



Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

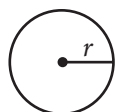
DIRECTIONS

For questions 1-15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For questions 16-20, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTES

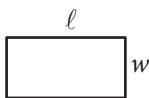
1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

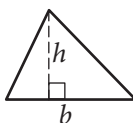


$$A = \pi r^2$$

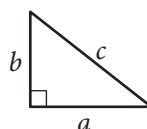
$$C = 2\pi r$$



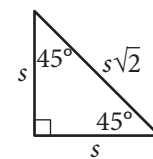
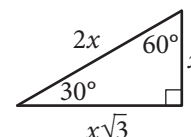
$$A = \ell w$$



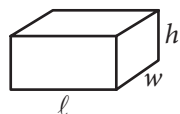
$$A = \frac{1}{2}bh$$



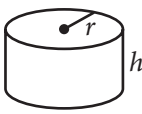
$$c^2 = a^2 + b^2$$



Special Right Triangles



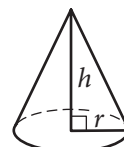
$$V = \ell wh$$



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



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



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



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

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.



1

A farmer sold 108 pounds of produce that consisted of z pounds of zucchini and c pounds of cucumbers. The farmer sold the zucchini for \$1.69 per pound and the cucumbers for \$0.99 per pound and collected a total of \$150.32. Which of the following systems of equations can be used to find the number of pounds of zucchini that were sold?

- A)
$$\begin{aligned} z + c &= 150.32 \\ 1.69z + 0.99c &= 108 \end{aligned}$$
- B)
$$\begin{aligned} z + c &= 108 \\ 1.69z + 0.99c &= 150.32 \end{aligned}$$
- C)
$$\begin{aligned} z + c &= 108 \\ 0.99z + 1.69c &= 150.32 \end{aligned}$$
- D)
$$\begin{aligned} z + c &= 150.32 \\ 0.99z + 1.69c &= 108 \end{aligned}$$

2

$$C = 10x + 4y$$

The formula above gives the monthly cost C , in dollars, of operating a delivery truck when the driver works a total of x hours and when y gallons of gasoline are used. If, in a particular month, it cost no more than \$2,000 to operate the truck and at least 150 gallons of gas were used, what is the maximum number of hours the driver could have worked?

- A) 125
 B) 140
 C) 500
 D) 1,400

3

$$5x^2 - 3(1 - x) - 2x(x + 5)$$

Which of the following polynomials is equivalent to the expression above?

- A) $3x^2 - 7x - 3$
 B) $3x^2 + 7x - 3$
 C) $5x^2 - 5x - 3$
 D) $5x^2 - 9x - 3$

4

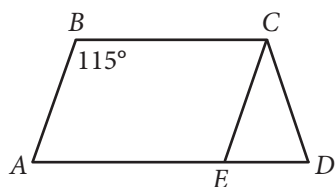
$$x(x + 2) = 8$$

Which of the following lists all solutions to the quadratic equation above?

- A) 8 and 6
 B) 4 and -2
 C) -4 and 2
 D) $\sqrt{6}$



5



Note: Figure not drawn to scale.

In the figure above, \overline{BC} and \overline{AD} are parallel, \overline{AB} and \overline{EC} are parallel, $CD = CE$, and the measure of $\angle ABC$ is 115° . What is the measure of $\angle BCD$?

- A) 85°
- B) 115°
- C) 125°
- D) 140°

6

$$0.8p = t$$

At a store, a coat originally priced at p dollars is on sale for t dollars, and the relationship between p and t is given in the equation above. What is p in terms of t ?

- A) $p = t - 0.8$
- B) $p = 0.8t$
- C) $p = \frac{0.8}{t}$
- D) $p = \frac{t}{0.8}$

7

$$x + 2y = 16$$

$$0.5x - y = 10$$

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

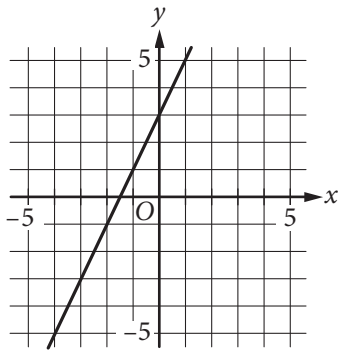
- A) -2
- B) 2
- C) 18
- D) 36



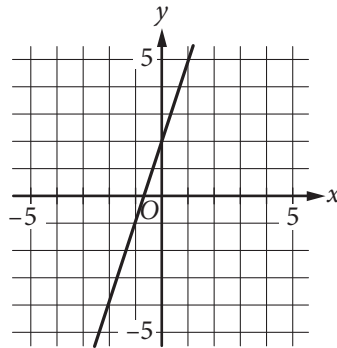
8

Which of the following is the graph of the equation $y = 2x + 3$ in the xy -plane?

