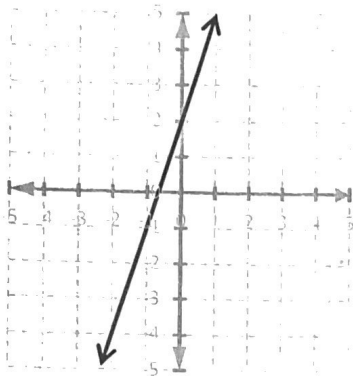


Name: Key Teacher: _____ Hour: _____

Algebra 2A Final Exam Review

Describe the domain and range of each graph using inequality, set notation, and interval notation. Then describe the end behavior.

1.)



Domain: Inequality $-\infty < x < +\infty$

Set Notation $\{x \mid -\infty < x < +\infty\}$

Interval Notation $(-\infty, +\infty)$

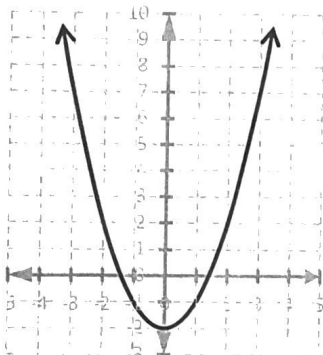
Range: Inequality $-\infty < y < +\infty$

Set Notation $\{y \mid -\infty < y < +\infty\}$

Interval Notation $(-\infty, +\infty)$

End Behavior: As $x \rightarrow -\infty$, $f(x) \rightarrow -\infty$
As $x \rightarrow +\infty$, $f(x) \rightarrow +\infty$

2.)



Domain: Inequality $-\infty < x < +\infty$

Set Notation $\{x \mid -\infty < x < +\infty\}$

Interval Notation $(-\infty, +\infty)$

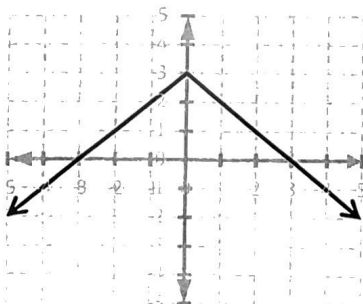
Range: Inequality $y \geq -2$

Set Notation $\{y \mid y \geq -2\}$

Interval Notation $[-2, +\infty)$

End Behavior: As $x \rightarrow -\infty$, $f(x) \rightarrow +\infty$
As $x \rightarrow +\infty$, $f(x) \rightarrow +\infty$

3.)



Domain: Inequality $-\infty < x < +\infty$

Set Notation $\{x \mid -\infty < x < +\infty\}$

Interval Notation $(-\infty, +\infty)$

Range: Inequality $y \leq 3$

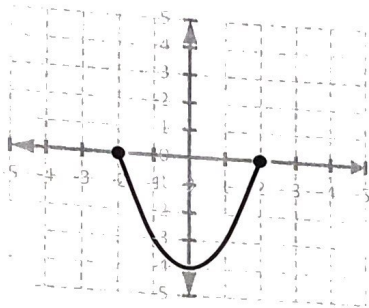
Set Notation $\{y \mid y \leq 3\}$

Interval Notation $(-\infty, 3]$

End Behavior: As $x \rightarrow -\infty$, $f(x) \rightarrow -\infty$
As $x \rightarrow +\infty$, $f(x) \rightarrow -\infty$

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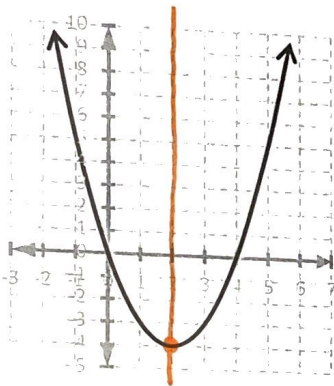
4.)



