



Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

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

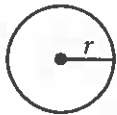
DIRECTIONS

For questions 1-15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding bubble 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

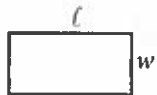
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5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

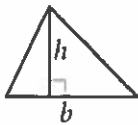


$$A = \pi r^2$$

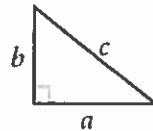
$$C = 2\pi r$$



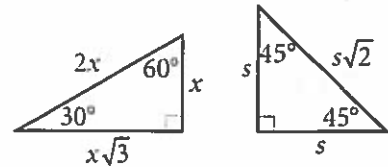
$$A = lw$$



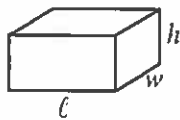
$$A = \frac{1}{2}bh$$



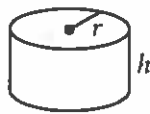
$$c^2 = a^2 + b^2$$



Special Right Triangles



$$V = lwh$$



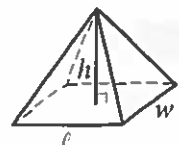
$$V = \pi r^2 h$$



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



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



$$V = \frac{1}{3}lwh$$

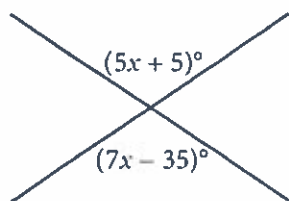
The number of degrees of arc in a circle is 360.

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



Two lines intersect as shown. What is the value of x ?

- A) 15
- B) 20
- C) 25
- D) 30

2

$$|2x - 4| = 8$$

What is the positive solution to the given equation?

- A) 2
- B) 4
- C) 6
- D) 8

3

Which of the following is equivalent to $4x^3 + 8x^2$?

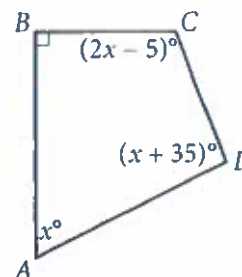
- A) $12x^5$
- B) $12x^2(2x + 1)$
- C) $4x^2(x + 2)$
- D) $x^2(12 + x)$

4

If $2n + 12 = 26n$, what is the value of $6n$?

- A) 8
- B) 4
- C) 3
- D) $\frac{1}{2}$

5



Quadrilateral $ABCD$ is shown. Which equation shows how the measures of the angles of the quadrilateral are related?

- A) $x + 90 + (2x - 5) + (x + 35) = 360$
- B) $4(x + 90 + (2x - 5) + (x + 35)) = 360$
- C) $x + (2x - 5) + (x + 35) = 360$
- D) $4(x + (2x - 5) + (x + 35)) = 360$



6

In right triangle ABC , the length of side \overline{AC} is 12, the measure of $\angle A$ is 40° , and $\angle B$ is a right angle. Which of the following can be determined using the information given?

- I. The measure of $\angle C$
- II. The length of side \overline{AB}

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

7

In the xy -plane, line l has a slope of 2. Line k is perpendicular to line l and contains the point $(4, 2)$. Which of the following is an equation of line k ?

- A) $y = -2x - 6$
- B) $y = -2x + 10$
- C) $y = -\frac{1}{2}x$
- D) $y = -\frac{1}{2}x + 4$

8

$$c = \frac{x}{y}$$

The given equation relates the variables c , x , and y , where $c > 0$, $x > 0$, and $y > 0$. Which equation correctly expresses y in terms of c and x ?

- A) $y = cx$
- B) $y = \frac{1}{cx}$
- C) $y = \frac{c}{x}$
- D) $y = \frac{x}{c}$

9

The function f is a linear function. The y -intercept of the graph of $y = f(x)$ in the xy -plane is $(0, -12)$.

