



Math Test

25 Minutes — 20 Questions

NO-CALCULATOR SECTION

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

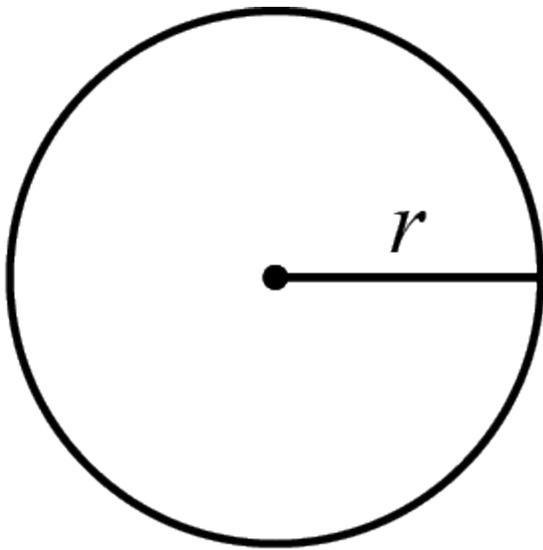
Directions

For this section, solve each problem and decide which is the best of the choices given. Fill in the corresponding oval on the answer sheet. You may use any available space for scratch work.

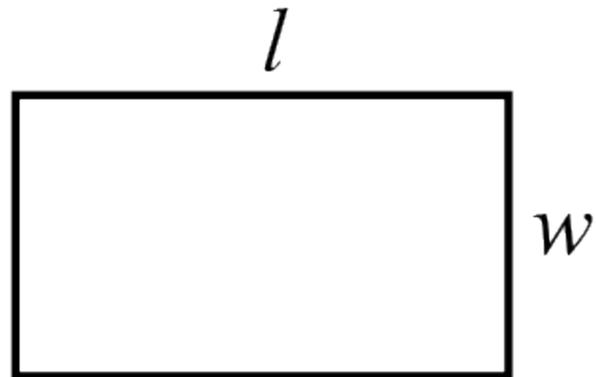
Notes:

1. Calculator use is NOT permitted.
2. All numbers used are real numbers.
3. All figures used are necessary to solving the problems that they accompany. All figures are drawn to scale EXCEPT when it is stated that a specific figure is not drawn to scale.
4. Unless stated otherwise, the domain of any function f is assumed to be the set of all real numbers x , for which $f(x)$ is a real number.

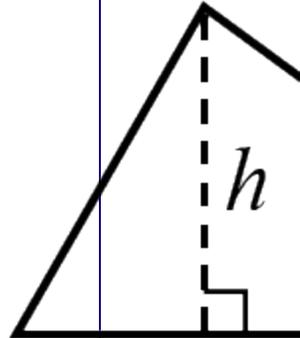
Information:



