2 Module 1 2

Math

35 MINUTES, 22 QUESTIONS

DIRECTIONS

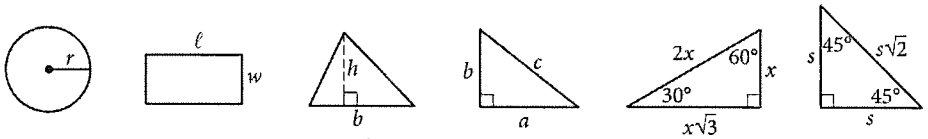
The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

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



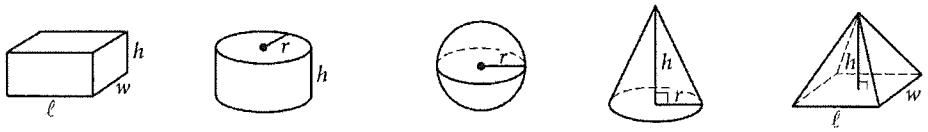
$A = \pi r^2$
$C = 2\pi r$

$A = \ell w$

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

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

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.

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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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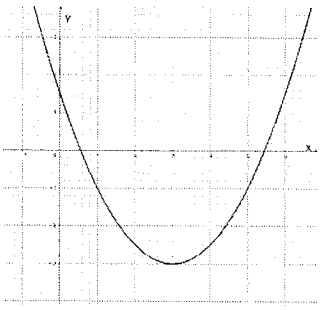
1

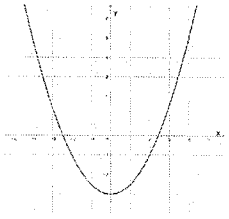
If $\frac{3x}{2} + 5 = 8$, what is the value of $3x + 3$?

2

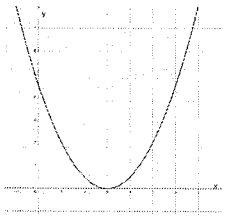


The graph above is the function of $y = f(x)$. Which of the following graphs represents the function of $y = f(x) + m$, where m is a constant and $m < 0$?

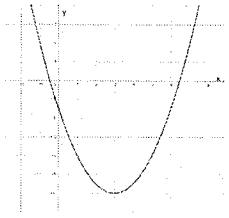
A)



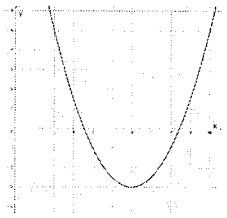
C)



B)



D)



3

$$3x + 6y = 30$$
$$2x - 5y = 2$$

If (a, b) is a solution of the given system of equations, what is the value of $5a + b$?

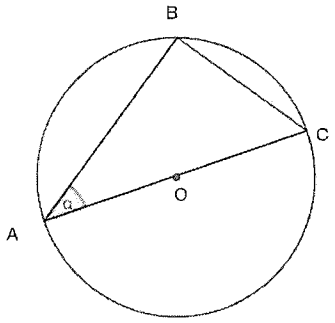
A) 28

B) 32

C) 16

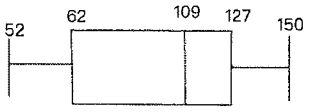
D) 21

4



The circle above has a center O. In triangle ABC, the measure of $\angle BAC$ is 25°. What is the measure of $\angle BCA$, in degrees?

5



Based on the box plot above, which of the following statements about the data represented is not true?

A) The range of the data set is 65.

B) The maximum value of the data set is 150.

C) The range of the data set is 98.

D) The median of the data set is 109.

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6

The equation F models the number of rabbits in a population at the end of each year from 2018 to 2023. The number of rabbits in a population at the end of each year is always 120% more than that at the end of the previous year. The model estimates that at the end of 2019, there were 440 rabbits in the population. Which of the following equations represents this model, where t is the number of years after the end of 2018 and $0 \leq t \leq 5$?

A) $F = 600(1.2)^t$

B) $F = 200(1.2)^t$

C) $F = 600(2.2)^t$

D) $F = 200(2.2)^t$

7

A car is traveling at a constant speed along a straight stretch of the road. The equation $d = 40t$ gives the distance d, in feet, from an intersection that the car will be t seconds after passing it. How many feet from the intersection will the car be 4 seconds after passing the intersection?

A) 10

B) 160

C) 80

D) 20

8

A data set contains 6 numbers arranged from least to greatest. The mean of the entire data set is 27, the mean of the first 4 data values is 23, and the mean of the last 3 data values is 34. What is the value of the fourth data value?

9

$$3y + 2x = 6$$
$$2y + 3x = 10$$

The equations above represent the line l and the line k in the xy-plane. Which of the following statement is true ?

