

Math

27 QUESTIONS

DIRECTIONS

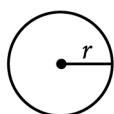
The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

NOTES

Unless otherwise indicated:

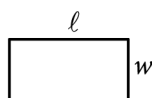
- All variables and expressions represent real numbers.
- Figures provided are drawn to scale.
- All figures lie in a plane.
- The domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

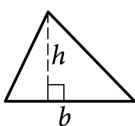


$$A = \pi r^2$$

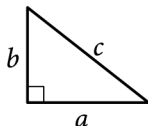
$$C = 2\pi r$$



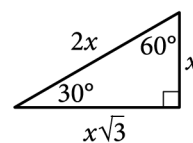
$$A = \ell w$$



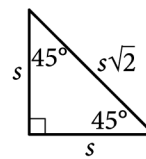
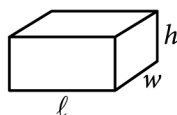
$$A = \frac{1}{2}bh$$



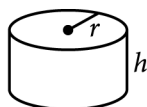
$$c^2 = a^2 + b^2$$



Special Right Triangles



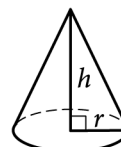
$$V = \ell wh$$



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



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



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



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

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

$$w + 7 = 357$$

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

- A) 51
- B) 350
- C) 364
- D) 3,577

2

Which expression is equivalent to $16(x + 15)$?

- A) $16x + 31$
- B) $16x + 240$
- C) $16x + 1$
- D) $16x + 15$

3

	Live east of the river	Live west of the river	Total
Less than 40 years old	17	11	28
At least 40 years old	18	89	107
Total	35	100	135

The table summarizes members of a local organization by age and whether they live east or west of the river. If a member of the organization is selected at random, what is the probability that the selected member is at least 40 years old?

- A) $\frac{28}{135}$
- B) $\frac{35}{135}$
- C) $\frac{100}{135}$
- D) $\frac{107}{135}$

4

$$3x = 12$$

$$-3x + y = -6$$

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

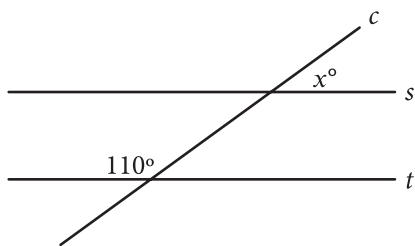
- A) -3
- B) 6
- C) 18
- D) 30

5

A line in the xy -plane has a slope of $\frac{1}{9}$ and passes through the point $(0, 14)$. Which equation represents this line?

- A) $y = -\frac{1}{9}x - 14$
B) $y = -\frac{1}{9}x + 14$
C) $y = \frac{1}{9}x - 14$
D) $y = \frac{1}{9}x + 14$

6



Note: Figure not drawn to scale.

In the figure shown, line c intersects parallel lines s and t . What is the value of x ?

7

$$f(x) = x + \frac{8}{11}$$

The function f is defined by the given equation.

What is the value of $f(x)$ when $x = \frac{3}{11}$?

8

x	y
0	18
1	13
2	8

The table shows three values of x and their corresponding values of y . There is a linear relationship between x and y . Which of the following equations represents this relationship?

- A) $y = 18x + 13$
B) $y = 18x + 18$
C) $y = -5x + 13$
D) $y = -5x + 18$

9

$$\begin{aligned}x + 7 &= 10 \\(x + 7)^2 &= y\end{aligned}$$

Which ordered pair (x, y) is a solution to the given system of equations?

- A) $(3, 100)$
- B) $(3, 3)$
- C) $(3, 10)$
- D) $(3, 70)$

10

The function f is defined by $f(x) = 7x - 84$. What is the x -intercept of the graph of $y = f(x)$ in the xy -plane?

- A) $(-12, 0)$
- B) $(-7, 0)$
- C) $(7, 0)$
- D) $(12, 0)$

11

Time (years)	Total amount (dollars)
0	604.00
1	606.42
2	608.84

Rosa opened a savings account at a bank. The table shows the exponential relationship between the time t , in years, since Rosa opened the account and the total amount n , in dollars, in the account. If Rosa made no additional deposits or withdrawals, which of the following equations best represents the relationship between t and n ?

- A) $n = (1 + 604)^t$
- B) $n = (1 + 0.004)^t$
- C) $n = 604(1 + 0.004)^t$
- D) $n = 0.004(1 + 604)^t$

12

$$w(t) = 300 - 4t$$

The function w models the volume of liquid, in milliliters, in a container t seconds after it begins draining from a hole at the bottom. According to the model, what is the predicted volume, in milliliters, draining from the container each second?