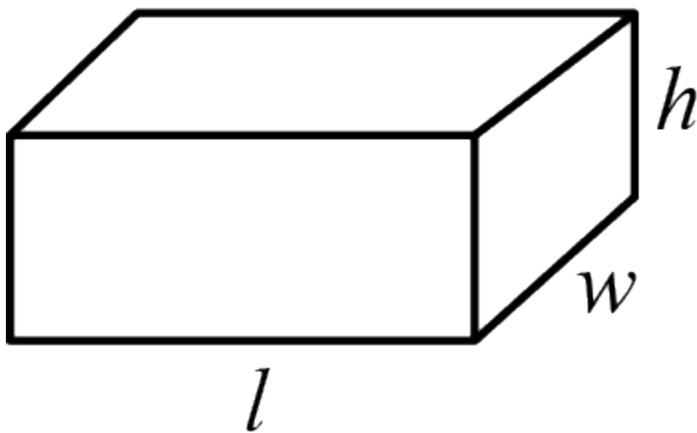
$$A = \pi r^2$$
$$C = 2\pi r$$



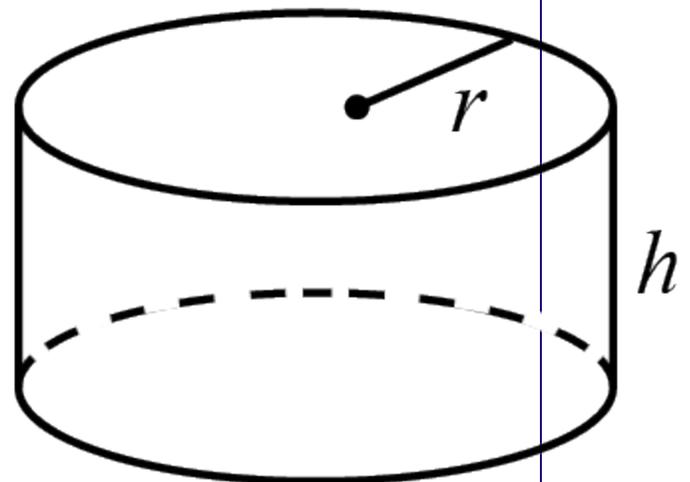
$$A = lw$$



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



$$V = lwh$$

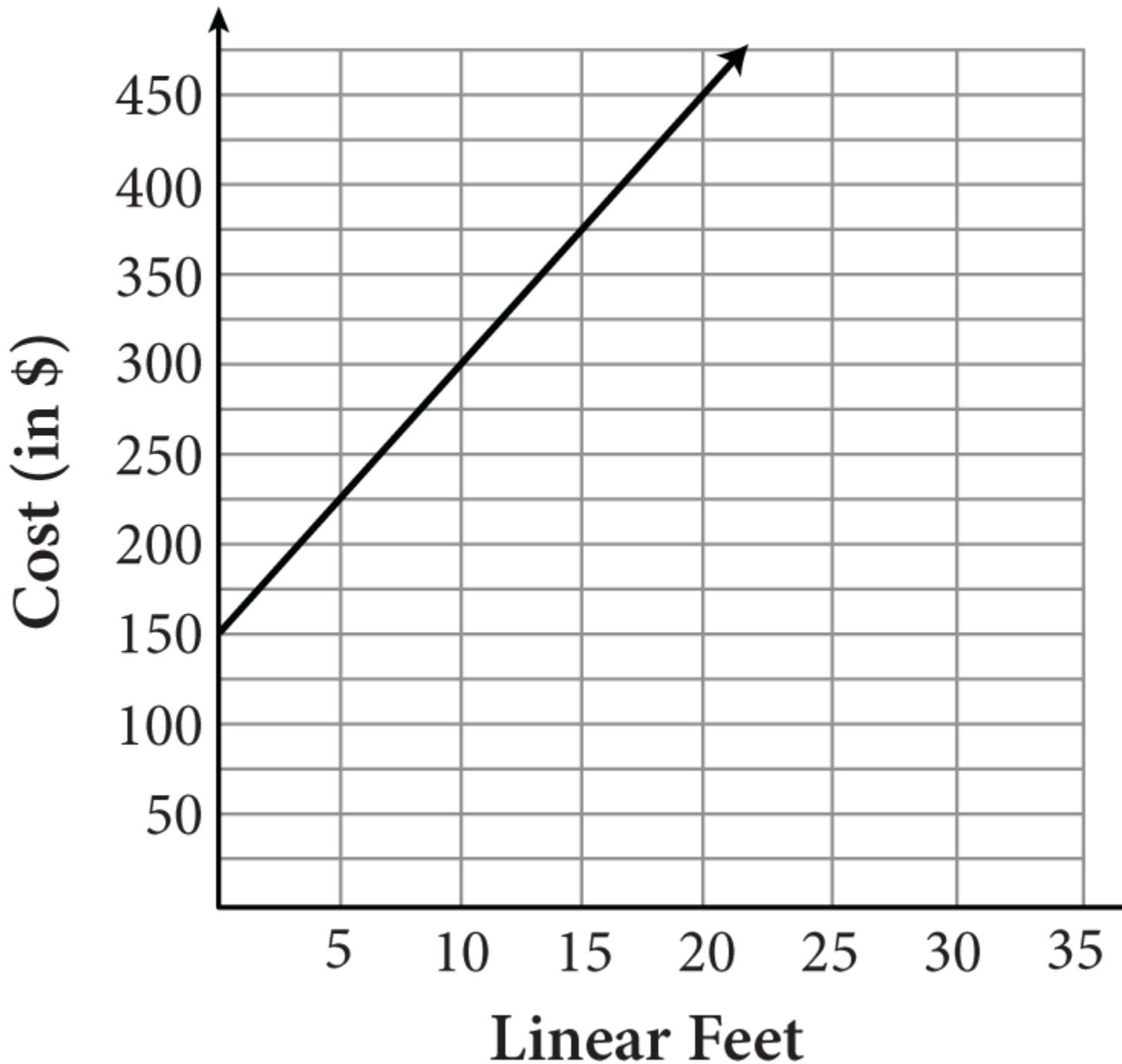


$$V = \pi r^2 h$$

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

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π .

