

Math

27 QUESTIONS

DIRECTIONS

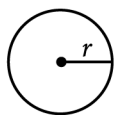
The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

NOTES

Unless otherwise indicated:

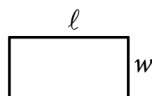
- All variables and expressions represent real numbers.
- Figures provided are drawn to scale.
- All figures lie in a plane.
- The domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

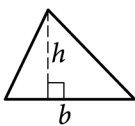


$$A = \pi r^2$$

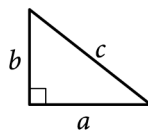
$$C = 2\pi r$$



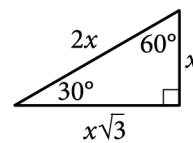
$$A = \ell w$$



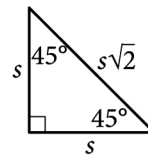
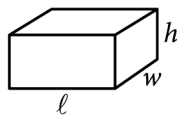
$$A = \frac{1}{2}bh$$



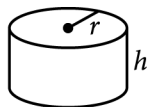
$$c^2 = a^2 + b^2$$



Special Right Triangles



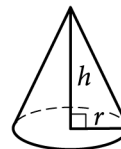
$$V = \ell wh$$



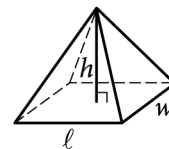
$$V = \pi r^2 h$$



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



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



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

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.

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

A bus is traveling at a constant speed along a straight portion of road. The equation $d = 30t$ gives the distance d , in feet from a road marker, that the bus will be t seconds after passing the marker. How many feet from the marker will the bus be 2 seconds after passing the marker?

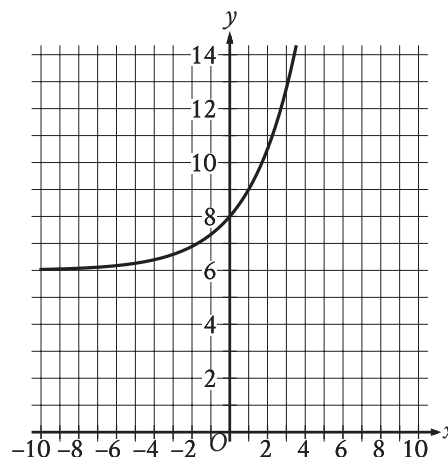
- A) 30
- B) 32
- C) 60
- D) 90

2

For a particular machine that produces beads, 29 out of every 100 beads it produces have a defect. A bead produced by the machine will be selected at random. What is the probability of selecting a bead that has a defect?

- A) $\frac{1}{2,900}$
- B) $\frac{1}{29}$
- C) $\frac{29}{100}$
- D) $\frac{29}{10}$

3



What is the y -intercept of the graph shown?

- A) $(-8, 0)$
- B) $(-6, 0)$
- C) $(0, 6)$
- D) $(0, 8)$

4

Which expression is equivalent to

$$(2x^2 + x - 9) + (x^2 + 6x + 1) ?$$

- A) $2x^2 + 7x + 10$
- B) $2x^2 + 6x - 8$
- C) $3x^2 + 7x - 10$
- D) $3x^2 + 7x - 8$

5

An analyst collected data on the price of a carton of grape tomatoes at 30 locations selected at random in Utah. The mean price of a carton of grape tomatoes in Utah was estimated to be \$4.23, with an associated margin of error of \$0.08. Which of the following is a plausible statement about the mean price of a carton of grape tomatoes for all locations that sell this product in Utah?

- A) It is between \$4.15 and \$4.31.
- B) It is either less than \$4.15 or greater than \$4.31.
- C) It is less than \$4.15.
- D) It is greater than \$4.31.

6

$$2.6 + x = 2.8$$

What value of x is the solution to the given equation?

7

Out of 300 seeds that were planted, 80% sprouted. How many of these seeds sprouted?

8

$$f(x) = 4x + b$$

For the linear function f , b is a constant and $f(7) = 28$. What is the value of b ?

- A) 0
- B) 1
- C) 4
- D) 7

9

Right triangles LMN and PQR are similar, where L and M correspond to P and Q , respectively. Angle M has a measure of 53° . What is the measure of angle Q ?

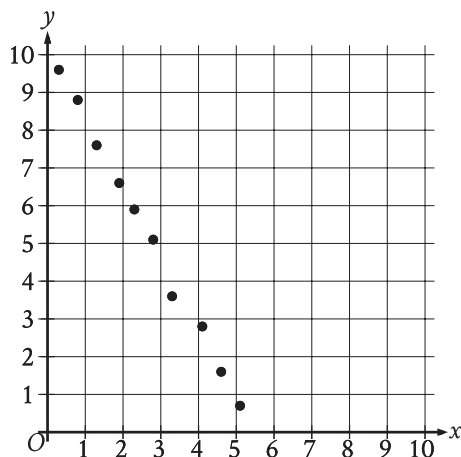
- A) 37°
- B) 53°
- C) 127°
- D) 143°

10

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) $y = 5x + 7$

11



Which of the following equations is the most appropriate linear model for the data shown in the scatterplot?

