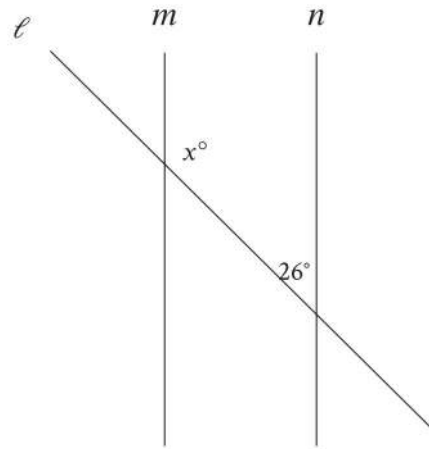
- A) 20
- B) 21
- C) 23
- D) 24

3

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)  $c = 10d + 11$

4



Note: Figure not drawn to scale.

In the figure shown, line  $m$  is parallel to line  $n$ . What is the value of  $x$  ?

- A) 13
- B) 26
- C) 52
- D) 154

5

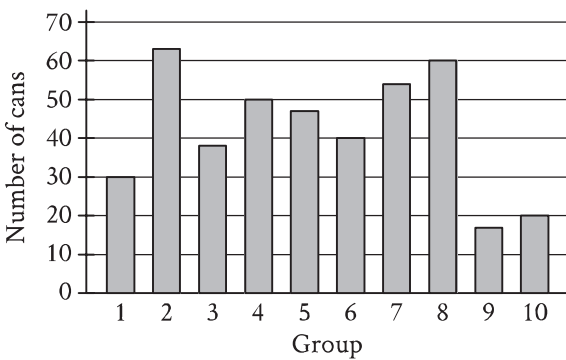
John paid a total of \$165 for a microscope by making a down payment of \$37 plus  $p$  monthly payments of \$16 each. Which of the following equations represents this situation?

- A)  $16p - 37 = 165$
- B)  $37p - 16 = 165$
- C)  $16p + 37 = 165$
- D)  $37p + 16 = 165$

6

If  $y = 5x + 10$ , what is the value of  $y$  when  $x = 8$  ?

7



The bar graph shows the distribution of 419 cans collected by 10 different groups for a food drive. How many cans were collected by group 6?

8

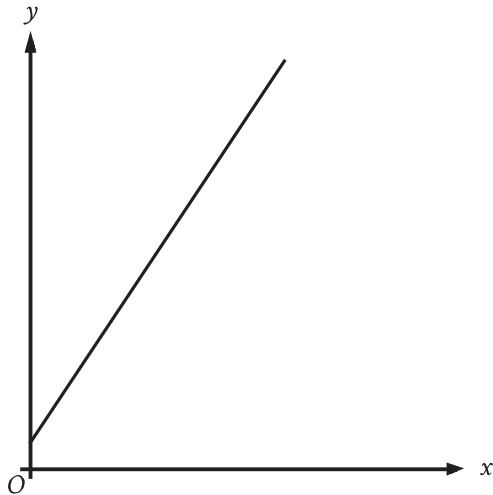
The table gives the distribution of votes for a new school mascot and grade level for 80 students.

Mascot	Grade level			Total
	Sixth	Seventh	Eighth	
Badger	4	9	9	22
Lion	9	2	9	20
Longhorn	4	6	4	14
Tiger	6	9	9	24
Total	23	26	31	80

If one of these students is selected at random, what is the probability of selecting a student whose vote for new mascot was for a lion?

- A)  $\frac{1}{9}$
- B)  $\frac{1}{5}$
- C)  $\frac{1}{4}$
- D)  $\frac{2}{3}$

9



The graph represents the total charge, in dollars, by an electrician for  $x$  hours of work. The electrician charges a onetime fee plus an hourly rate. What is the best interpretation of the slope of the graph?

- A) The electrician's hourly rate
- B) The electrician's onetime fee
- C) The maximum amount that the electrician charges
- D) The total amount that the electrician charges

10

Square X has a side length of 12 centimeters. The perimeter of square Y is 2 times the perimeter of square X. What is the length, in centimeters, of one side of square Y?

- A) 6
- B) 10
- C) 14
- D) 24

11

What is the equation of the line that passes through the point  $(0, 5)$  and is parallel to the graph of  $y = 7x + 4$  in the  $xy$ -plane?

- A)  $y = 5x$
- B)  $y = 7x + 5$
- C)  $y = 7x$
- D)  $y = 5x + 7$

12

In the linear function  $h$ ,  $h(0) = 41$  and  $h(1) = 40$ . Which equation defines  $h$  ?

- A)  $h(x) = -x + 41$
- B)  $h(x) = -x$
- C)  $h(x) = -41x$
- D)  $h(x) = -41$

13

The function  $f(t) = 60,000(2)^{\frac{t}{410}}$  gives the number of bacteria in a population  $t$  minutes after an initial observation. How much time, in minutes, does it take for the number of bacteria in the population to double?