- A) 300
- B) 296
- C) 75
- D) 4

13

$$h(x) = x + b$$

For the linear function h , b is a constant and $h(0) = 45$. What is the value of b ?

14

$$z^2 + 10z - 24 = 0$$

What is one of the solutions to the given equation?

15

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 $\sin(J)$?

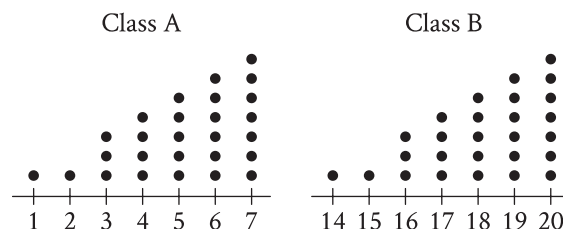
- A) $\frac{75}{317}$
- B) $\frac{308}{317}$
- C) $\frac{317}{308}$
- D) $\frac{317}{75}$

16

The population of Greenville increased by 7% from 2015 to 2016. If the 2016 population is k times the 2015 population, what is the value of k ?

- A) 0.07
- B) 0.7
- C) 1.07
- D) 1.7

17



Each of the dot plots shown represents the number of glue sticks brought in by each student for two classes, class A and class B. Which statement best compares the standard deviations of the numbers of glue sticks brought in by each student for these two classes?

- A) The standard deviation of the number of glue sticks brought in by each student for class A is less than the standard deviation of the number of glue sticks brought in by each student for class B.
- B) The standard deviation of the number of glue sticks brought in by each student for class A is equal to the standard deviation of the number of glue sticks brought in by each student for class B.
- C) The standard deviation of the number of glue sticks brought in by each student for class A is greater than the standard deviation of the number of glue sticks brought in by each student for class B.
- D) There is not enough information to compare these standard deviations.

18

$$m(t) = -0.0274\left(\frac{t}{7}\right)^2 + 7.3873\left(\frac{t}{7}\right) + 75.032$$

The function m gives the predicted body mass $m(t)$, in kilograms (kg), of a certain animal t days after it was born in a wildlife reserve, where $t \leq 390$. Which of the following is the best interpretation of the statement “ $m(330)$ is approximately equal to 362” in this context?

- A) The predicted body mass of the animal was approximately 330 kg 362 days after it was born.
- B) The predicted body mass of the animal was approximately 362 kg 330 days after it was born.
- C) The predicted body mass of the animal was approximately 362 kg $\frac{330}{7}$ days after it was born.
- D) The predicted body mass of the animal was approximately $\frac{330}{7}$ kg 362 days after it was born.

19

Triangle XYZ is similar to triangle RST such that X , Y , and Z correspond to R , S , and T , respectively. The measure of $\angle Z$ is 20° and $2XY = RS$. What is the measure of $\angle T$?

- A) 2°
- B) 10°
- C) 20°
- D) 40°

20

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?

21

The function f is defined by $f(x) = a^x + b$, where a and b are constants and $a > 0$. In the xy -plane, the graph of $y = f(x)$ has a y -intercept at $(0, -25)$ and passes through the point $(2, 23)$. What is the value of $a + b$?

22

$$y > 13x - 18$$

For which of the following tables are all the values of x and their corresponding values of y solutions to the given inequality?

A)

x	y
3	21
5	47
8	86

B)

x	y
3	26
5	42
8	86

C)

x	y
3	16
5	42
8	81

D)

x	y
3	26
5	52
8	91

23

A certain town has an area of 4.36 square miles. What is the area, in square yards, of this town? (1 mile = 1,760 yards)

- A) 404
 B) 7,674
 C) 710,459
 D) 13,505,536

24

A square is inscribed in a circle. The radius of the circle is $\frac{20\sqrt{2}}{2}$ inches. What is the side length, in inches, of the square?

- A) 20
 B) $\frac{20\sqrt{2}}{2}$
 C) $20\sqrt{2}$
 D) 40

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

The function f is defined by $f(x) = a(2 \cdot 2^x + 2 \cdot 2^b)$, where a and b are integer constants and $0 < a < b$. The functions g and h are equivalent to function f , where k and m are constants. Which of the following equations displays the y -coordinate of the y -intercept of the graph of $y = f(x)$ in the xy -plane as a constant or coefficient?

I. $g(x) = a(2 \cdot 2^x + k)$

II. $h(x) = a(2 \cdot 2)^x + m$

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

27

$$x(kx - 56) = -16$$

In the given equation, k is an integer constant. If the equation has no real solution, what is the least possible value of k ?

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