



# Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

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

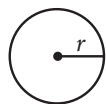
## DIRECTIONS

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

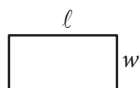
1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated,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

## REFERENCE

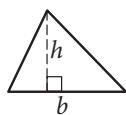


$$A = \pi r^2$$

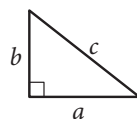
$$C = 2\pi r$$



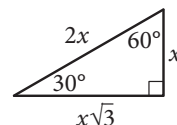
$$A = \ell w$$



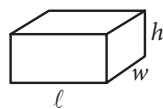
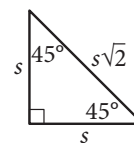
$$A = \frac{1}{2}bh$$



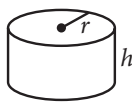
$$c^2 = a^2 + b^2$$



Special Right Triangles



$$V = \ell wh$$



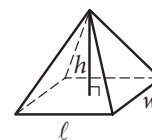
$$V = \pi r^2 h$$



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



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



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

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

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

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



1

$$2x - y = 8$$

$$x + 2y = 4$$

For the system of equations above, what is the value of  $x + y$ ?

- A) -1
- B) 4
- C) 5
- D) 20

2

Which of the following is equivalent to  $2(x^2 - x) + 3(x^2 - x)$ ?

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

3

Which of the following statements is true about the graph of the equation  $2y - 3x = -4$  in the  $xy$ -plane?

- A) It has a negative slope and a positive  $y$ -intercept.
- B) It has a negative slope and a negative  $y$ -intercept.
- C) It has a positive slope and a positive  $y$ -intercept.
- D) It has a positive slope and a negative  $y$ -intercept.

4

The front of a roller-coaster car is at the bottom of a hill and is 15 feet above the ground. If the front of the roller-coaster car rises at a constant rate of 8 feet per second, which of the following equations gives the height  $h$ , in feet, of the front of the roller-coaster car  $s$  seconds after it starts up the hill?

- A)  $h = 8s + 15$
- B)  $h = 15s + \frac{335}{8}$
- C)  $h = 8s + \frac{335}{15}$
- D)  $h = 15s + 8$



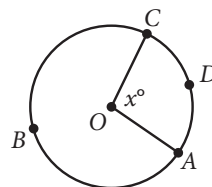
5

$$C = 75h + 125$$

The equation above gives the amount  $C$ , in dollars, an electrician charges for a job that takes  $h$  hours. Ms. Sanchez and Mr. Roland each hired this electrician. The electrician worked 2 hours longer on Ms. Sanchez's job than on Mr. Roland's job. How much more did the electrician charge Ms. Sanchez than Mr. Roland?

- A) \$75
- B) \$125
- C) \$150
- D) \$275

6



The circle above has center  $O$ , the length of arc  $\widehat{ADC}$  is  $5\pi$ , and  $x = 100$ . What is the length of arc  $\widehat{ABC}$ ?

- A)  $9\pi$
- B)  $13\pi$
- C)  $18\pi$
- D)  $\frac{13}{2}\pi$

7

If  $\frac{8}{x} = 160$ , what is the value of  $x$ ?

- A) 1,280
- B) 80
- C) 20
- D) 0.05



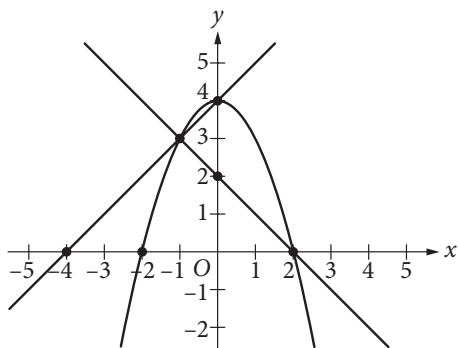
8

$$2ax - 15 = 3(x + 5) + 5(x - 1)$$

In the equation above,  $a$  is a constant. If no value of  $x$  satisfies the equation, what is the value of  $a$ ?

- A) 1
- B) 2
- C) 4
- D) 8

9



A system of three equations is graphed in the  $xy$ -plane above. How many solutions does the system have?

- A) None
- B) One
- C) Two
- D) Three

10

$$(ax + 3)(5x^2 - bx + 4) = 20x^3 - 9x^2 - 2x + 12$$

The equation above is true for all  $x$ , where  $a$  and  $b$  are constants. What is the value of  $ab$ ?

- A) 18
- B) 20
- C) 24
- D) 40

11

$$\frac{x}{x-3} = \frac{2x}{2}$$

Which of the following represents all the possible values of  $x$  that satisfy the equation above?

