



# Math Test – No Calculator

25 MINUTES, 17 QUESTIONS

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

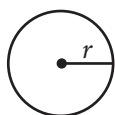
## DIRECTIONS

For questions 1-13, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For questions 14-17, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 14 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

## NOTES

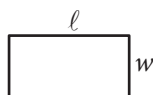
- The use of a calculator is **not permitted**.
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise indicated,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

## REFERENCE

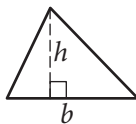


$$A = \pi r^2$$

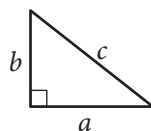
$$C = 2\pi r$$



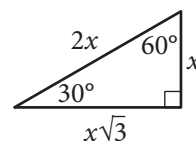
$$A = \ell w$$



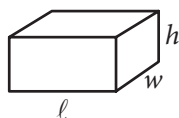
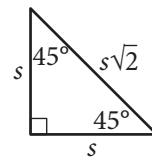
$$A = \frac{1}{2}bh$$



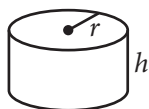
$$c^2 = a^2 + b^2$$



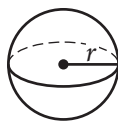
Special Right Triangles



$$V = \ell wh$$



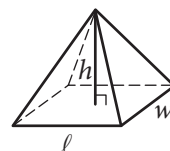
$$V = \pi r^2 h$$



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



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



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

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is  $2\pi$ .

The sum of the measures in degrees of the angles of a triangle is 180.



1

Which of the following is an equivalent form of the expression  $15x + 24ax$  ?

- A)  $39ax^2$
- B)  $39(a + 2x)$
- C)  $(5 + 8a)x$
- D)  $(15 + 24a)x$

2

The formula  $d = rt$  is used to calculate the distance an object travels over a period of time,  $t$ , at a constant rate,  $r$ . Based on this formula, what is the rate,  $r$ , in terms of  $d$  and  $t$  ?

- A)  $r = \frac{d}{t}$
- B)  $r = dt$
- C)  $r = \frac{t}{d}$
- D)  $r = d - t$

3

Which of the following ordered pairs  $(x, y)$  satisfies both equations  $y = x^2 + 3x - 4$  and  $x = y - 4$  ?

- A)  $(0, -4)$
- B)  $(2, 6)$
- C)  $(3, 14)$
- D)  $(5, 9)$

4

Which of the following is a solution to the equation  $2x^2 + 4x = 3 + 3x^2$  ?

- A)  $-1$
- B)  $0$
- C)  $3$
- D)  $6$



5

$$-3x - 4y = 20$$

$$x - 10y = 16$$

If  $(x, y)$  is the solution to the system of equations above, what is the value of  $x$  ?

- A)  $-14$
- B)  $-12$
- C)  $-4$
- D)  $16$

6

The equation  $y = 36 + 18x$  models the relationship between the height  $y$ , in inches, of a typical golden delicious apple tree and the number of years,  $x$ , after it was planted. If the equation is graphed in the  $xy$ -plane, what is indicated by the  $y$ -intercept of the graph?

- A) The age, in years, of a typical apple tree when it is planted
- B) The height, in inches, of a typical apple tree when it is planted
- C) The number of years it takes a typical apple tree to grow
- D) The number of inches a typical apple tree grows each year

7

Giovanni wants to buy shirts that cost \$19.40 each and sweaters that cost \$24.80 each. An 8% sales tax will be applied to the entire purchase. If Giovanni buys 2 shirts, which equation relates the number of sweaters purchased,  $p$ , and the total cost in dollars,  $y$  ?

- A)  $1.08(38.80 + 24.80p) = y$
- B)  $38.80 + 24.80p = 0.92y$
- C)  $38.80 + 24.80p = 1.08y$
- D)  $0.92(38.80 + 24.80p) = y$

8

A line is graphed in the  $xy$ -plane. If the line has a positive slope and a negative  $y$ -intercept, which of the following points cannot lie on the line?

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



9

A parachute design uses 18 separate pieces of rope. Each piece of rope must be at least 270 centimeters and no more than 280 centimeters long. What inequality represents all possible values of the total length of rope  $x$ , in centimeters, needed for the parachute?

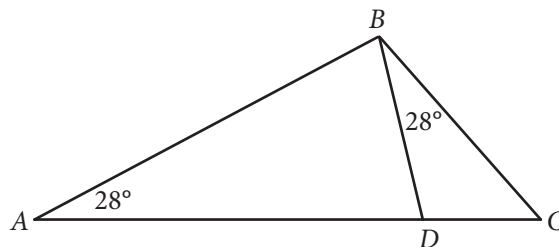
- A)  $270 \leq x \leq 280$
- B)  $4,860 \leq x \leq 4,870$
- C)  $4,860 \leq x \leq 5,040$
- D)  $5,030 \leq x \leq 5,040$

10

A carpenter has \$60 with which to buy supplies. The carpenter needs to buy both nails and screws. Nails cost \$12.99 per box, and screws cost \$14.99 per box. If  $n$  represents the number of boxes of nails and  $s$  represents the number of boxes of screws, which of the following systems of inequalities models this situation?

- A)  $\begin{cases} 12.99n + 14.99s \geq 60 \\ n + s \leq 1 \end{cases}$
- B)  $\begin{cases} 12.99n + 14.99s \leq 60 \\ n + s \leq 1 \end{cases}$
- C)  $\begin{cases} 12.99n + 14.99s \geq 60 \\ n \geq 1 \\ s \geq 1 \end{cases}$
- D)  $\begin{cases} 12.99n + 14.99s \leq 60 \\ n \geq 1 \\ s \geq 1 \end{cases}$

11



In the figure above, which of the following ratios has the same value as  $\frac{AB}{BC}$  ?

- A)  $\frac{BD}{DC}$
- B)  $\frac{BC}{AC}$
- C)  $\frac{AD}{BD}$
- D)  $\frac{DC}{BC}$



12

$$(x^2y^3)^{\frac{1}{2}}(x^2y^3)^{\frac{1}{3}} = x^{\frac{a}{3}}y^{\frac{a}{2}}$$

If the equation above, where  $a$  is a constant, is true for all positive values of  $x$  and  $y$ , what is the value of  $a$ ?

- A) 2
- B) 3
- C) 5
- D) 6

13

If the equation  $y = (x - 6)(x + 12)$  is graphed in the  $xy$ -plane, what is the  $x$ -coordinate of the parabola's vertex?

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



14

$$21x + 14 = 7(3x + a)$$

In the equation above,  $a$  is a constant. For what value of  $a$  does the equation have an infinite number of solutions?

15

Julienne practiced her dance routine for twice as many minutes on Monday as she did on Tuesday. She practiced her routine those two days for a total of 2 hours and 15 minutes. For how many minutes did Julienne practice her dance routine on Monday?

16

In the expression below,  $a$  is an integer.

$$12x^2 + ax - 20$$

If  $3x + 4$  is a factor of the expression above, what is the value of  $a$  ?

17

$$(ax + by)(cx - dy)$$

In the expression above,  $a$ ,  $b$ ,  $c$ , and  $d$  are non-zero constants and  $ad = bc$ . If  $ac = 18$  and  $bd = 50$ , what is the value of the coefficient of the  $xy$  term when the expression is multiplied out and the like terms are collected?

**STOP**

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