14

The function  $f$  is defined by  $f(x) = (x - 6)(x - 2)(x + 6)$ . In the  $xy$ -plane, the graph of  $y = g(x)$  is the result of translating the graph of  $y = f(x)$  up 4 units. What is the value of  $g(0)$ ?

15

A candle is made of 17 ounces of wax. When the candle is burning, the amount of wax in the candle decreases by 1 ounce every 4 hours. If 6 ounces of wax remain in this candle, for how many hours has it been burning?

- A) 3
- B) 6
- C) 24
- D) 44

16

$$14j + 5k = m$$

The given equation relates the numbers  $j$ ,  $k$ , and  $m$ . Which equation correctly expresses  $k$  in terms of  $j$  and  $m$ ?

- A)  $k = \frac{m - 14j}{5}$
- B)  $k = \frac{1}{5}m - 14j$
- C)  $k = \frac{14j - m}{5}$
- D)  $k = 5m - 14j$

17

Triangle  $FGH$  is similar to triangle  $JKL$ , where angle  $F$  corresponds to angle  $J$  and angles  $G$  and  $K$  are right angles. If  $\sin(F) = \frac{308}{317}$ , what is the value of  $\sin(J)$ ?

- A)  $\frac{75}{317}$
- B)  $\frac{308}{317}$
- C)  $\frac{317}{308}$
- D)  $\frac{317}{75}$

18

The product of two positive integers is 546. If the first integer is 11 greater than twice the second integer, what is the smaller of the two integers?

- A) 7
- B) 14
- C) 39
- D) 78

19

$$\begin{aligned}y &\leq x + 7 \\y &\geq -2x - 1\end{aligned}$$

Which point  $(x, y)$  is a solution to the given system of inequalities in the  $xy$ -plane?

- A)  $(-14, 0)$
- B)  $(0, -14)$
- C)  $(0, 14)$
- D)  $(14, 0)$

20

$$\sqrt{(x-2)^2} = \sqrt{3x+34}$$

What is the smallest solution to the given equation?

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?

22

A sample of oak has a density of 807 kilograms per cubic meter. The sample is in the shape of a cube, where each edge has a length of 0.90 meters. To the nearest whole number, what is the mass, in kilograms, of this sample?

- A) 588
- B) 726
- C) 897
- D) 1,107

23

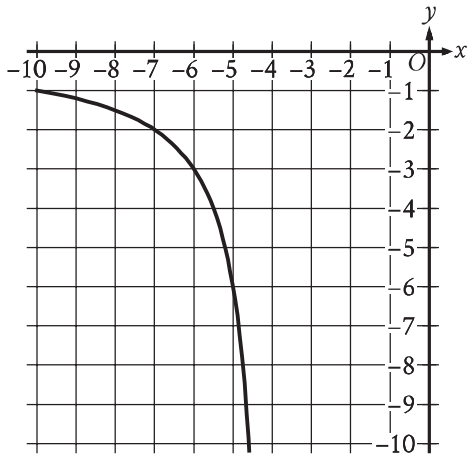
For  $x > 0$ , the function  $f$  is defined as follows:

$$f(x) \text{ equals } 201\% \text{ of } x$$

Which of the following could describe this function?

- A) Decreasing exponential
- B) Decreasing linear
- C) Increasing exponential
- D) Increasing linear

24



The rational function  $f$  is defined by an equation in the form  $f(x) = \frac{a}{x+b}$ , where  $a$  and  $b$  are constants.

The partial graph of  $y = f(x)$  is shown. If

$g(x) = f(x+4)$ , which equation could define function  $g$ ?

- A)  $g(x) = \frac{6}{x}$
- B)  $g(x) = \frac{6}{x+4}$
- C)  $g(x) = \frac{6}{x+8}$
- D)  $g(x) = \frac{6(x+4)}{x+4}$

25

Which expression is equivalent

to  $\frac{y+12}{x-8} + \frac{y(x-8)}{x^2y-8xy}$ ?

- A)  $\frac{xy+y+4}{x^3y-16x^2y+64xy}$
- B)  $\frac{xy+9y+12}{x^2y-8xy+x-8}$
- C)  $\frac{xy^2+13xy-8y}{x^2y-8xy}$
- D)  $\frac{xy^2+13xy-8y}{x^3y-16x^2y+64xy}$



26

Poll Results

Angel Cruz	483
Terry Smith	320

The table shows the results of a poll. A total of 803 voters selected at random were asked which candidate they would vote for in the upcoming election. According to the poll, if 6,424 people vote in the election, by how many votes would Angel Cruz be expected to win?

- A) 163
- B) 1,304
- C) 3,864
- D) 5,621

27

The graph of  $x^2 + x + y^2 + y = \frac{199}{2}$  in the  $xy$ -plane is a circle. What is the length of the circle's radius?

**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.**