

Solving Linear Equations and Inequalities

1. Solve: $5x + 12 = x - 4$

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

2. Solve $2(2 - x) \leq -3x - 2$ for x .

- A. $x \leq -6$
- B. $x \leq -3$
- C. $x \leq 2$
- D. $x \geq 6$

3. Solve $5x - 10y = -40$ for y .

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

4. Solve: $\frac{2x+3}{4} = \frac{x}{4}$

- A. $x = -3$
- B. $x = -1$
- C. $x = 1$
- D. $x = 3$

5. The formula $A = \frac{1}{2}bh$ represents the area of a triangle where A represents the area, b is the base of the triangle and h is the height of the triangle.

Solve this formula for b .

- A. $b = 2A - h$
- B. $b = A - \frac{1}{2}h$
- C. $b = \frac{A}{2h}$
- D. $b = \frac{2A}{h}$

6. Megan bought 7 charms for \$31.50. Each charm costs the same amount of money.

Write an inequality that can be used to find the maximum amount of charms (c) Megan can buy with \$75.

Answer _____

What is the maximum amount of charms Megan can buy with \$75?

Answer _____

7. Solve $-2x - 1 = \frac{3x + 5}{2}$ for x .

Enter your answer in the response grid.

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8. Solve: $x + 4.25 = 3.5x - 1.5x - 0.75$

Enter your answer in the response grid.

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9. Solve the inequality below for x .

$$\frac{3}{4}x + 2 \leq 3x - 1$$

- A. $x \leq \frac{4}{3}$
- B. $x \leq \frac{4}{15}$
- C. $x \geq \frac{4}{5}$
- D. $x \geq \frac{4}{3}$

10. The equation below was solved incorrectly. Study the work below.

$$5x + 5 = -3(x - 1)$$

Step 1: $5x + 5 = -3x + 3$

Step 2: $2x = -2$

Step 3: $x = -1$

Describe the mistake in the work shown above.

What is the solution to the equation $5x + 5 = -3(x - 1)$?

Answer _____

11. Tony works at a bike store. Tony earns \$300 every week plus \$15 for every bike that he sells.

Write an inequality that can be used to determine the number of bikes (b) Tony must sell in one week if he wants to earn a minimum of \$500 for that week.

Answer _____

What is the minimum number of bikes Tony must sell in one week to earn a weekly salary of \$500?

Answer _____

12. Alex sells T-shirts. It costs Alex \$6.50 to buy each T-shirt. Alex also pays \$150 each month to rent equipment to add print to the T-shirts.

Alex sells each T-shirt for \$12.

Write an inequality that can be used to determine the number of T-shirts (T) Alex must sell each month in order to make a profit for the month. (*Assume that Alex sells each T-shirt he buys.*)

Answer _____

What is the minimum number of T-shirts Alex must sell in order to make a profit in a given month? (*Assume that Alex sells each T-shirt he buys.*)

Answer _____

13. Solve: $-9 \leq -2x + 3 \leq 1$

- A. $3 \geq x \geq -1$
- B. $6 \leq x \leq 1$
- C. $3 \leq x \leq -1$
- D. $6 \geq x \geq 1$

Graphing and Interpreting Linear and Non-Linear Relations

1. What is the domain and range of the relation shown in the table below?

x	y
-1	-5
1	-1
3	3
5	7

Domain _____

Range _____

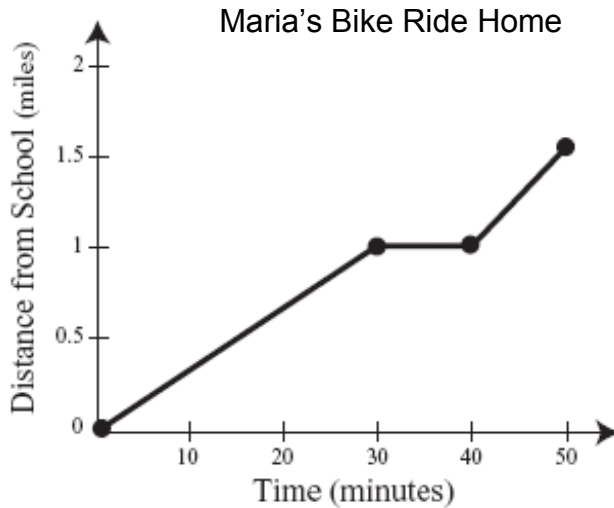
Is the relation in the table above a function?