Fence Installation



1.

The graph shows the cost of installing a vinyl privacy fence. The company charges a flat installation fee plus a cost per linear foot of fencing. Based on the graph, how much does one linear foot of this particular vinyl fence cost?

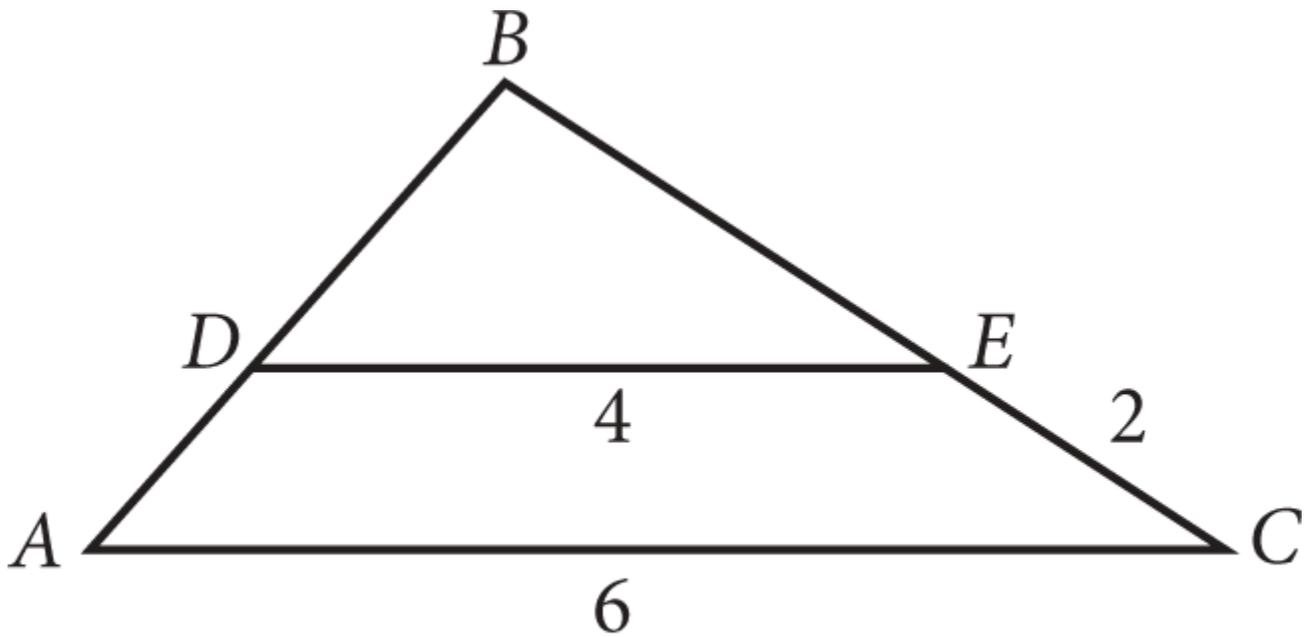
- A) \$5
- B) \$15
- C) \$75
- D) \$150

2.

$$\frac{24x^4 + 36x^3 - 12x^2}{12x^2}$$

Which of the following expressions is equivalent to the expression shown above?

- A) $2x^2 + 3x$
- B) $24x^4 + 36x^3$
- C) $2x^2 + 3x - 1$
- D) $24x^4 + 36x^3 - 1$