Domain: $-2 \leq x \leq 2$
Inequality $\{x \mid -2 \leq x \leq 2\}$
Set Notation $\{x \mid -2 \leq x \leq 2\}$
Interval Notation $[-2, 2]$
Range: $-4 \leq y \leq 0$
Inequality $\{y \mid -4 \leq y \leq 0\}$
Set Notation $\{y \mid -4 \leq y \leq 0\}$
Interval Notation $[-4, 0]$

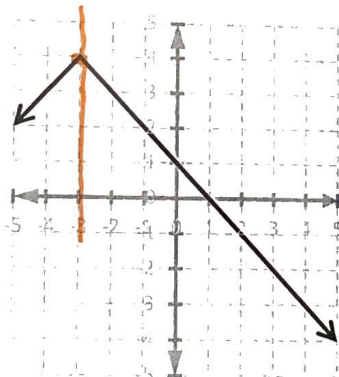
5.) Identify the Axis of Symmetry and Vertex on the graphs below.

a.)



$x = 2$
 $(2, -4)$

b.)

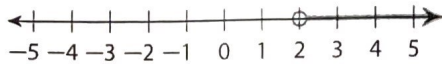


$x = -3$
 $(-3, 4)$

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6.) Describe the intervals shown using inequality, set notation and interval notation.

a.)



Inequality $x > 2$

Set Notation $\{x \mid x > 2\}$

Interval Notation $(2, +\infty)$

b.)



Inequality $-3 < x \leq 2$

Set Notation $\{x \mid -3 < x \leq 2\}$

Interval Notation $(-3, 2]$

7.) Find the inverse of each function.

a.) $f(x) = 10 - 4x$

$$x = 10 - 4y$$

$$\frac{x-10}{-4} = \frac{-4y}{-4}$$

$$f^{-1}(x) = \frac{x-10}{-4}$$

b.) $f(x) = 15x - 10$

$$x = 15y - 10$$

$$\frac{x+10}{15} = \frac{15y}{15}$$

$$f^{-1}(x) = \frac{x+10}{15}$$

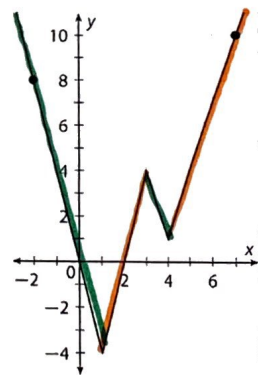
8.) Using the graph to the right.

a.) On which interval(s) is the graph increasing?

$$(1, 3) \text{ ; } (4, +\infty)$$

b.) On which interval(s) is the graph decreasing?

$$(-\infty, 1) \text{ ; } (3, 4)$$



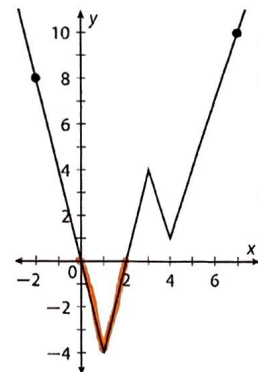
9.) Using the graph to the right.

a.) On which interval(s) is the graph negative?

$$(0, 2)$$

b.) On which interval(s) is the graph positive?

$$(-\infty, 0) \text{ ; } (2, +\infty)$$



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10.) John earns \$30 per week for his allowance, plus \$25 for each lawn he mows. He wants to earn at least \$175 a week.

a.) Write an equation to represent the situation.

$$y = 25x + 30$$

b.) How many lawns must he mow to reach his goal?

$$x = 6 \text{ lawns}$$

$$\begin{array}{r} 175 = 25x + 30 \\ -30 \\ \hline 145 = 25x \\ x = 5.8 \end{array}$$

11.) Joy earns \$20 per week for her allowance, plus \$15 for each SHIPT order she fills. She wants to earn at least \$320 a week.

a.) Write an equation to represent the situation.

$$y = 15x + 20$$

b.) How many SHIPT orders must she fill to reach her goal?

