

## Math

22 QUESTIONS | 35 MINUTES

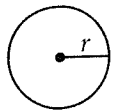
## DIRECTIONS

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

## NOTES

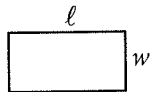
Unless otherwise indicated: • All variables and expressions represent real numbers. • Figures provided are drawn to scale. • All figures lie in a plane. • The domain of a given function is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE

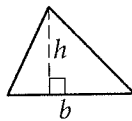


$$A = \pi r^2$$

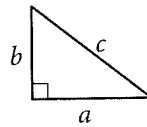
$$C = 2\pi r$$



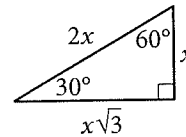
$$A = \ell w$$



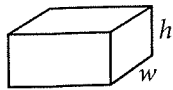
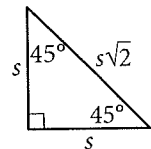
$$A = \frac{1}{2}bh$$



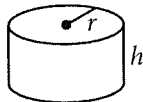
$$c^2 = a^2 + b^2$$



Special Right Triangles



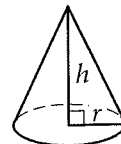
$$V = \ell wh$$



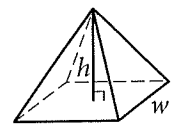
$$V = \pi r^2 h$$



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



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



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

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

If  $p$  and  $q$  are solutions to the equation below, which of the following best represents  $p+q$ ?

$$|3x - 1| = 2$$

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

2

Which of the following coordinates lie on the circle whose equation is  $(x-3)^2 + y^2 + 8y = 84$ ?

- A) (1, 7)
- B) (-2, 5)
- C) (-3, 4)
- D) (3, -6)

3

If  $\sin C = 0.986$  and  $\cos 63^\circ = 0.986$ , what is the value of  $C$ ?

4

If  $\frac{2-2i}{3+4i}$  is equal to  $a+bi$ . What is the value of  $a$ ?

- A)  $-\frac{2}{25}$
- B)  $-\frac{14}{25}$
- C)  $\frac{2}{3}$
- D)  $-\frac{1}{2}$

5

Which of the following can be the value of  $x$  for the system of equations below?

$$y = 2x^2 - 9x + 7$$

$$y = 2x - 2$$

- A)  $\frac{11}{2}$
- B) -1
- C)  $\frac{9}{2}$
- D)  $\frac{7}{2}$

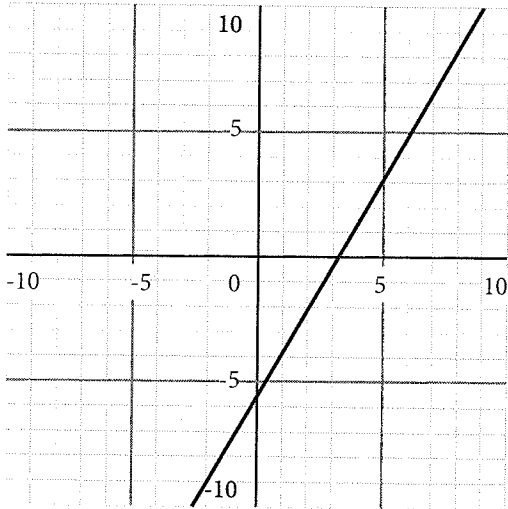
6

What is the positive solution to the following equation?

$$3|3x-2| - |6x-4| = 7$$

7

Which of the following represents a line  $l$  (not shown) which is perpendicular to the line  $m$  (shown below)?



- A)  $3y = 5x - 15$
- B)  $5y = 3x + 15$
- C)  $5y = -3x + 15$
- D)  $3y = 5x + 10$

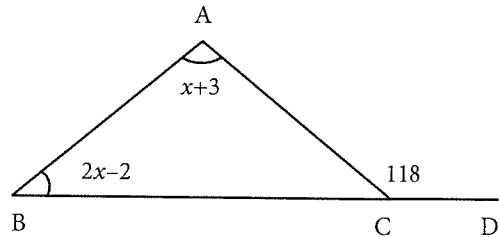
8

What is the circumference of the circle whose equation is  $x^2 + 6x + y^2 - 4y = 51$ ?