What is the y -intercept of the graph of

$$y = f(x) + 2?$$

- A) $(0, -14)$
- B) $(0, -10)$
- C) $(-2, -12)$
- D) $(2, -12)$

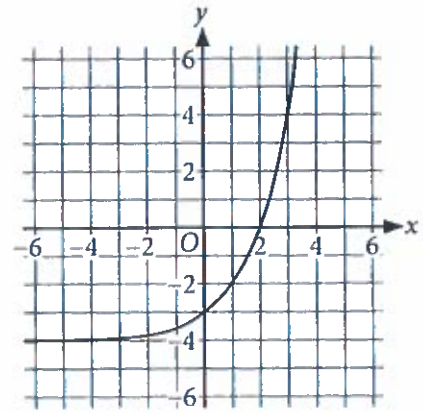


10

Which of the following is(are) an x -intercept of the graph of $y = \frac{(x + 3)(x - 2)}{x}$ in the xy -plane?

- I. $(-3, 0)$
 - II. $(2, 0)$
 - III. $(0, 0)$
- A) I only
 B) III only
 C) I and II only
 D) I, II and III

11

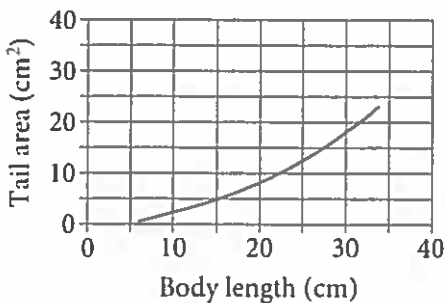


The graph of $y = 2^x - a$ is shown, where a is a constant. What is the value of a ?

- A) 4
 B) 3
 C) 2
 D) 1



12



For a certain group of fish, the graph models the relationship between body length L , in centimeters (cm), and tail area A , in square centimeters (cm^2), where $6 \leq L \leq 34$. Which equation represents the relationship between body length and tail area?

- A) $A = 0.02L^2$
- B) $A = 1.23L^2$
- C) $A = 2.02L^2$
- D) $A = 3.23L^2$

13

$$\begin{aligned} 8x - 4y &= 7 \\ 3x + 6y &= 12 \end{aligned}$$

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

- A) 1.5
- B) 1.25
- C) 0.5
- D) 0.25

14

$$\begin{aligned} y &= 2x + 5 \\ y &= kx + 3 \end{aligned}$$

In the given system of equations, k is a constant. The system has exactly one solution. Which of the following could be the value of k ?

- I. 2
 - II. 5
- A) I only
 - B) II only
 - C) I and II
 - D) Neither I nor II

15

$$b(t) = 100(1.11)^t$$

The given function b models the number of flour beetles in a certain area, where t represents the number of days after June 1. Which of the following is the best interpretation of the number 1.11 in this context?

- A) The model predicts that there were approximately 1.11 flour beetles in this area on June 1.
- B) The model predicts that the number of flour beetles in this area increases by approximately 1.11 each day.
- C) The model predicts that it will take approximately 1.11 days for the number of flour beetles to double.
- D) The model predicts that the number of flour beetles grows by a factor of approximately 1.11 each day.



DIRECTIONS

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- 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 $\begin{array}{|c|c|c|c|} \hline 3 & 1 & / & 2 \\ \hline \bullet & \bullet & \bullet & \bullet \\ \hline \end{array}$ is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
- 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. →

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

7	/	1	2
•	•	•	•
0	0	0	0
1	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

Grid in result.

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	•	•	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
1	1	•	1
•	2	2	2
3	3	3	3
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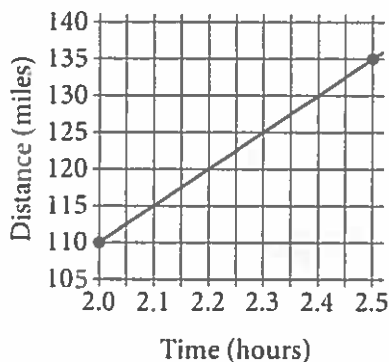
NOTE:
You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



16

In the xy -plane, the graph of $y = \frac{1}{2}x + b$, where b is a constant, intersects the x -axis at $(-6, 0)$. What is the value of b ?