$$x = 20 \text{ orders}$$

$$\begin{array}{r} 320 = 15x + 20 \\ -20 \\ \hline 300 = 15x \\ \frac{300}{15} \\ x = 20 \end{array}$$

12.) Solve the following absolute value equations

a.) $2|x - 5| - 4 = 2$

$$\begin{array}{r} +4 +4 \\ \hline 2|x-5| = 6 \\ \frac{2}{2} \quad \frac{6}{2} \\ \hline |x-5| = 3 \end{array}$$

$$\begin{array}{r} x-5 = 3 \\ +5 \\ \hline x = 8 \end{array}$$

$$\begin{array}{r} x-5 = -3 \\ +5 \\ \hline x = 2 \end{array}$$

b.) $\frac{3|x + 2|}{3} = \frac{12}{3}$

$$|x + 2| = 4$$

$$\begin{array}{r} x+2 = 4 \\ -2 \quad -2 \\ \hline x = 2 \end{array}$$

$$\begin{array}{r} x+2 = -4 \\ -2 \quad -2 \\ \hline x = -6 \end{array}$$

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13.) Determine the number of solutions of each of the following absolute value equations.

a.) $3|2x + 7| + 6 = 15$

$$\frac{-6 - 6}{3}$$

$$\frac{3}{3}|2x + 7| = \frac{9}{3}$$

$$|2x + 7| = 3$$

2 solutions

b.) $9|4x + 9| + 3 = 3$

$$\frac{-3 - 3}{9}$$

$$9|4x + 9| = 0$$

$$|4x + 9| = 0$$

1 solution

c.) $4|6x - 5| + 12 = 8$

$$\frac{-12 - 12}{4}$$

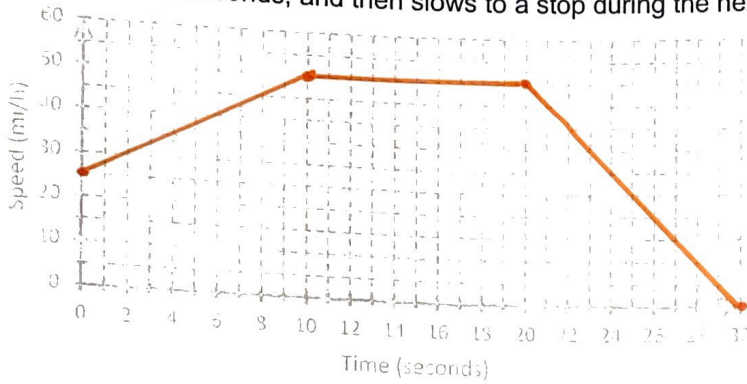
$$4|6x - 5| = -4$$

$$|6x - 5| = -1$$

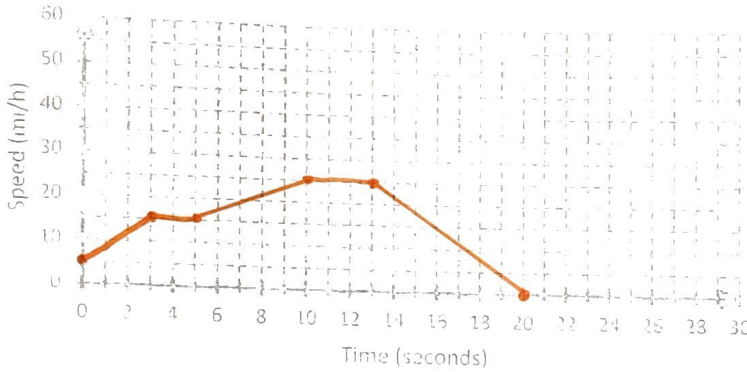
no solution

14.) Graph each situation below.

a.) A car travelling at 25 mi/h accelerates to 50 mi/h in 10 seconds. It maintains that speed for the next 10 seconds, and then slows to a stop during the next 10 seconds.



b.) A car travelling at 5 mi/h accelerates to 15 mi/h in 3 seconds. It maintains that speed for the next 2 seconds. Then the car accelerates again to 25 mi/h in 5 seconds. It stays this speed for 3 seconds, and then slows to a stop during the next 7 seconds.