- A) $y = -1.9x - 10.1$
- B) $y = -1.9x + 10.1$
- C) $y = 1.9x - 10.1$
- D) $y = 1.9x + 10.1$

12

A model predicts that the population of Bergen was 15,000 in 2005. The model also predicts that each year for the next 5 years, the population p increased by 4% of the previous year's population. Which equation best represents this model, where x is the number of years after 2005, for $x \leq 5$?

- A) $p = 0.96(15,000)^x$
- B) $p = 1.04(15,000)^x$
- C) $p = 15,000(0.96)^x$
- D) $p = 15,000(1.04)^x$

13

$$2a + 8b = 198$$

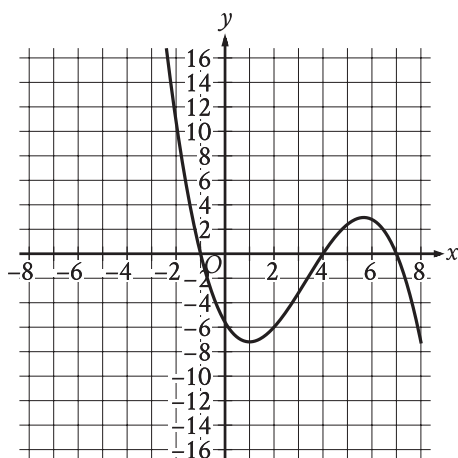
$$2a + 4b = 98$$

The solution to the given system of equations is (a, b) . What is the value of b ?

14

The expression $90y^5 - 54y^4$ is equivalent to $ry^4(15y - 9)$, where r is a constant. What is the value of r ?

15



The graph of $y = f(x)$ is shown, where the function f is defined by $f(x) = ax^3 + bx^2 + cx + d$ and a , b , c , and d are constants. For how many values of x does $f(x) = 0$?

- A) One
- B) Two
- C) Three
- D) Four

16

The area A , in square centimeters, of a rectangular cutting board can be represented by the expression $w(w + 9)$, where w is the width, in centimeters, of the cutting board. Which expression represents the length, in centimeters, of the cutting board?

- A) $w(w + 9)$
- B) w
- C) 9
- D) $(w + 9)$

17

$$p = \frac{k}{4j + 9}$$

The given equation relates the distinct positive numbers p , k , and j . Which equation correctly expresses $4j + 9$ in terms of p and k ?

- A) $4j + 9 = \frac{k}{p}$
- B) $4j + 9 = kp$
- C) $4j + 9 = k - p$
- D) $4j + 9 = \frac{p}{k}$

18

Circle A has a radius of $3n$ and circle B has a radius of $129n$, where n is a positive constant. The area of circle B is how many times the area of circle A ?

- A) 43
- B) 86
- C) 129
- D) 1,849

19

The measure of angle R is $\frac{2\pi}{3}$ radians. The measure of angle T is $\frac{5\pi}{12}$ radians greater than the measure of angle R . What is the measure of angle T , in degrees?

- A) 75
- B) 120
- C) 195
- D) 390

20

$$y = x^2 - 14x + 22$$

The given equation relates the variables x and y . For what value of x does the value of y reach its minimum?

21

A small business owner budgets \$2,200 to purchase candles. The owner must purchase a minimum of 200 candles to maintain the discounted pricing. If the owner pays \$4.90 per candle to purchase small candles and \$11.60 per candle to purchase large candles, what is the maximum number of large candles the owner can purchase to stay within the budget and maintain the discounted pricing?

22

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

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) $(14, 0)$

23

Weight (pounds)	Frequency
13	12
14	8
15	5
16	7
17	9
18	10
19	13
20	7

The frequency table summarizes a data set of the weights, rounded to the nearest pound, of 71 tortoises. A weight of 39 pounds is added to the original data set, creating a new data set of the weights, rounded to the nearest pound, of 72 tortoises. Which statement best compares the mean and median of the new data set to the mean and median of the original data set?

- A) The mean of the new data set is greater than the mean of the original data set, and the median of the new data set is greater than the median of the original data set.
- B) The mean of the new data set is greater than the mean of the original data set, and the medians of the two data sets are equal.
- C) The mean of the new data set is less than the mean of the original data set, and the median of the new data set is less than the median of the original data set.
- D) The mean of the new data set is less than the mean of the original data set, and the medians of the two data sets are equal.

24

$$x - 29 = (x - a)(x - 29)$$

Which of the following are solutions to the given equation, where a is a constant and $a > 30$?

- I. a
 - II. $a + 1$
 - III. 29
- A) I and II only
 - B) I and III only
 - C) II and III only
 - D) I, II, and III

25

In the xy -plane, the graph of the equation $y = -x^2 + 9x - 100$ intersects the line $y = c$ at exactly one point. What is the value of c ?

- A) $-\frac{481}{4}$
- B) -100
- C) $-\frac{319}{4}$
- D) $-\frac{9}{2}$

26

The functions f and g are defined by the given equations, where $x \geq 0$. Which of the following equations displays, as a constant or coefficient, the maximum value of the function it defines, where $x \geq 0$?

I. $f(x) = 18(1.25)^x + 41$

II. $g(x) = 9(0.73)^x$

- A) I only
- B) II only
- C) I and II
- D) Neither I nor II

27

The perimeter of an equilateral triangle is 852 centimeters. The three vertices of the triangle lie on a circle. The radius of the circle is $w\sqrt{3}$ centimeters. What is the value of w ?

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.**

No Test Material On This Page