Answer _____

2. Which relation below is NOT a function?

- A. $\{ (-2, 4), (1, 3), (0, 4) \}$
- B. $\{ (5, 5), (4, 4), (3,3) \}$
- C. $\{ (-4, 0), (-7, 0), (11, 0) \}$
- D. $\{ (1, 4), (2, 5) (1, 7) \}$

3. Maria rode her bike home from school. The graph below shows Maria's distance from school over time.



Describe Maria's bike ride home with respect to time and distance. Be sure to include any changes in speed during the bike ride.

4. Which equation has a graph with no y-intercept?

- A. $y = 5$
- B. $x = 1$
- C. $x = y$
- D. $y = -x$

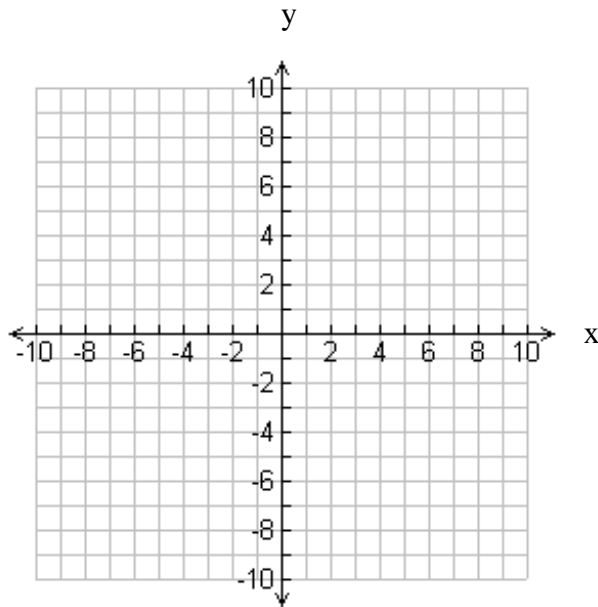
5. What is the slope, x-intercept, and y-intercept of the graph of $3x + y = 7$?

slope = _____ **x-intercept** = _____ **y-intercept** = _____

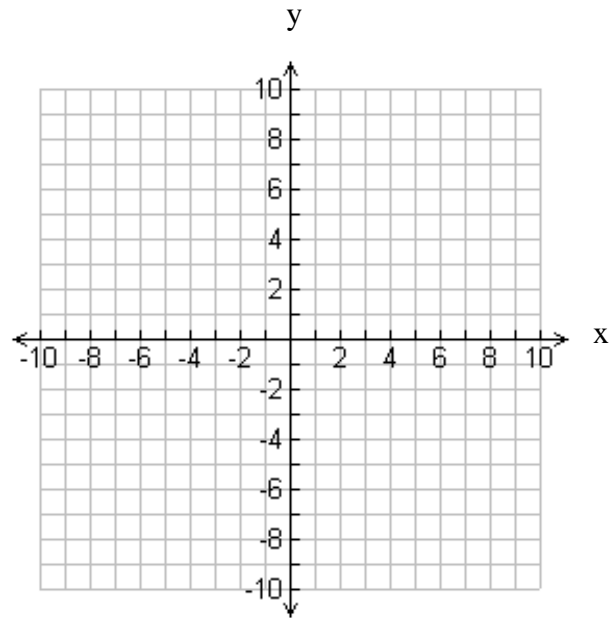
6. What is the y-intercept of the graph of $-2y = x - 4$?
- A. -4
 - B. -2
 - C. 2
 - D. 4
7. Which of the following is an equation of a line with a slope of -2 that passes through the point $(-4, 3)$?
- A. $y = -2x - 5$
 - B. $y = -2x - 4$
 - C. $y = -2x + 3$
 - D. $y = -2x + 11$
8. Write an equation of a line that passes through the points $(-2, 5)$ and $(1, 2)$.