- A)  $64\pi$
- B)  $8\pi$
- C)  $14.28\pi$
- D)  $16\pi$

9

In the triangle ABC (not drawn to scale) shown below,  $\angle ABC = 2x - 2$  and  $\angle BAC = x + 3$ . If  $\angle ACD = 118^\circ$ , what is the value of  $x$ ?



10

It takes 4 carpenters to build a bed in 3 days, how many carpenters will it take to build the bed in 2 days?

- A) 12
- B) 6
- C) 8
- D) 24

11

Which of the following is equivalent to  $(5xy + 3x)(x - 2y)$ ?

- A)  $5x^2y - 6xy$
- B)  $5x^2y + 3x^2 + 10xy^2 - 6xy$
- C)  $5x^2y + 3x^2 - 10xy^2 - 6xy$
- D)  $-5x^2y^2 + 3x^2 - 6xy$

12

What is the value of  $y$ , if  $7x - 4y = 1$  and  $5x + 2y = 8$ ?

13

Which of the following is NOT a solution to the following equation?

$$-2x \leq 8 - x$$

- A)  $-8$
- B)  $-10$
- C)  $2$
- D)  $-7$

14

If an unfair coin is tossed 20 times, and it lands on heads 14 times. What would be the probability of it landing on heads the 21<sup>st</sup> time?

- A) 0.5
- B) 0.20
- C) 0.3
- D) 0.7

15

What is the value of  $x - y$  if  $3y - 2x = 16$  and  $5x + y = -6$ ?

- A) 6
- B) 4
- C)  $-2$
- D)  $-6$

16

A student conducted research on how many fish there are in a pond after  $m$  months and came up with the model,  $f(x) = 1,200(1.03)^m$ .

He wanted to have the time on the model in  $d$  days instead, as shown below

(assuming 1 month has 30 days)

$$f(x) = 1,200(1.03)^{ad}$$

What is the value of  $a$ ?

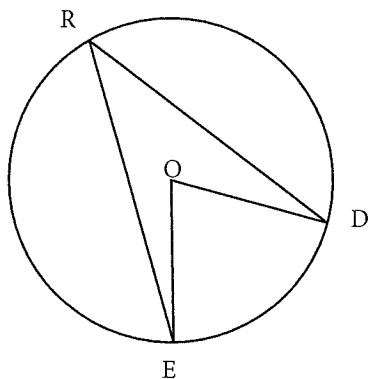
17

If the radius of a circular cylinder is 6, what is the volume of the cylinder if the height is twice its radius?

- A)  $432\pi$
- B)  $864\pi$
- C)  $216\pi$
- D)  $108\pi$

18

What is the value of the angle EOD, if the angle DRE is  $35^\circ$ ?



- A)  $70^\circ$
- B)  $35^\circ$
- C)  $60^\circ$
- D)  $55^\circ$

19

Which of the following is equivalent to

$$\frac{4x^2 - 3}{2x + \sqrt{3}}?$$

- A)  $2x - \sqrt{3}$
- B)  $2x + \sqrt{3}$
- C)  $2x - 3$
- D)  $2x + 3$

20

If the system of equations below has infinite solutions, what is the value of  $b$ ?

$$9x - 14y = -3$$

$$ax - by = 6$$

21

If  $3x + 5y = ax - 4x - by$ , what is the value of  $a$ ?

- A) 3
- B) 1
- C) -5
- D) 7

**CONTINUE**

22

Which of the following values is a solution to inequality?

$$3x + 2 < -5(x + 6)$$

- A) 4
- B) 3
- C) -4
- D) -5

**STOP**