A) line l and line k are parallel.

B) line l and line k are coincide.

C) line l and line k are perpendicular.

D) line l and line k intersect at (x_0, y_0)

10

$$x^3 - 6x^2 + 5x = 0$$

How many solutions does the given equation have?

A) One

B) Two

C) Three

D) None

11

To celebrate the company's 10th anniversary, each employee receives a box of chocolates or a bouquet of flowers. Each box of chocolates costs \$35, each bouquet of flowers costs \$38, and the company paid a total of \$2935. Which system of equations represents this situation?

A) $x + y = 80$
$(35 + 38)y = 2935$

B) $x + y = 80$
$35x + 38y = 2935$

C) $x + y = 80$
$(35 + 38)x = 2935$

D) $x + y = 2935$
$35x + 38y = 80$

2 Module 2 2

12

According to recorded statistics, 6371 of the participants for the 2000 Boston Marathon were women, making up 35.77% of the total participants. How many participants were there in total for the 2000 Boston Marathon? (to the nearest whole number)

13

Which of the following equations represents a circle in the x y -plane that intersects the x-axis at exactly one point?

A) $(x-6)^2+(y-3)^2=36$

B) $(x-3)^2+(y-6)^2=9$

C) $(x-3)^2+(y-6)^2=36$

D) $(x-6)^2+(y-3)^2=6$

14

	Number of violinists	Number of violists	Number of cellists	Total
Female	35	12	8	55
Male	30	13	10	53
Total	65	25	18	108

The table above shows information about the Intermediate Youth Orchestra's team members. The Intermediate Youth Orchestra has 118 members. If one of the members is selected randomly, what is the probability that this member is a cellist?

A) $\frac{1}{6}$

B) $\frac{2}{27}$

C) $\frac{5}{54}$

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

15

Alex runs y kilometers every $3x$ hours. Which expression represents the total kilometers that Alex runs in $9x$ hours?

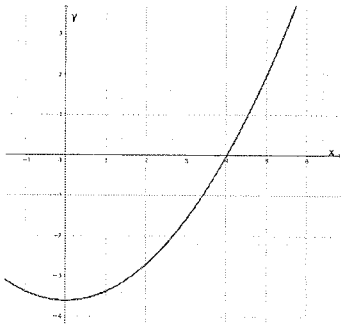
A) $9y$

B) $\frac{y}{3}$

C) $\frac{y}{9}$

D) $3y$

16



What is the x-intercept of the graph shown above?

A) (0, 3.5)

B) (3.5, 0)

C) (4,0)

D) (0,4)

17

Which expression is equivalent to $(x^6 \cdot y^{-3} \cdot z^2)(x \cdot y^2 \cdot z^3)$, where x,y, z are positive?

A) $x^7 \cdot y \cdot z^5$

B) $x^5 \cdot y^{-2} \cdot z$

C) $x^6 \cdot y^{-6} \cdot z^6$

D) $x^7 \cdot y^{-1} \cdot z^5$

2 Module 2 2

18

$x^2 + 4x - 9 = 0$ has two solutions: $x = a$ and $x = b$. What is the value of $a + b$?

19

The equation $(x + 2)^2 + (y - 3)^2 = 25$ is a circle in the xy-plane. Which of the following equations represents this circle after being shifted 3 unit down and 3 units to the right?

A) $(x + 5)^2 + (y + 3)^2 = 25$

B) $(x - 1)^2 + (y + 3)^2 = 25$

C) $(x - 1)^2 + y^2 = 25$

D) $(x + 5)^2 + y^2 = 25$

20

Triangles ABC and EFG are similar, where A and B correspond to E and F, respectively. Angle A has a measure 62° and angle B has a measure of 55°. What is the measure of angle G?

A) 62°

B) 118°

C) 63°

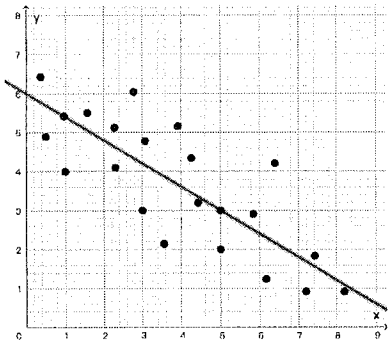
D) 55°

21

$$y = -3x^2 + 6x - 12$$

The given equation relates the variables x and y. What is the maximum value of y?

22



The given scatterplot shows the relationship between the two variables x and y. Which of the following equations best represents the line of best fit, l?

A) $f(x) = -\frac{3}{5}x - 6$

B) $f(x) = -\frac{3}{5}x + 6$

C) $f(x) = \frac{3}{5}x + 6$

D) $f(x) = \frac{3}{5}x - 6$