Answer _____

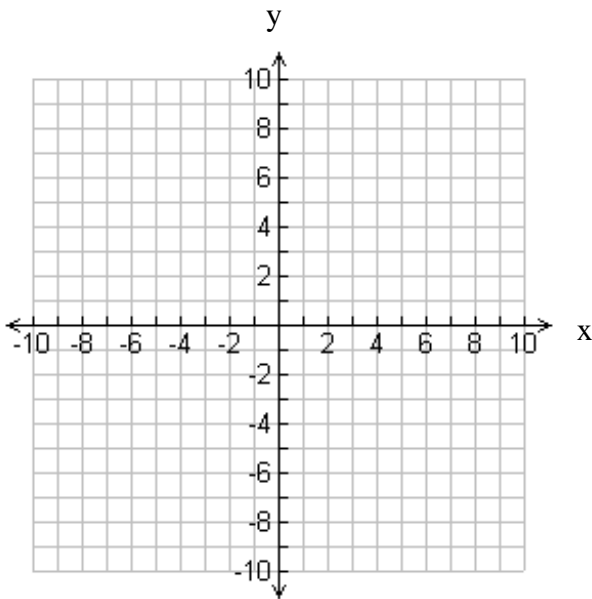
9. Graph: $y = \frac{2}{3}x - 1$



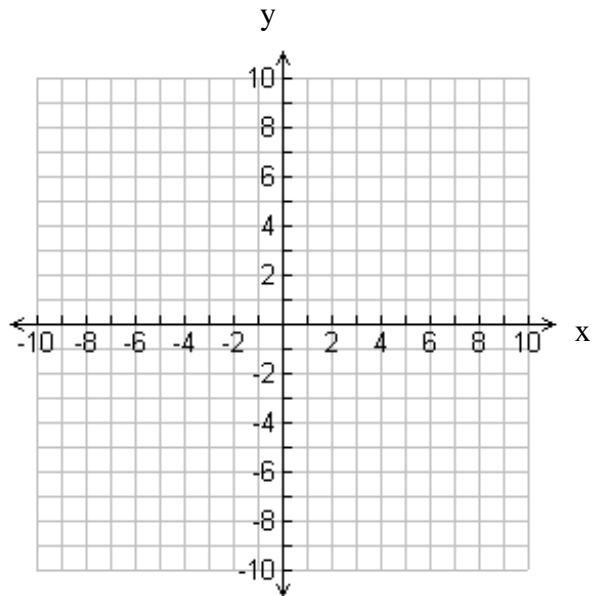
10. Graph: $6x - 2y = 10$



11. Graph: $y \leq \frac{-1}{3}x + 4$



12. Graph: $-5y < 10x$



13. Sue earns \$2 for each CD she sells and \$2.50 for each DVD she sells. Sue earned \$950 last week selling CDs and DVDs.

Write an equation to represent the number of CDs (c) and DVDs (d) Sue sold last week given that she earned \$950.

Answer _____

If Sue sold 305 CDs last week, how many DVDs did she sell?

Answer _____

14. Wes bought a pizza with 2 toppings from Bill's Pizza Place for \$11.00. Lisa bought a pizza with 5 toppings from Bill's Pizza Place for \$14.75.

Each topping at Bill's Pizza Place costs the same amount.

What is the price per topping at Bill's Pizza Place?

Answer _____

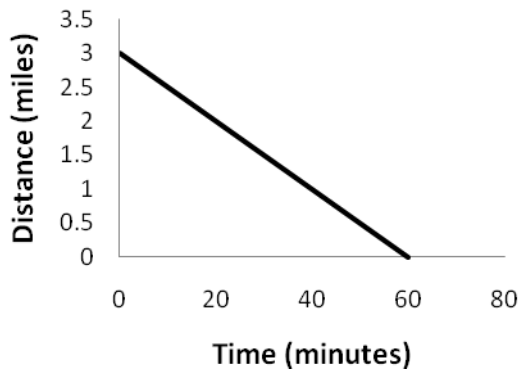
Write an equation that can be used to determine the cost (C), in dollars, of a pizza at Bill's Pizza Place given the number of toppings (T).

Answer _____

15. Joe ran from his home to school at a constant speed. He immediately turned around and ran back home, but at a slower constant speed. Joe ran along a straight path to and from school. Which graph best represents Joe's distance from his home over time?

