Math

35 MINUTES, 22 QUESTIONS

DIRECTIONS

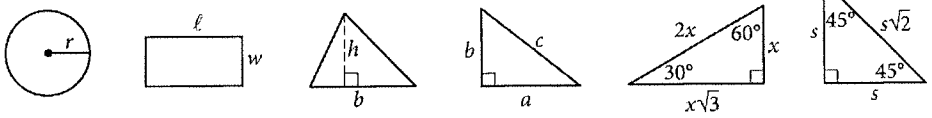
The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

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



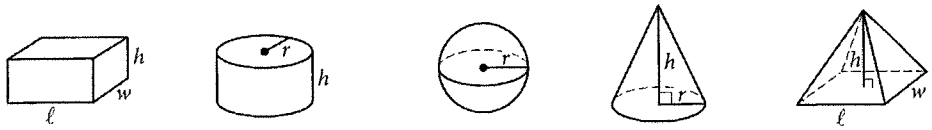
$A = \pi r^2$
$C = 2\pi r$

$A = \ell w$

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

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

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.

2 Module 2 2

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.

2 Module 2 2

1

If $2m^2 - 4m + 2 = 50$, what is the negative value of $2(m - 1)$?

2

In the x y-plane, quadratic equation $y = ax^2 + bx + 11$ passes through the points (1, 5) and (3, 5). What is the value of $a - b$?

A) 10

B) -6

C) -10

D) 6

3

Which of the following systems of equations has no solution?

A) $y - 2x = 5$
$2y - 2x = 2$

B) $y - 2x = 5$
$2y - 4x = 2$

C) $y - 2x = 5$
$y - x = 6$

D) $y - 2x = 5$
$2x - 3y = 1$

4

In the x y-plane, points m, (14, a), and n, (2, 1), are on the line l. If points m and n are 13 units apart, which of the following equations represent line l?

A) $y = -\frac{5}{12}x + \frac{11}{6}$

B) $y = \frac{5}{12}x + \frac{1}{6}$

C) $y = \frac{1}{6}x + 3$

D) $y = -\frac{5}{12}x - \frac{1}{6}$

5

Distance (km)	Number of days
22	8
18	4
10	5
5	3

A long-distance runner runs varying distances each day. The number of days she ran each distance is shown in the table above. What is the difference between the mode and the range of the data set?

A) 5

B) 22

C) 17

D) 18

6

The equation of $(m - 1)x^2 + 2x - 5 = 0$ has exactly one solution, where m is a constant. What is the value of m?

A) 5

B) -5

C) $\frac{4}{5}$

D) $-\frac{4}{5}$

7

In a right triangle MOP, one of the acute angles M has a measure of 30° and the other acute angle is $\angle P$. What is the value of $\sin(P)$?

A) $\frac{1}{2}$

B) $\frac{\sqrt{2}}{2}$

C) 1

D) $\frac{\sqrt{3}}{2}$

8

The price of a stock increased by 25% in one year and decreased by 12% the next year. By what percent did the price increase over the two-year period?

A) 13%

B) 25%

C) 10%

D) 12%

9

When initially purchased, a car valued $56,200. However, it depreciated at a rate of approximately 15% per year within 5 years. What is the value of the car 5 years after purchase? (Neglect the decimals)

10

The function f is defined by $f(x) = x - 6$. What is the x-intercept of the graph of $y = f(x)$ in the x y-plane?

A) (0,6)

B) $(0, -6)$

C) (6,0)

D) $(-6,0)$

11

A water tank has dimensions of width 14 feet, length 20 feet, and height 8 feet. How much water, in cubic meters, is needed to fill the tank? (1 foot = 0.3 meters)

A) 60.48

B) 672

C) 201.6

D) 2240

12

$$3 - \frac{2}{3}x = 8$$

Which equation has the same solution as the given equation?

A) $3 - 2x = 24$

B) $6 - 2x = 16$

C) $9 - 2x = 24$

D) $2x - 9 = 24$

13

An electric vehicle (EV) traveled at an average speed of 66 miles per hour for 3 hours and had an average energy consumption of 0.25 kilowatt-hour (kwh) per mile. Approximately how many kwh did the EV consume over the entire 3 hour drive?

A) 18.5

B) 49.5

C) 5.5

D) 0.75

14

Which of the following expressions below is equivalent to $5x^5 - 26x + 5$?

I. $(5x - 5)(x - 1)$
II. $(x - 5)(5x - 1)$
III. $(x - 1)(5x + 1)$

A) I only
B) II only
C) III only
D) None

15

$$y + 2x < 3$$
$$x + 2y > 2$$

Which of the following pairs of (x_0, y_0) satisfies the system of inequalities above in the x y-plane?

A) $(-1, -2)$
B) $(-1,2)$
C) $(2,3)$
D) $(-3, -1)$

16

If a circle has a radius of 6 units, what is the length of an arc with a central angle of 120°?

A) $\frac{2}{3}\pi$
B) 2π
C) 4π
D) 3π

17

A department store sells a toaster at a regular price and makes a profit of \$5 per toaster. If the profit of selling 4 toasters at 10% off of the regular price is equal to the profit of selling 5 toasters at \$3 less than the regular price for each toaster, what is the regular price of a toaster?

18

Which expression is equivalent to $\frac{x(y-6)}{xy^2 - 6xy} - \frac{3(y-6)}{y-6}$, where $y \neq 0$?

A) $\frac{1}{3}y + 3$
B) $\frac{3xy - 12}{xy^2 - 6xy}$
C) $\frac{1}{y} - 3$
D) $\frac{4x^2}{2x - 1}$

19

Which expression is equivalent to $\frac{m^{-4} \cdot n^8 \cdot p^{12}}{m^{-2} \cdot n^2 \cdot p^{-2}}$, where m, n, and p are positive?

A) $m^{-6} \cdot n^6 \cdot p^{14}$
B) $m^{-6} \cdot n^6 \cdot p^{10}$
C) $m^{-2} \cdot n^6 \cdot p^{14}$
D) $m^2 \cdot n^4 \cdot p^{-6}$

20

What is the diameter of the circle $x^2 - 10x + y^2 - 6y + 22 = 0$ in the x y-plane?

A) $2\sqrt{3}$

B) 12

C) $4\sqrt{3}$

D) 6

21

Mode of transportation	Number of students
Drive	
Bike	33
Walk	22
Other	19
Total	100

A university conducted a survey in which 100 students were selected randomly and asked about the mode of transportation they take to get to campus. The results are shown in the incomplete table above. If the university has a total of 8000 students, how many of them drive to the campus?

22

The function f is defined by $f(x) = 8x^2 + 3$. In the x y-plane, the graph of $y = p(x)$ is the result of shifting the graph of $y = f(x)$ down 8 units. Which equation defines the function p?

A) $p(x) = 8x^2 + 11$

B) $p(x) = 8x^2 - 5$

C) $p(x) = x^2 + 3$

D) $p(x) = x^2 - 3$