15.) Compare each of the following graphs with the graph of $f(x) = x^2$

a.) $g(x) = x^2 + 5$

up 5

b.) $g(x) = -x^2$

reflect over x-axis

c.) $g(x) = (x + 3)^2$

left 3

d.) $g(x) = 4x^2$

vert. stretch of 4

e.) $g(x) = (x - 5)^2$

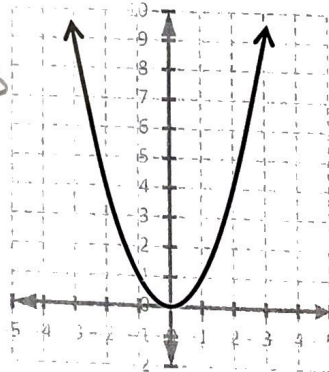
right 5

f.) $g(x) = x^2 - 2$

down 2

g.) $g(x) = \frac{1}{3}x^2$

vert. comp. of $\frac{1}{3}$



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16.) If $f(x) = |x|$ write a function $g(x)$ that is reflected over the x-axis vertically compressed by a factor of $\frac{1}{3}$ translated 4 units left and down 2 unit.

$$g(x) = -\frac{1}{3}|x+4|-2$$

17.) If $f(x) = |x|$ write a function $g(x)$ that is vertically stretched by a factor of 7 translated 8 units right and up 5 units.

$$g(x) = 7|x-8|+5$$

18.) If $f(x) = x^2$ write a function $g(x)$ that is reflected over the x-axis vertically stretched by a factor of 4 translated 2 units right and up 6 units.

$$g(x) = -4(x-2)^2+6$$

19.) If $f(x) = x^2$ write a function $g(x)$ that is vertically compressed by a factor of $\frac{1}{4}$ translated 5 units left and down 1 unit.

$$g(x) = \frac{1}{4}(x+5)^2-1$$

20.) Identify the transformations of the graph from the parent function $f(x) = |x|$.

$$g(x) = 3|x+7|-2$$

vert. stretch of 3
left 7
down 2

21.) Identify the transformations of the graph from the parent function $f(x) = |x|$.

$$g(x) = \frac{3}{4}|x-6|+4$$

vert. comp. of $\frac{3}{4}$
right 6
up 4

22.) Identify the transformations of the graph from the parent function $f(x) = x^2$.

$$g(x) = -2(x-2)^2+7$$

reflection over x-axis
vert. stretch of 2
right 2, up 7

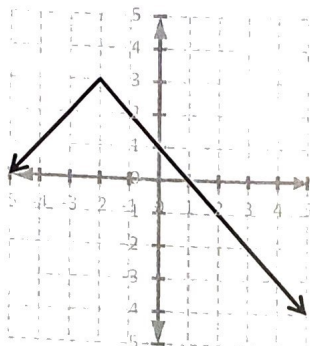
23.) Identify the transformations of the graph from the parent function $f(x) = x^2$.

$$g(x) = \frac{1}{2}(x+4)^2-3$$

vert. comp. of $\frac{1}{2}$
left 4
down 3

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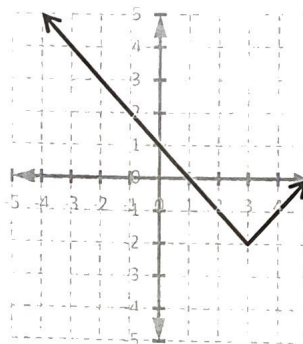
24.) What is the equation of $g(x)$ in vertex form $g(x) = a|x - h| + k$.