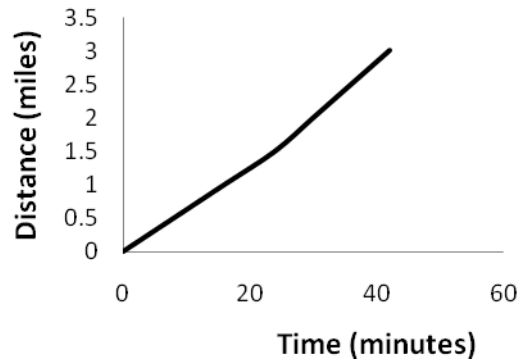
A.

Joe's Distance From Home



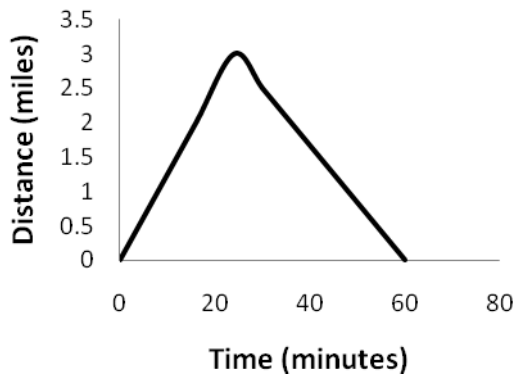
B.

Joe's Distance From Home



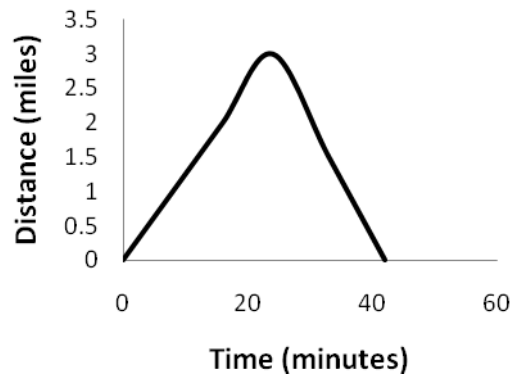
C.

Joe's Distance From Home

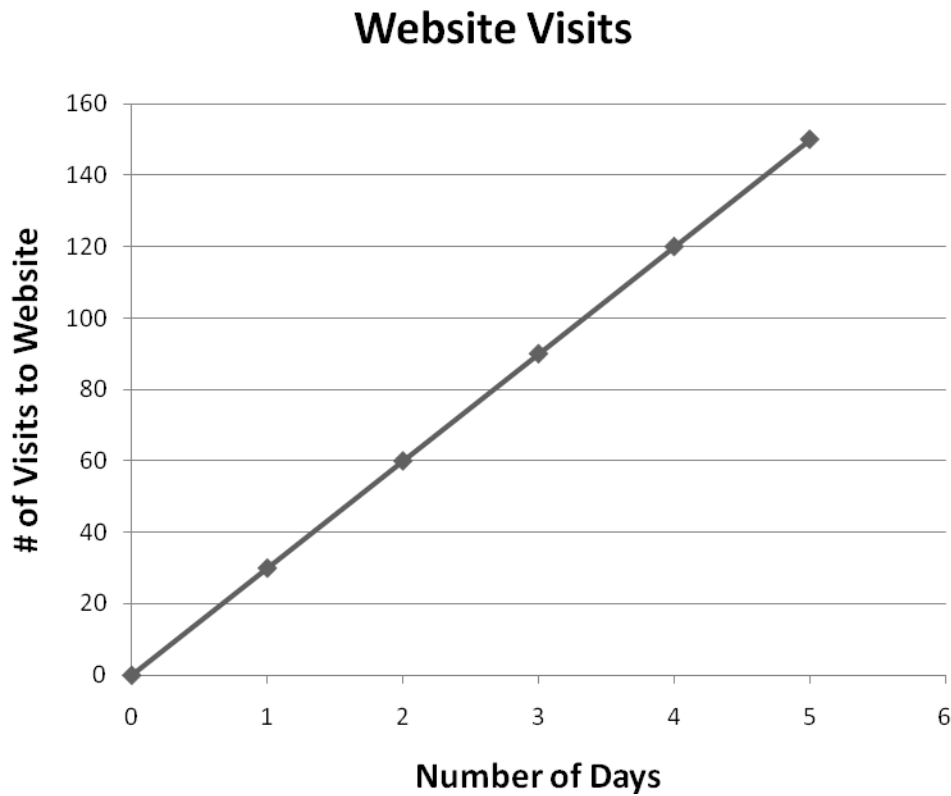


D.