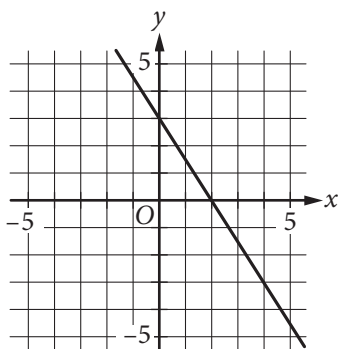
A)



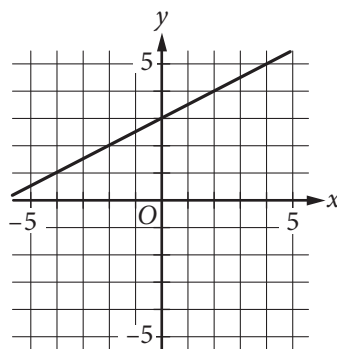
B)



C)



D)



9

$$\begin{aligned}x^2 - 6x + 11 &= y \\ x &= y + 1\end{aligned}$$

The system of equations above is graphed in the xy -plane. Which of the following is the y -coordinate of an intersection point (x, y) of the graphs of the two equations?

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

10

$$\frac{5}{x-1} + \frac{8}{2(x-1)}$$

Which of the following expressions is equivalent to the one above, where $x \neq 1$?

- A) $\frac{9}{x-1}$
- B) $\frac{14}{x-1}$
- C) $\frac{15}{2x-2}$
- D) $\frac{21}{2x-2}$



11

For a positive real number x , where $x^8 = 2$, what is the value of x^{24} ?

- A) $\sqrt[3]{24}$
- B) 4
- C) 6
- D) 8

12

Which of the following is an equivalent form of

$\sqrt[3]{f^{6a}k^2}$, where $f > 0$ and $k > 0$?

- A) $f^{\frac{1}{3a}}k^{-1}$
- B) $f^{\frac{1}{2a}}k^{\frac{3}{2}}$
- C) $f^{3a}k^{-1}$
- D) $f^{2a}k^{\frac{2}{3}}$

13

$$g(t) = \frac{5(7t - 12c)}{2} - 25$$

The number of people who go to a public swimming pool can be modeled by the function g above, where c is a constant and t is the air temperature in degrees Fahrenheit ($^{\circ}\text{F}$) for $70 < t < 100$. If 350 people are predicted to go to the pool when the temperature is 90°F , what is the value of c ?

- A) 20
- B) 40
- C) 60
- D) 80



14

The boiling point of water at sea level is 212 degrees Fahrenheit ($^{\circ}\text{F}$). For every increase of 1,000 feet above sea level, the boiling point of water drops approximately 1.84°F . Which of the following equations gives the approximate boiling point B , in $^{\circ}\text{F}$, at h feet above sea level?

- A) $B = 212 - 1.84h$
- B) $B = 212 - (0.00184)h$
- C) $B = 212h$
- D) $B = 1.84(212) - 1,000h$

15

The graph of $x^2 - 4x + y^2 + 6y - 24 = 0$ in the xy -plane is a circle. What is the radius of the circle?

- A) $2\sqrt{6}$
- B) $\sqrt{11}$
- C) $\sqrt{37}$
- D) $\sqrt{76}$



DIRECTIONS

For questions 16-20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.