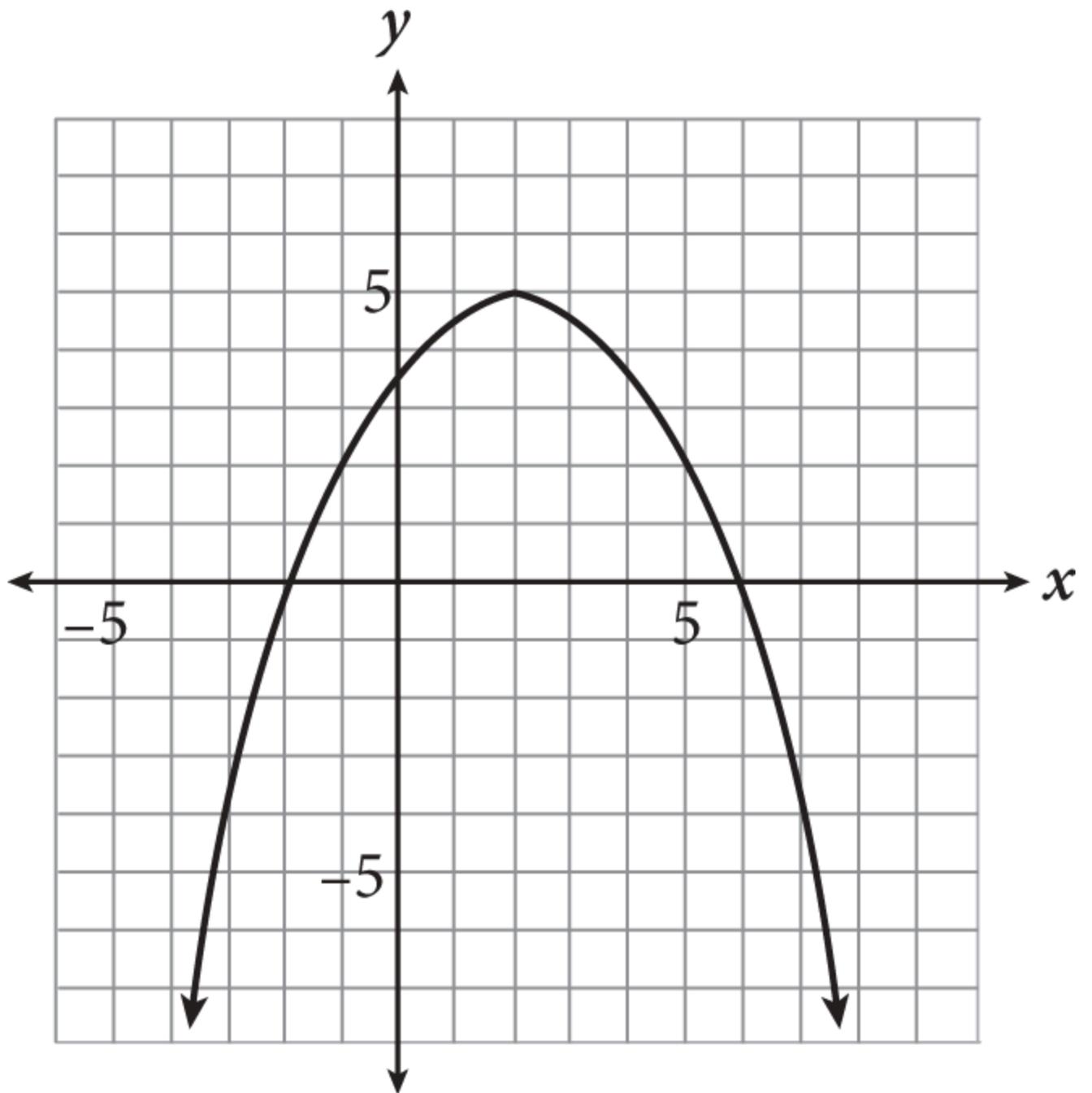


Note: Figure not drawn to scale.

3.