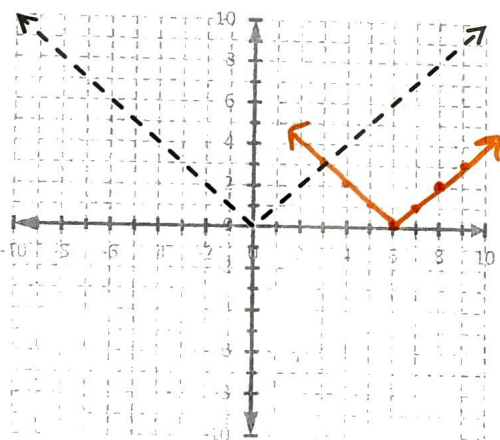
$$g(x) = -|x + 2| + 3$$

25.) What is the equation of $g(x)$ in vertex form $g(x) = a|x - h| + k$.

$$g(x) = |x - 3| - 2$$

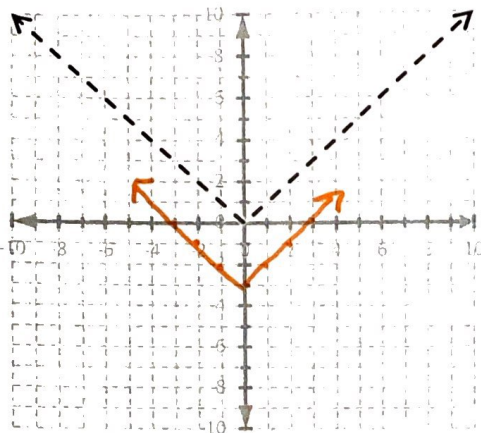


26.) Graph $g(x) = |x - 5|$. Compare it with the graph of $f(x) = |x|$. The dashed line is $f(x) = |x|$.



right 5

- 27.) Graph $g(x) = |x| - 3$. Compare it with the graph of $f(x) = |x|$.
The dashed line is $f(x) = |x|$



down 3

- 28.) Solve the equation $(x - 9)^2 = \sqrt{16}$

$$x - 9 = \pm 4$$

$$x = 9 \pm 4$$

$$x = 13 \quad x = 5$$

- 29.) Solve the equation $(x - 16)^2 = \sqrt{25}$

$$x - 16 = \pm 5$$

$$x = 16 \pm 5$$

$$x = 21 \quad x = 11$$

- 30.) Solve the equation $(2x - 3)^2 = 113$

$$2x - 3 = \pm \sqrt{113}$$

$$\frac{2x}{2} = \frac{3 \pm \sqrt{113}}{2}$$

$$x = \frac{3 \pm \sqrt{113}}{2}$$

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31.) Solve the equation $(4x - 5)^2 = 97$

$$4x - 5 = \pm\sqrt{97}$$
$$4x = \frac{5 \pm \sqrt{97}}{4}$$

$$x = \frac{5 \pm \sqrt{97}}{4}$$

32.) What does the imaginary unit i represent?

$$\sqrt{-1}$$

33.) Solve the equation $9x^2 - 65 = -1$

$$\begin{array}{r} +65 +65 \\ \hline 9x^2 = \sqrt{\frac{64}{9}} \end{array}$$

$$x = \pm \frac{8}{3}$$

34.) Solve the equation $16x^2 - 30 = -5$

$$\begin{array}{r} +30 +30 \\ \hline \frac{16x^2}{16} = \sqrt{\frac{25}{16}} \end{array}$$

$$x = \pm \frac{5}{4}$$

35.) Solve the equation $2x^2 + 47 = 15$

$$\begin{array}{r} -47 \\ \hline 2x^2 = -\frac{32}{2} \end{array}$$

$$x^2 = \sqrt{-16}$$

$$x = \pm 4i$$

36.) Solve the equation $2x^2 + 148 = 20$

$$\begin{array}{r} -148 -148 \\ \hline 2x^2 = -\frac{128}{2} \end{array}$$
$$x^2 = \sqrt{-64}$$

$$x = \pm 8i$$

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37.) On Venus, the distance d (in feet) that an object falls in time t (in seconds) can be modeled by the function $d(t) = 12t^2$. How long would it take an object to fall 108 feet on Venus?