5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If $\begin{array}{|c|c|c|c|} \hline 3 & 1 & / & 2 \\ \hline \bullet & \bullet & \bullet & \bullet \\ \hline \end{array}$ is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)

6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Write answer in boxes. →

Grid in result. ←

Answer: $\frac{7}{12}$

| | | | |
|---|---|---|---|
| 7 | / | 1 | 2 |
| • | • | • | • |
| 0 | 0 | 0 | 0 |
| 1 | 1 | • | 1 |
| 2 | 2 | 2 | • |
| 3 | 3 | 3 | 3 |
| 4 | 4 | 4 | 4 |
| 5 | 5 | 5 | 5 |
| 6 | 6 | 6 | 6 |
| • | 7 | 7 | 7 |
| 8 | 8 | 8 | 8 |
| 9 | 9 | 9 | 9 |

← Fraction line

Answer: 2.5

| | | | |
|---|---|---|---|
| | 2 | . | 5 |
| • | • | • | • |
| 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 |
| 2 | • | 2 | 2 |
| 3 | 3 | 3 | 3 |
| 4 | 4 | 4 | 4 |
| 5 | 5 | 5 | • |
| 6 | 6 | 6 | 6 |
| 7 | 7 | 7 | 7 |
| 8 | 8 | 8 | 8 |
| 9 | 9 | 9 | 9 |

← Decimal point

Acceptable ways to grid $\frac{2}{3}$ are:

| | | | |
|---|---|---|---|
| | 2 | / | 3 |
| • | • | • | • |
| 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 |
| 2 | • | 2 | 2 |
| 3 | 3 | 3 | • |
| 4 | 4 | 4 | 4 |
| 5 | 5 | 5 | 5 |
| 6 | 6 | 6 | 6 |
| 7 | 7 | 7 | 7 |
| 8 | 8 | 8 | 8 |
| 9 | 9 | 9 | 9 |

| | | | |
|---|---|---|---|
| . | 6 | 6 | 6 |
| • | • | • | • |
| 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 2 |
| 3 | 3 | 3 | 3 |
| 4 | 4 | 4 | 4 |
| 5 | 5 | 5 | 5 |
| 6 | • | • | • |
| 7 | 7 | 7 | 7 |
| 8 | 8 | 8 | 8 |
| 9 | 9 | 9 | 9 |

| | | | |
|---|---|---|---|
| . | 6 | 6 | 7 |
| • | • | • | • |
| 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 2 |
| 3 | 3 | 3 | 3 |
| 4 | 4 | 4 | 4 |
| 5 | 5 | 5 | 5 |
| 6 | • | • | • |
| 7 | 7 | 7 | • |
| 8 | 8 | 8 | 8 |
| 9 | 9 | 9 | 9 |

Answer: 201 – either position is correct

| | | | |
|---|---|---|---|
| | 2 | 0 | 1 |
| • | • | • | • |
| 0 | 0 | • | 0 |
| 1 | 1 | 1 | • |
| 2 | • | 2 | 2 |
| 3 | 3 | 3 | 3 |
| 4 | 4 | 4 | 4 |
| 5 | 5 | 5 | 5 |
| 6 | 6 | 6 | 6 |
| 7 | 7 | 7 | 7 |
| 8 | 8 | 8 | 8 |
| 9 | 9 | 9 | 9 |

| | | | |
|---|---|---|---|
| 2 | 0 | 1 | |
| • | • | • | • |
| 0 | • | 0 | 0 |
| 1 | 1 | • | 1 |
| • | 2 | 2 | 2 |
| 3 | 3 | 3 | 3 |
| 4 | 4 | 4 | 4 |
| 5 | 5 | 5 | 5 |
| 6 | 6 | 6 | 6 |
| 7 | 7 | 7 | 7 |
| 8 | 8 | 8 | 8 |
| 9 | 9 | 9 | 9 |

NOTE: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



16

$$|5 - x| = 4$$

The value of one solution to the equation above is 1.
What is the value of the other solution?

17

If $f(x) = x^2 - 4x + 10$ and c is a positive integer less than 5, what is one possible value of $f(c)$?

18

Students in a science lab are working in groups to build both a small and a large electrical circuit. A large circuit uses 4 resistors and 2 capacitors, and a small circuit uses 3 resistors and 1 capacitor. There are 100 resistors and 70 capacitors available, and each group must have enough resistors and capacitors to make one large and one small circuit. What is the maximum number of groups that could work on this lab project?

19

An angle with a measure of $\frac{7\pi}{6}$ radians has a measure of d degrees, where $0 \leq d < 360$. What is the value of d ?

20

The function f is defined by $f(r) = (r - 4)(r + 1)^2$. If $f(h - 3) = 0$, what is one possible value of h ?

STOP

**If you finish before time is called, you may check your work on this section only.
Do not turn to any other section.**