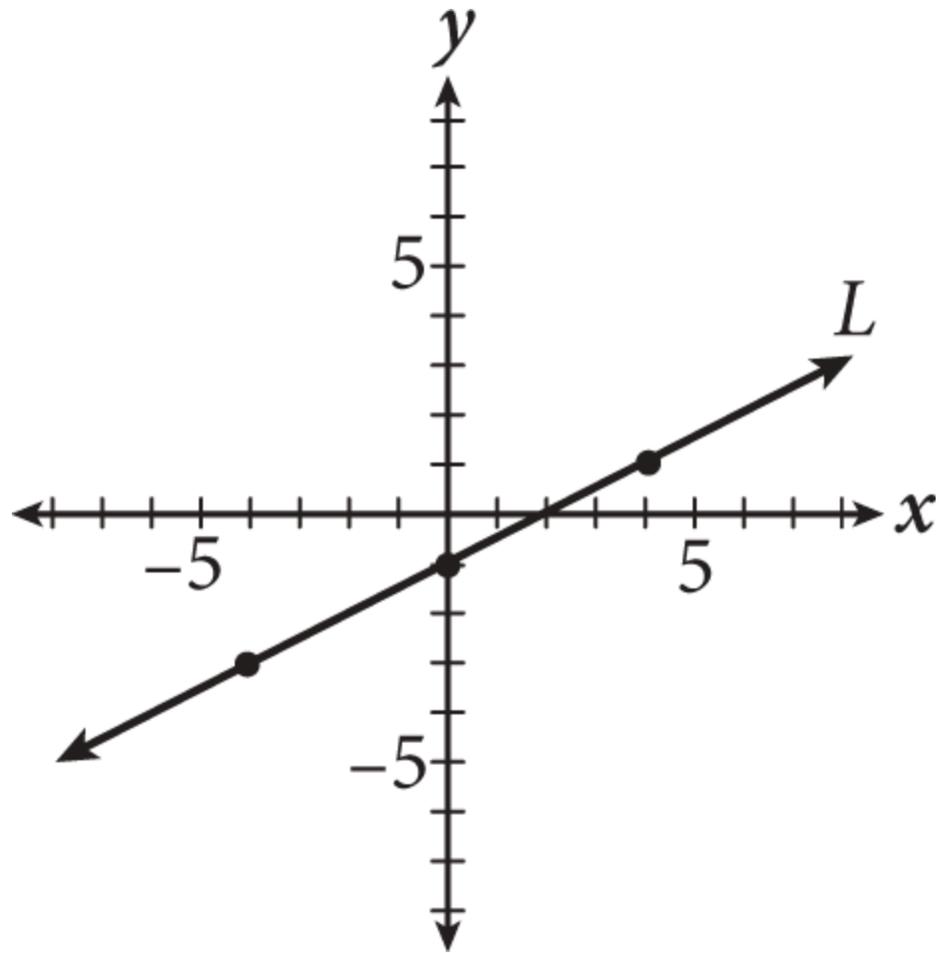
In the figure shown, $\triangle ABC \sim \triangle DBE$. What is the length of \overline{BE} ?

- A) 3.5
 - B) 3.75
 - C) 4
 - D) 4.5
- 4.



Which of the following represents the function shown?

- A) $f(x) = -\frac{1}{3}(x - 2)^2 + 5$
- B) $f(x) = -\frac{1}{3}(x + 2)^2 + 5$
- C) $f(x) = \frac{1}{3}(x + 2)^2 + 5$
- 5. D) $f(x) = 3(x - 2)^2 + 5$



If line L shown above is reflected over the x -axis, what is the slope of the new line?

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

6. If $p = 4x^3 + x - 2$, $q = x^2 - 1$, and $r = 3x - 5$, then what is $2p - (q + r)$?

- A) $7x^3 - x + 2$
- B) $8x^3 - x^2 - x + 2$
- C) $8x^3 - x^2 - x - 10$
- D) $8x^3 - x^2 + 5x - 8$

7. Which of the following are the roots of the equation $2x^2 + 4x - 3 = 0$?

A) $\frac{-2 \pm \sqrt{10}}{2}$

B) $-2 \pm \sqrt{5}$

C) $-1 \pm \sqrt{10}$

D) $-1 \pm 2\sqrt{10}$

8. If $g(x) = 3x - 5$ and $h(x) = \frac{7x + 10}{4}$, at what point does the graph of $g(x)$ intersect the graph of $h(x)$?

A) $(-2, -11)$

B) $(-2, 1)$

C) $(3, 4)$

D) $(6, 13)$

9. If $x = k^{-\frac{1}{3}}$, where $x > 0$ and $k > 0$, which of the following equations gives k in terms of x ?

A) $k = \frac{1}{x^3}$

B) $k = \frac{1}{\sqrt[3]{x}}$

C) $k = -\sqrt[3]{x}$

D) $k = -x^3$

10. $4x - (10 - 2x) = c(3x - 5)$

If the equation shown has infinitely many solutions, and c is a constant, what is the value of c ?

A) -2

B) $-\frac{2}{3}$

C) $\frac{2}{3}$

D) 2

11. If $0 < 1 - \frac{a}{3} \leq \frac{1}{2}$, which of the following is not a possible value of a ?

- A) 1.5
- B) 2
- C) 2.5
- D) 3

12.

$$\begin{cases} y - \frac{2}{k}x \leq 0 \\ \frac{1}{k}x - \frac{1}{2}y \leq -1 \end{cases}$$

If the system of inequalities shown has no solution, what is the value of k ?