17



For part of a trip, a car traveled directly away from its starting point at a constant speed. The graph shows the car's distance from its starting point, in miles, for times from 2.0 hours to 2.5 hours after the start of the trip. What was the speed of the car, in miles per hour, during this part of the trip?

18

$$x^2 - 8x + y^2 - 10y = 40$$

In the xy -plane, the graph of the given equation is a circle. What is the radius of this circle?

19

$$x^2 - 6x + 7 = 0$$

What is the sum of the solutions to the equation above?

20

$$\left(\sqrt{x^3}\right)^a, \text{ where } x \geq 0$$

In the given expression, a is a constant. The expression is equivalent to x^6 , where $x \geq 0$. What is the value of a ?

STOP

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

No Test Material On This Page



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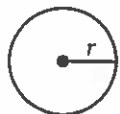
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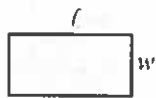
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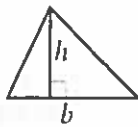


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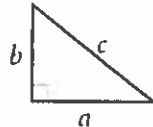
$$C = 2\pi r$$



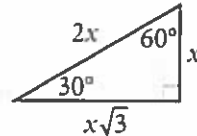
$$A = lw$$



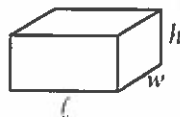
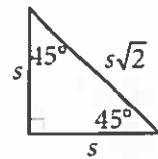
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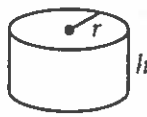
$$c^2 = a^2 + b^2$$



Special Right Triangles



$$V = lwh$$



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



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



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



$$V = \frac{1}{3}lwh$$

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

The number of radians of arc in a circle is 2π .

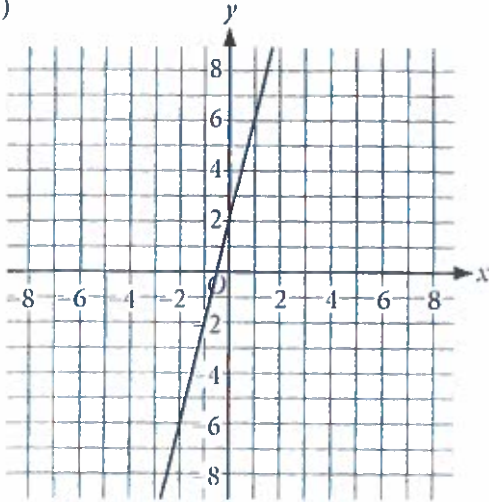
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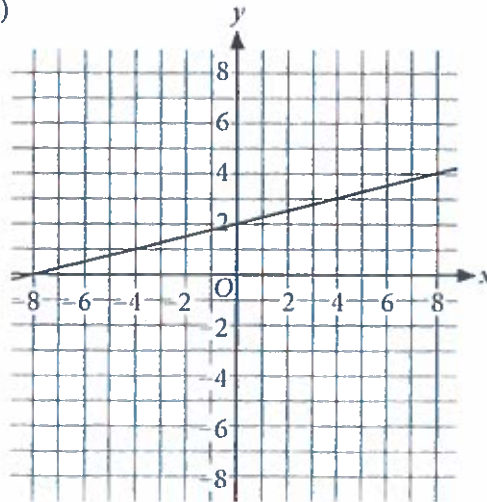
1

The function h is defined by $h(x) = -\frac{1}{4}x - 2$. Which is the graph of $y = h(x)$?

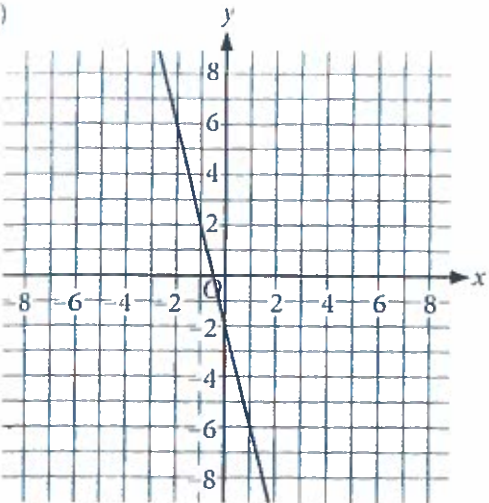
A)