$$\frac{108}{12} = \frac{12t^2}{12}$$

$$t^2 = 9$$

$$t = 3 \text{ sec}$$

38.) On Venus, the distance d (in feet) that an object falls in time t (in seconds) can be modeled by the function $d(t) = 5t^2$. How long would it take an object to fall 125 feet on Venus?

$$\frac{125}{5} = \frac{5t^2}{5}$$

$$25 = t^2$$

$$t = 5 \text{ sec.}$$

39.) A soccer player uses her head to hit a ball up in the air from a height of 2 meters with an initial velocity of 10 meters per second. The height h in meters of the ball is given by $h(t) = -4.9t^2 + 10t + 2$, where t is the time elapsed in seconds. Use the discriminant (D) to see if the ball will go up, and come back down to height of 1.5 meters. Explain why.

$$1.5 = -4.9t^2 + 10t + 2$$

$$0 = -4.9t^2 + 10t - 0.5$$

$$10^2 - 4(-4.9)(-0.5)$$
$$100 + 9.8$$
$$109.8$$

yes, b/c 2 solutions

40.) In the past, professional baseball was played at the Astrodome in Houston, Texas. The Astrodome has a maximum height of 63.4 m. The height in meters of a baseball t seconds after it is hit straight up in the air with a velocity of 45 m/s is given by $h = -9.8t^2 + 45t + 1$. Will a baseball hit straight up with this velocity hit the roof of the Astrodome?

$$63.4 = -9.8t^2 + 45t + 1$$

$$-9.8t^2 + 45t - 62.4$$

no, neg. discriminant means non-real answer

$$45^2 - 4(-9.8)(-62.4)$$
$$2025 - 2,446.08$$
$$-421.08$$

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41.) Determine if each quadratic equation has real or non-real solutions

a.) $x^2 - 3x + 8 = 0$

$$\begin{aligned} &(-3)^2 - 4(1)(8) \\ &9 - 32 \\ &-23 \end{aligned}$$

non-real

b.) $-2x^2 + 3x - 1 = 0$

$$\begin{aligned} &3^2 - 4(-2)(-1) \\ &9 - 8 \\ &1 \end{aligned}$$

1 real

c.) $3x^2 + 6x + 3 = 0$

$$\begin{aligned} &6^2 - 4(3)(3) \\ &36 - 36 \\ &0 \end{aligned}$$

1 real

42.) Solve $3x^2 + 11x + 5 = 0$ using the quadratic formula

$$\frac{-11 \pm \sqrt{11^2 - 4(3)(5)}}{2(3)}$$

$$\frac{-11 \pm \sqrt{61}}{6}$$

43.) Solve $2x^2 + 9x + 4 = 0$ using the quadratic formula

$$\frac{-9 \pm \sqrt{9^2 - 4(2)(4)}}{2(2)}$$

$$\frac{-9 \pm \sqrt{49}}{4}$$

$$\frac{-9 \pm 7}{4} \rightarrow \frac{-9+7}{4} = \frac{-2}{4} = \frac{-1}{2}$$

$$\frac{-9-7}{4} = \frac{-16}{4} = -4$$

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44.) Complete the square for the following expression then write it as a binomial squared

$$x^2 - 6x + \boxed{9} = \boxed{(x-3)^2}$$

45.) Complete the square for the following expression then write it as a binomial squared

$$x^2 + 8x + \boxed{16} = \boxed{(x+4)^2}$$

46.) Write the equation that shows $x^2 + 16x + 7 = 0$ after the method of completing the square has been applied? (DON'T SOLVE)

$$x^2 + 16x + \underline{64} = -7 + \underline{64}$$

$$\boxed{(x+8)^2 = 57}$$

47.) Write the equation that shows $x^2 - 6x + 10 = 0$ after the method of completing the square has been applied? (DON'T SOLVE)

$$x^2 - 6x + \underline{9} = -10 + \underline{9}$$

$$\boxed{(x-3)^2 = -1}$$

48.) Solve $x^2 - 4x = -1$ by completing the square.