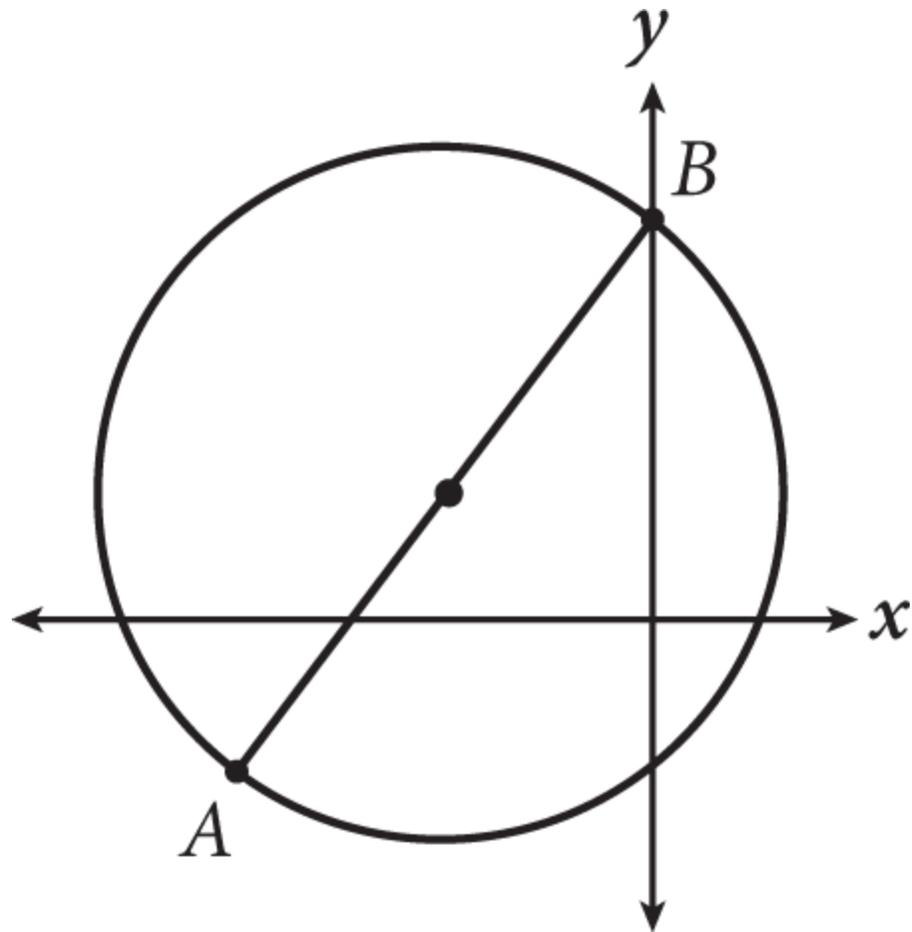
- A) 1
- B) 2
- C) There is no value of k that results in no solution.
- D) There are infinitely many values of k that result in no solution.

13.

$$\frac{4x}{x-7} + \frac{2x}{2x-14} = \frac{70}{2(x-7)}$$

What value(s) of x satisfy the equation above?

- A) 0
- B) 7
- C) No solution
- 14. D) Any value such that $x \neq 7$



The circle shown is given by the equation $x^2 + y^2 + 6x - 4y = 12$. What is the shortest distance from A to B ?

- A) 5
- B) 10
- C) $4\sqrt{3}$
- D) 24

15. If g is a function defined over the set of all real numbers and $g(x - 1) = 3x^2 + 5x - 7$, then which of the following defines $g(x)$?

- A) $g(x) = 3x^2 - x - 9$
- B) $g(x) = 3x^2 + 5x + 1$
- C) $g(x) = 3x^2 + 11x + 1$
- D) $g(x) = 3x^2 + 11x - 6$

Directions

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

1. 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.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. 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 $\frac{7}{2}$.

(If $3 \frac{1}{2}$ is entered into the grid as

3	1	/	2
	<input type="radio"/>	<input checked="" type="radio"/>	

, 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.

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

Write answer
in boxes.

7	/	1	2
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	0	0	0
1	1	<input checked="" type="radio"/>	1
2	2	2	<input checked="" type="radio"/>
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
<input checked="" type="radio"/>	7	7	7
8	8	8	8
9	9	9	9