- A) 0 and 2
- B) 0 and 4
- C) -4 and 4
- D) 4



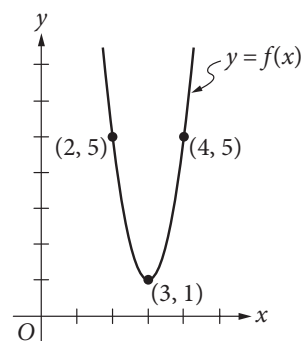
12

$$\frac{1}{2x+1} + 5$$

Which of the following is equivalent to the expression above for  $x > 0$ ?

- A)  $\frac{2x+5}{2x+1}$
- B)  $\frac{2x+6}{2x+1}$
- C)  $\frac{10x+5}{2x+1}$
- D)  $\frac{10x+6}{2x+1}$

13



The graph of the function  $f$  in the  $xy$ -plane above is a parabola. Which of the following defines  $f$ ?

- A)  $f(x) = 4(x-3)^2 + 1$
- B)  $f(x) = 4(x+3)^2 + 1$
- C)  $f(x) = (x-3)^2 + 1$
- D)  $f(x) = 3(x+3)^2 + 1$



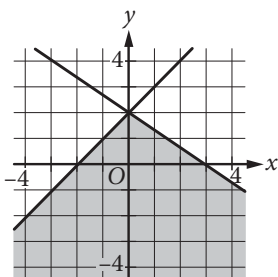
14

$$y \geq x + 2$$

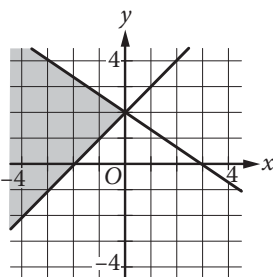
$$2x + 3y \leq 6$$

In which of the following does the shaded region represent the solution set in the  $xy$ -plane to the system of inequalities above?

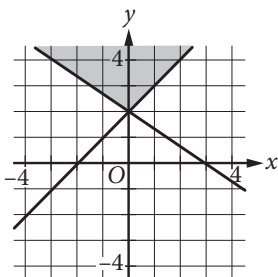
A)



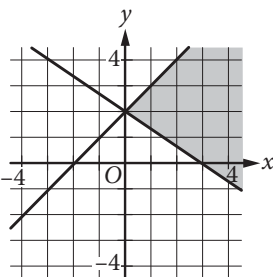
B)



C)



D)




15

What is the set of all solutions to the equation  $\sqrt{x+2} = -x$ ?

- A)  $\{-1, 2\}$
- B)  $\{-1\}$
- C)  $\{2\}$
- D) There are no solutions to the given equation.

**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.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or  $7/2$ . (If  is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)
- 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	1
2	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

← Fraction line

Answer: 2.5

2	.	5
.	.	.
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9

← Decimal point

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

2	/	3
.	.	.
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
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	6	6	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	6	6	6
7	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
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9

2	0	1
.	.	.
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
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

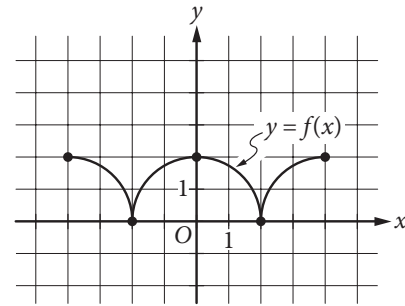
What is the volume, in cubic centimeters, of a right rectangular prism that has a length of 4 centimeters, a width of 9 centimeters, and a height of 10 centimeters?

17

$$4x + 2 = 4$$

If  $x$  satisfies the equation above, what is the value of  $2x + 1$ ?

18



The figure above shows the complete graph of the function  $f$  in the  $xy$ -plane. The function  $g$  (not shown) is defined by  $g(x) = f(x) + 6$ . What is the maximum value of the function  $g$ ?

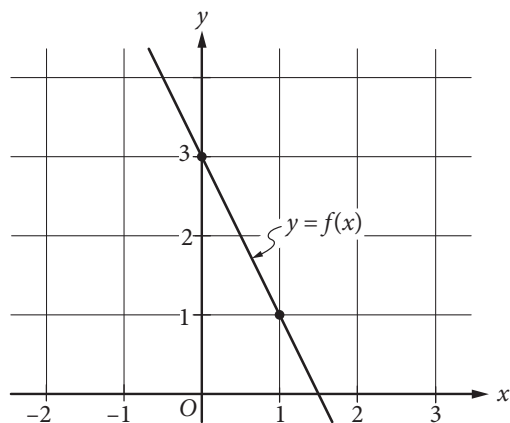




19

Triangle  $PQR$  has right angle  $Q$ . If  $\sin R = \frac{4}{5}$ , what is the value of  $\tan P$ ?

20



The graph of the linear function  $f$  is shown in the  $xy$ -plane above. The graph of the linear function  $g$  (not shown) is perpendicular to the graph of  $f$  and passes through the point  $(1, 3)$ . What is the value of  $g(0)$ ?

**STOP**

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