$$x^2 - 4x + \underline{4} = -1 + \underline{4}$$

$$(x-2)^2 = \pm\sqrt{3}$$

$$x-2 = \pm\sqrt{3}$$

$$\boxed{x = 2 \pm \sqrt{3}}$$

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49.) Solve $x^2 - 2x = 4$ by completing the square.

$$x^2 - 2x + \frac{1}{1} = 4 + \frac{1}{1}$$

$$(x-1)^2 = \sqrt{5}$$

$$x-1 = \pm\sqrt{5}$$

$$x = 1 \pm \sqrt{5}$$

50.) Write the following function in vertex form and identify the vertex. $g(x) = (x^2 + 8x) - 10$

$$(x^2 + 8x + \frac{16}{1}) - 10 - \frac{16}{1}$$

$$(x+4)^2 - 26$$

$$(-4, -26)$$

51.) Write the following function in vertex form and identify the vertex. $g(x) = (x^2 - 6x) + 15$

$$(x^2 - 6x + \frac{9}{1}) + 15 - \frac{9}{1}$$

$$(x-3)^2 + 6$$

$$(3, 6)$$

52.) What value should be added in the blanks to complete the square?

$$[x^2 + 6x + \frac{9}{1}] + [y^2 + 4y + \frac{4}{1}] = -20 + \frac{9}{1} + \frac{4}{1}$$

53.) What value should be added in the blanks to complete the square?

$$[x^2 - 2x + \frac{1}{1}] + [y^2 + 6y + \frac{9}{1}] = -15 + \frac{1}{1} + \frac{9}{1}$$

54.) Write the equation of a circle with center $C(4, -3)$ and radius $r = 4$

$$(x-4)^2 + (y+3)^2 = 16$$

55.) Write the equation of a circle with center $C(-2, 8)$ and radius $r = 6$

$$(x+2)^2 + (y-8)^2 = 36$$

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56.) What is the center and radius of the circle? $(x - 4)^2 + (y + 3)^2 = 49$

$$(4, -3) \quad r = 7$$

57.) What is the center and radius of the circle? $(x + 6)^2 + (y - 2)^2 = 16$.

$$(-6, 2) \quad r = 4$$

58.) Find the radius of a circle with center $C(2, 2)$ and passes through the point $P(-1, 6)$

$$(-1 - 2)^2 + (6 - 2)^2 = r^2$$

$$(-3)^2 + (4)^2 = r^2$$

$$9 + 16 = r^2$$

$$25 = r^2$$

$$r = 5$$

59.) Find the radius of a circle with center $C(2, -1)$ and passes through the point $P(4, 4)$

$$(4 - 2)^2 + (4 + 1)^2 = r^2$$

$$2^2 + 5^2 = r^2$$

$$4 + 25 = r^2$$

$$29 = r^2$$

$$r = \sqrt{29}$$

60.) Write the equation in the standard form of a circle. $x^2 + y^2 + 4x - 4y - 1 = 0$.