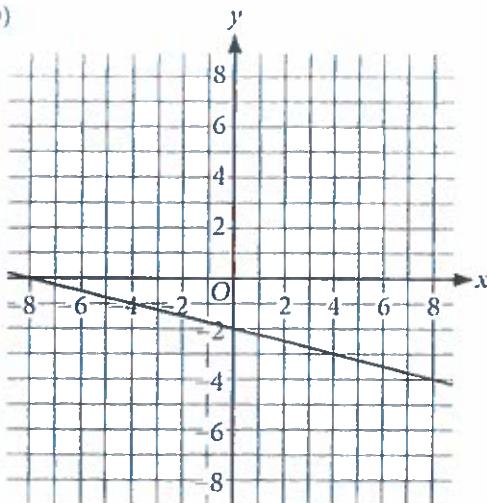
B)



C)



D)





2

$$x^2 + 10 = 91$$

What is the positive solution to the given equation?

- A) 9
- B) 10
- C) 41
- D) 51

3

$$x + 7 = 3(x - 3)$$

What value of x satisfies the given equation?

- A) 4
- B) 8
- C) 9
- D) 16

4

A line in the xy -plane has a slope of 1 and passes through the point $(0, 2)$. Which is an equation of the line?

- A) $y = \frac{x}{2}$
- B) $y = 2x$
- C) $y = x + 2$
- D) $y = x - 2$

5

From 1990 to 2001, German currency included coins called *pfennigs*, worth 1 pfennig each, and *groschen*, worth 10 pfennigs each. Which equation represents the number of pfennig coins, p , and groschen coins, g , that have a combined value of 85 pfennigs?

- A) $p + g = 85$
- B) $p + 10g = 85$
- C) $10p + g = 85$
- D) $10(p + g) = 85$



6

If $x > 0$, which of the following is equivalent

to $\frac{1}{x} + \frac{1}{2x}$?

- A) $\frac{1}{x}$
- B) $\frac{1}{2x}$
- C) $\frac{3}{2x}$
- D) $\frac{2}{3x}$

7

$$x^2 - 10x + y^2 + 6y = 2$$

The graph in the xy -plane of the equation above is a circle. What are the coordinates of the center of the circle?

- A) $(-5, -3)$
- B) $(-5, 3)$
- C) $(5, -3)$
- D) $(5, 3)$

8

$$y > 4x$$

$$y < -x$$

When graphed in the xy -plane, what point (x, y) is a solution to the given system of inequalities?

- A) $(1, 1)$
- B) $(-2, -2)$
- C) $(3, -3)$
- D) $(-4, 4)$

9

The equation $h = 150 + 10t$ gives the total number of housing units, h , in a community t months after a new zoning law was passed. How many housing units are added to the community each month after the zoning law was passed?

- A) 10
- B) 150
- C) 160
- D) 1,500



10

Which expression is equivalent to $(2x^2 + 3x - 2) - (5x^2 - x - 7)$?

- A) $7x^2 + 4x + 9$
- B) $3x^2 + 4x + 5$
- C) $-3x^2 + 2x - 9$
- D) $-3x^2 + 4x + 5$

11

$$y = (x - 1)(x + 1)(x + 2)$$

The graph in the xy -plane of the equation above contains the point (a, b) . If $-1 \leq a \leq 1$, which of the following is NOT a possible value of b ?

- A) -2
- B) -1
- C) 0
- D) 1

12

Two beach balls are each in the shape of a sphere. The larger beach ball has a diameter of $3x$, and the smaller beach ball has a diameter of x . What is the ratio of the volume of the larger beach ball to the volume of the smaller beach ball?