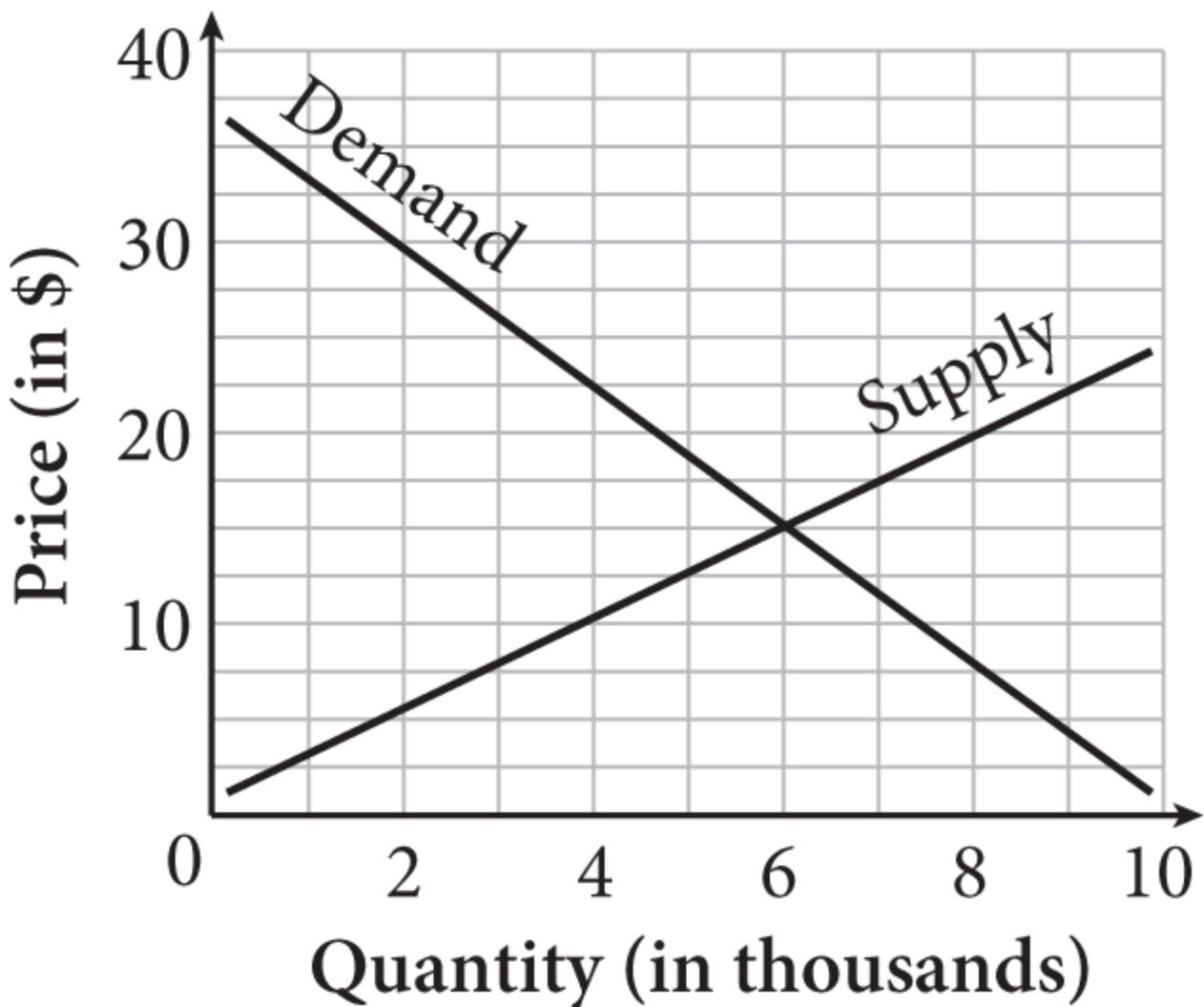
Fract
line

Grid in
result.

Answer: 201

Either position is correct.

	0	0	1		0	0	1	
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16.

Retail businesses strive to price their products so that they sell as many as possible without losing money. Economic equilibrium is the price point at which the supply for a product is equal to the demand for that product. The graph above models this scenario. According to the graph, at what price in dollars will supply equal demand for this particular product?

17. Once an insect reaches its larval stage, its mass increases linearly for a short period of time and then slows down as it prepares to enter pupation. Suppose the larva of a certain species has an initial mass of 10 grams and grows linearly from $t = 0$ to $t = 48$ hours of its larval stage. If after 48 hours, the mass of the larva is 14 grams, what was its mass in grams at $t = 6$ hours?

18.