Joe's Distance From Home



16. The graph below represents the total number of times a certain website was visited over a 5-day period.



What is the slope of this line segment and what does it represent in terms of this situation?

Write an equation that represents the total number of times this website is visited, V , after d days.

Answer _____

If this trend continues, how many times will this website be visited in 30 days?

Answer _____

Systems of Linear Equations and Inequalities

1. Solve the system of equations below.

$$\begin{aligned} -5y + 3x &= -16 \\ 10y + 4x &= 62 \end{aligned}$$

What is the x-value in the solution?

- A. 3
 - B. 4.6
 - C. 5
 - D. 6.6
2. Solve the system of equations below.

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

What is the value of y in the solution?

- A. -3
 - B. -1
 - C. 1
 - D. 3
3. Kim bought 4 shirts and 3 pairs of jeans for \$109.85.
Jim bought 6 shirts and 1 pair of jeans for \$94.95.

Each shirt costs the same amount.

Each pair of jeans costs the same amount.

What is the cost, in dollars, for 1 pair of jeans?

Enter your answer in the response grid.

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4. Jen is 13 years younger than Andre. The sum of their ages in years is 137.

What is Andre's age in years?

Enter your answer in the response grid.

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5. Solve the system of equations below.

$$3x - 2y = -7$$

$$-4x + y = 11$$

Answer _____

6. A group of 2 adults and 4 children paid \$95 for admission to a water park.
A different group of 3 adults and 7 children paid \$155 for admission to the same water park.

Write a system of equations that can be used to determine the admission price to the water park for an adult (A) and a child (C).

Answer _____

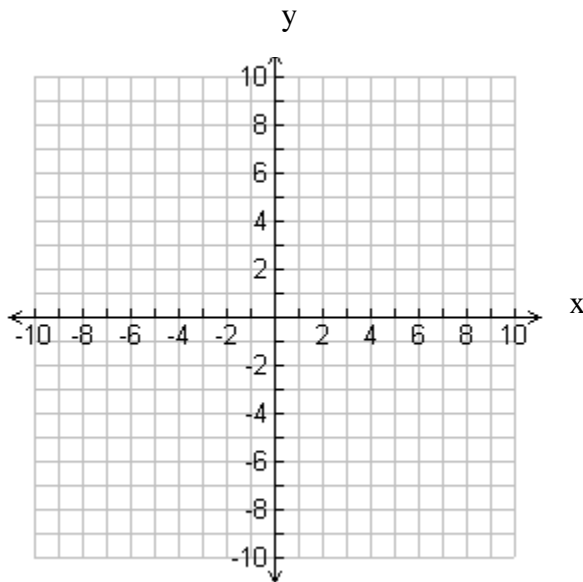
What is the admission price, in dollars, for 1 child?

Answer _____

7. Graph the system of linear inequalities below.

$$-3x + 2y > -6$$

$$-y \geq 2x - 5$$



8. Describe how to estimate the solution to a pair of equations graphed on a coordinate plane. Then, explain how to determine if there is one solution, no solution, or infinitely many solutions to the pair of equations.

Polynomials

1. Multiply: $(3x - 1)(2x + 5)$
- A. $6x^2 + 6x - 5$
 - B. $6x^2 - 13x + 4$
 - C. $6x^2 + 13x - 5$
 - D. $6x^2 + 17x - 5$
2. Which of the following is equivalent to $(x - 4)^2$?
- A. $x^2 - 16$
 - B. $x^2 + 16$
 - C. $x^2 - 8x - 16$
 - D. $x^2 - 8x + 16$
3. Add: $(5x^3 - 3x + 7) + (2x^3 + 6x^2 - x)$
- A. $7x^3 + 3x^2 - x + 7$
 - B. $7x^3 - 3x^2 - x + 7$
 - C. $7x^3 + 6x^2 - 4x + 7$
 - D. $7x^3 + 6x^2 - 2x + 7$
4. Subtract: $(9x^2 + 3x - 4) - (3x^2 + 8x - 1)$
- A. $6x^2 - 5x - 3$
 - B. $6x^2 + 5x - 5$
 - C. $6x^2 + 11x - 5$
 - D. $6x^2 - 5x - 4$