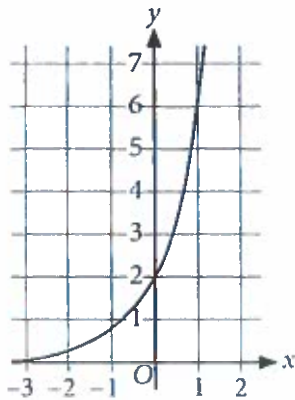
- A) 3 to 1
- B) 6 to 1
- C) 9 to 1
- D) 27 to 1



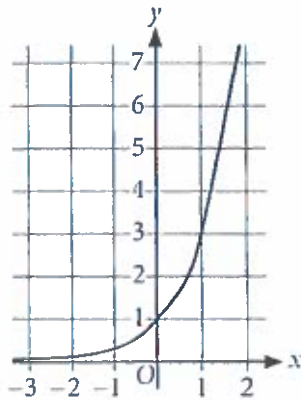
13

What is the graph of the equation $y = 2(3)^x$?

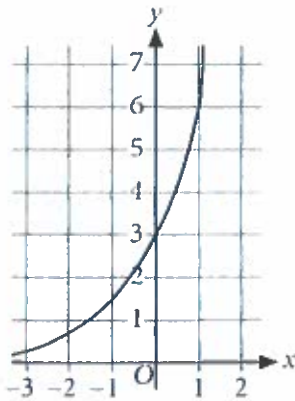
A)



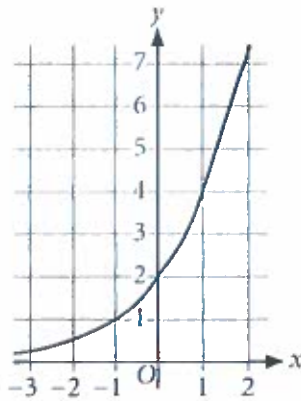
B)



C)

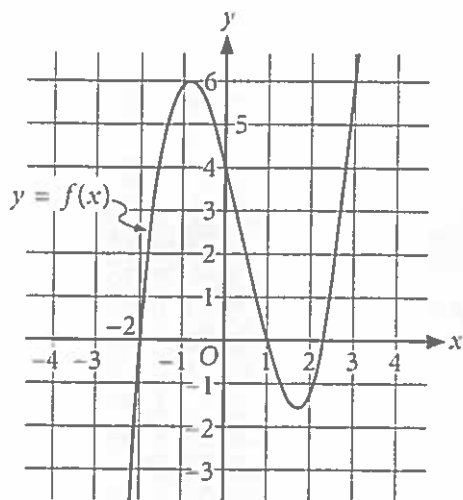


D)





14



The graph of the function f is shown. Which of the following is a value of x for which $f(x) = 0$?

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

15

The function $A(t) = 12(2)^{\frac{t}{6}}$ models the number of water hyacinths in a population over time, where $A(t)$ is the number of water hyacinths and t is the time, in days, since the population was first measured. Which is the best interpretation of $(2)^{\frac{t}{6}}$ in this context?

- A) The number of water hyacinths doubled t times.
- B) The number of water hyacinths doubled every 6 days.
- C) The number of water hyacinths increased by 2 every $\frac{t}{6}$ days.
- D) The number of water hyacinths increased by 2 every t days.


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3	1	/	2
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Write answer in boxes. →

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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

Grid in result.

Answer: 2.5

	2	.	5
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

← Decimal point

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

	2	/	3
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	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	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

2	0	1	
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

NOTE:

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

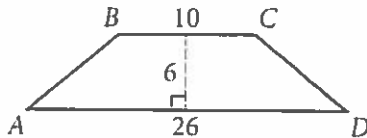


16

$$4T - 8D = 12H$$

The given equation can be rewritten as $T = aD + bH$, where a and b are constants. What is the value of a ?

17



In the figure shown, \overline{BC} is parallel to \overline{AD} and $AB = CD$. What is the perimeter of quadrilateral $ABCD$?

18

$$x^2 - 2x - 1 = 0$$

The equation above has solutions $x = n + \sqrt{k}$ and $x = n - \sqrt{k}$, where n and k are positive integers. What is the value of $n + k$?

19

$$4x + y = 7$$

$$2x - 7y = 1$$

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

20

$$\frac{1}{2}x + 5 = kx + 7$$

In the given equation, k is a constant. The equation has no solution. What is the value of k ?

STOP

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

No Test Material On This Page