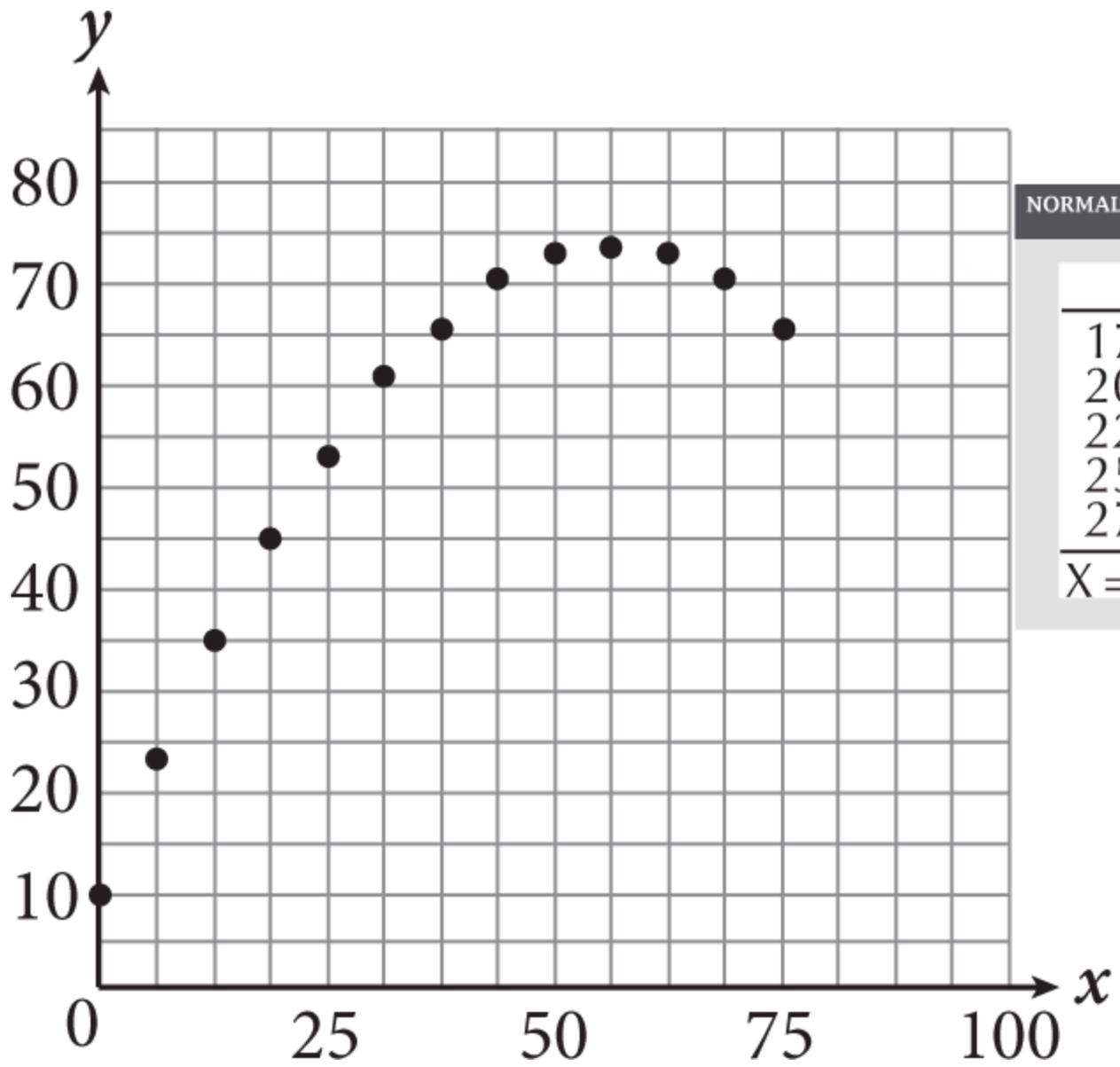
x	$f(x)$
-1	-2
0	0

x	$f(x)$
1	2
2	4
3	6

x	$g(x)$
-2	3
-1	2
0	1
1	-1
2	-2

Several values for the functions $f(x)$ and $g(x)$ are shown in the tables. What is the value of $f(g(-1))$?

20. If $(4 + 3i)(1 - 2i) = a + bi$, then what is the value of a ? (Note that $i = \sqrt{-1}$.)



NORMAL FLOAT AUTO

X	Y
17.5	43
20.0	47
22.5	50
25.0	53
27.5	56
X =	

The maximum value of the data shown in the scatterplot occurs at $x = 56.25$. If the data is modeled using a quadratic regression and the model is an exact fit, then what is the y -value when $x = 90$?

IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY CHECK YOUR WORK ON THIS SECTION ONLY. DO NOT TURN TO ANY OTHER SECTION IN THE TEST.

STOP