5. What is the greatest common factor of the expression below?

$$24a^6b^2 - 18a^3b + 12a^2b^3$$

- A. $2ab$
 - B. $2a^3b^2$
 - C. $6a^2b$
 - D. $6a^6b^3$
6. Divide: $(18m^5p^4 + 36m^7p^3 - 4m^3p)$ by $(2m^3p)$

- A. $9m^2p^3 + 18m^4p^2 - 2$
- B. $12m^2p^3 + 34m^4p^2 - 2$
- C. $9m^2p^3 + 18m^4p^2 - 2mp$
- D. $12m^2p^3 + 34m^4p^2 - 2mp$

7. Which is equivalent to $3x^2 \cdot 2x^4$?

- A. $5x^6$
- B. $5x^8$
- C. $6x^6$
- D. $6x^8$

8. Which expression is equivalent to $(g^6h^3)^3$?

- A. g^9h^6
- B. g^9h^9
- C. $g^{18}h^6$
- D. $g^{18}h^9$

9. The volume (V) of a right circular cone can be found using the formula

$$V = \frac{1}{3}\pi \cdot r^2h, \text{ where } r \text{ is the radius and } h \text{ is the height.}$$

Which equation represents the volume of a right circular cone with a radius of $6x$ and a height of 5 ?

- A. $V = 20\pi \cdot x$
- B. $V = 20\pi \cdot x^2$
- C. $V = 60\pi \cdot x$
- D. $V = 60\pi \cdot x^2$

10. Simplify: $\frac{15m^7c^6}{3mc^2}$

- A. $5m^6c^3$
- B. $5m^6c^4$
- C. $5m^7c^4$
- D. $12m^6c^4$

11. Factor: $4x^2 - 1$

Answer _____

12. Factor: $x^2 - 3x - 28$

Answer _____

13. Simplify: $\sqrt{252}$

- A. $6\sqrt{7}$
- B. $7\sqrt{6}$
- C. $7\sqrt{36}$
- D. $36\sqrt{7}$

14. Simplify: $-3m - \frac{1}{5}(50m + 100) - 1$

- A. $-48m - 1$
- B. $-13m + 19$
- C. $-13m - 21$
- D. $-13m - 2$

15. Simplify: $\sqrt{9d^{100}}$

- A. $4.5d^{50}$
- B. $3d^{50}$
- C. $4.5d^{10}$
- D. $3d^{10}$

16. Factor: $6x^2 - x - 15$

- A. $(2x + 3)(3x - 5)$
- B. $(6x + 5)(x - 3)$
- C. $(6x + 1)(x - 15)$
- D. $(2x - 3)(3x + 5)$

Solving and Graphing Quadratic Equations

1. Solve: $x^2 = -x + 30$

- A. $x = -6, -5$
- B. $x = -6, 5$
- C. $x = -5, 6$
- D. $x = 5, 6$

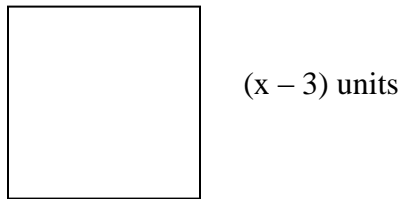
2. Solve: $(x + 3)^2 = 36$

- A. $x = 3$
- B. $x = 9$
- C. $x = -9, 3$
- D. $x = 3, 9$

3. Solve: $2x^2 - 4x - 3 = 0$

- A. $x = 1 \pm 2\sqrt{10}$
- B. $x = 2 \pm \sqrt{10}$
- C. $x = \frac{2 \pm \sqrt{10}}{2}$
- D. $x = \frac{2 \pm \sqrt{2}}{2}$

4. Consider the square below.



What is the value of x if the area of the square is 126.5625 square units?

- A. 8.25
B. 11.25
C. 14.25
D. 17.25
5. The graph of which function has x -intercepts $(-4, 0)$ and $(7, 0)$?
- A. $y = (x - 4)(x + 7)$
B. $y = (x + 4)(x - 7)$
C. $y = (x + 4)(x + 7)$
D. $y = (x - 4)(x - 7)$
6. What are the zeros of the function $y = x^2 - x - 20$?
- A. -5 and -4
B. -5 and 4
C. -4 and 5
D. 4 and 5
7. What are the x -intercepts of the graph of $y = 2x^2 + x - 10$?
- A. $(-5, 0)$ and $(2, 0)$
B. $(-2, 0)$ and $(5, 0)$
C. $(-2, 0)$ and $(2.5, 0)$
D. $(2, 0)$ and $(-2.5, 0)$

8. What is the solution of $x^2 - 16x = -64$?

Enter your answer in the response grid.

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7	7	7	7	7	7	7	7	7
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9. The height (h) of a stone, in meters, thrown into the air can be modeled by the equation $h = -4.9t^2 + 20t + 10$, where t represents time in seconds.

How many seconds will it take for the stone to hit the ground ($h = 0$) after it is thrown into the air? Round your answer to the tenths place.

Enter your answer in the response grid.

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7	7	7	7	7	7	7	7	7
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10. A rectangular dance floor measures 24 feet by 32 feet. The length and width of the floor will both be increased by x feet.

Write an equation that can be used to determine the value of x , in feet, if the area of the new dance floor is 1,174.25 square feet.

Answer _____

What are the dimensions of the new dance floor, in feet, if the area is 1,174.25 square feet?

Answer _____

What is the perimeter of the new dance floor, in feet, if the area is 1,174.25 square feet?

Answer _____

11. Solve $\sqrt{2x+3} = x$.

- A. $x = -3$
- B. $x = 1$
- C. $x = 3$
- D. $x = -1, 3$

12. The height (h) of a certain insect, in feet, that jumps straight up into the air is modeled by the equation $h = -16t^2 + vt$, where t is the time in seconds after the insect jumps, and v is the initial upward velocity of the insect.

Write an equation that can be used to find the height (h) of the insect, in feet, after t seconds, if the insect's initial upward velocity is 4 feet per second.

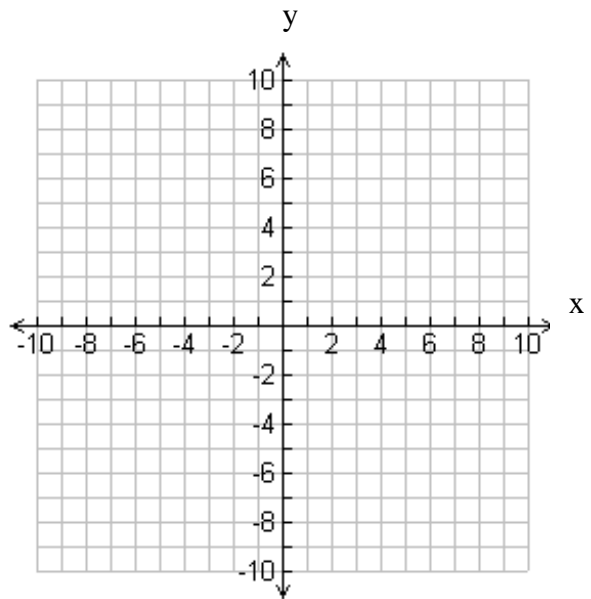
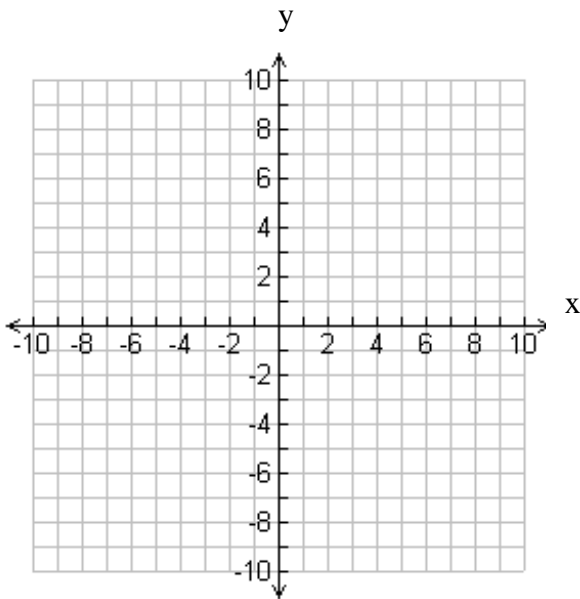
Answer _____

How long, in seconds, will it take for the insect to hit the ground after it jumps?

Answer _____

13. Graph $y = x^2 + 4x - 3$.

14. Graph $y = -2x^2 + 8x$.



Answer Key

Solving Linear Equations and Inequalities

1. A
2. A
3. C
4. A
5. D
6. $4.5c \leq 75$ and 16
7. -1
8. 5
9. D
10. In step 2, the equation should read $8x = -2$. When combining like terms, $3x$ was subtracted from $5x$ instead of adding $3x$ to both sides of the equation. (Or other valid explanation.)
$$x = -\frac{1}{4}$$
11. $300 + 15b \geq 500$ and 14
12. $12T > 6.5T + 150$ and 28
13. D

Graphing and Interpreting Linear and Non-Linear Relations

1. Domain: -1, 1, 3, 5
Range: -5, -1, 3, 7
Yes
2. D
3. Maria rode her bike at a constant speed for the first 30 minutes. Then, she rested for 10 minutes. Finally, Maria rode at a constant speed for 10 more minutes, but at a faster pace than before.
4. B
5. slope = -3, x-int. = $\frac{7}{3}$, y-int. = 7
6. C
7. A
8. $y = -x + 3$
9. The graph of $y = \frac{2}{3}x - 1$. The line contains the y-intercept of -1. Other points contained in the line are (3, 1) and (-3, -3).
10. The graph of $6x - 2y = 10$. The line contains the y-intercept of -5. Other points contained in the line are (1, -2), (-1, -8), and ($\frac{5}{3}$, 0).

11. The graph of $y \leq \frac{-1}{3}x + 4$. A solid line with a y-intercept of 4 should be graphed. Other points contained in the line are (3, 3) and (-3, 5). The solution (shading) is below the line $y = \frac{-1}{3}x + 4$.
12. The graph of $-5y < 10x$ ($y > -2x$). A dashed line with a y-intercept of 0 should be graphed. Other points contained in the line are (1, -2) and (-1, 2). The solution (shading) is above the dashed line $y = -2x$.
13. $2c + 2.5d = 950$ and 136
14. \$1.25 and $C = 8.5 + 1.25T$
15. C
16. 30; the slope represents that this website is visited 30 times each day; $V = 30d$; 900

Systems of Linear Equations and Inequalities

1. A
2. B
3. 19.95
4. 75
5. (-3, -1)
6. $2A + 4C = 95$
 $3A + 7C = 155$
\$12.50
7. The graph of $-3x + 2y > -6$ (Slope Int. Form: $y > 3/2x - 3$). Shading should be above the dashed line.
The graph of $-y \geq 2x - 5$ (Slope Int. Form: $y \leq -2x + 5$). Shading should be below the solid line.
The solution set is the intersection of the graphs (overlapping shaded region).
8. Estimate the point of intersection of the graphed lines. If the lines intersect in exactly one point, then there is one solution to the system of equations. If the lines are parallel (they do not intersect), then there is no solution. If the pair of equation produce the same line when graphed, then there are infinitely many solutions.

Polynomials

1. C
2. D
3. C
4. A
5. C
6. A
7. C
8. D
9. D
10. B
11. $(2x - 1)(2x + 1)$
12. $(x - 7)(x + 4)$
13. A
14. C
15. B
16. A

Solving and Graphing Quadratic Equations

1. B
2. C
3. C
4. C
5. B
6. C
7. D
8. 8
9. 4.5 or $9/2$ (**NOT $4\frac{1}{2}$ -- Mixed #'s are not allowed on gridded response items.**)
10. $(x + 24)(x + 32) = 1,174.25$ and 30.5 feet by 38.5 feet and 138 feet
11. C
12. $h = -16t^2 + 4t$ and $\frac{1}{4}$
13. The graph of $y = x^2 + 4x - 3$: Vertex at $(-2, -7)$. Parabola passing through $(-2, -7)$, $(0, -3)$, $(-4, -3)$, and/or other points contained in the graph of $y = x^2 + 4x - 3$.
14. The graph of $y = -2x^2 + 8x$: Vertex at $(2, 8)$. Parabola passing through $(2, 8)$, $(0, 0)$, $(4, 0)$, and/or other points contained in the graph of $y = -2x^2 + 8x$.