$$x^2 + 4x + \underline{4} + y^2 - 4y + \underline{4} = 1 + \underline{4} + \underline{4}$$

$$(x + 2)^2 + (y - 2)^2 = 9$$

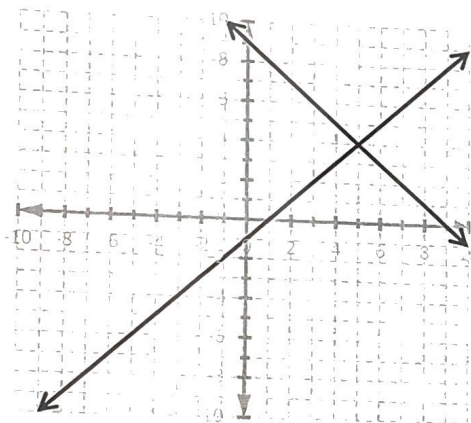
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61.) Write the equation in the standard form of a circle. $x^2 + y^2 - 10x + 6y + 30 = 0$.

$$x^2 - 10x + \frac{25}{1} + y^2 + 6y + \frac{9}{1} = -30 + \frac{25}{1} + \frac{9}{1}$$

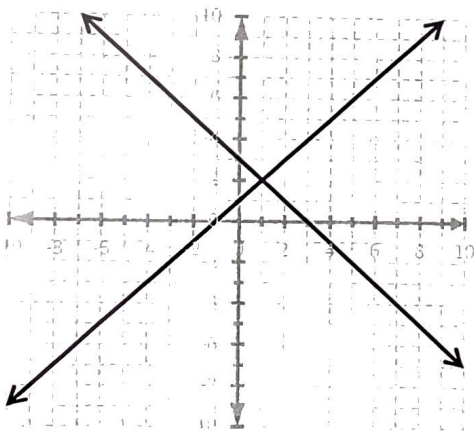
$$(x-5)^2 + (y+3)^2 = 4$$

62.) What is the solution to the system graphed?



$$(5, 4)$$

63.) What is the solution to the system graphed?



$$(1, 2)$$

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64.) What is the solution to the system of equations?

$$\begin{cases} y = -2x + 8 \\ y = x - 7 \end{cases}$$

$$\begin{array}{r} -2x + 8 = x - 7 \\ +7 \quad +2x \\ \hline \end{array}$$

$$15 = 3x$$

$$x = 5$$

$$y = 5 - 7$$

$$y = -2$$

$$(5, -2)$$

65.) What is the solution to the system of equations?

$$\begin{cases} y = x - 2 \\ y = 4x + 1 \end{cases}$$

$$\begin{array}{r} x - 2 = 4x + 1 \\ -1 \quad -x \\ \hline \end{array}$$

$$-3 = 3x$$

$$x = -1$$

$$y = -1 - 2$$

$$y = -3$$

$$(-1, -3)$$

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66.) Determine the number of solutions for each of the systems of equations

$$\begin{array}{l} \text{a.)} \\ + \end{array} \begin{cases} x + y = 4 \\ -x - y = 6 \end{cases}$$

$$0 = 10$$

no solution

$$\begin{array}{l} \text{b.)} \\ - \end{array} \begin{cases} x - 4y = 12 \\ x + 5y = 3 \end{cases}$$

$$-9y = 9$$

$$y = -1$$

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

$$x - 5 = 3$$

$$x = 8$$

(8, -1)

$$\begin{array}{l} \text{c.)} \\ -4 \end{array} \begin{cases} x - 3y = 6 \\ 4x - 12y = 24 \end{cases}$$

$$\begin{array}{l} -4x + 12y = -24 \\ 4x - 12y = 24 \end{array}$$

infinitely many

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67.) Solve the system of equations by substitution

$$\begin{cases} x^2 - y = 7 \\ x - y = 7 \end{cases} \quad \begin{matrix} y = x^2 - 7 \\ y = x - 7 \end{matrix} \quad \begin{matrix} x^2 - 7 = x - 7 \\ x^2 - x = 0 \\ a = 1 \quad b = -1 \end{matrix}$$

$$\frac{1 \pm \sqrt{(-1)^2 - 4(1)(0)}}{2(1)} = \frac{1 \pm \sqrt{1}}{2} = \frac{1 \pm 1}{2} \rightarrow \begin{matrix} x = 1 \\ x = 0 \end{matrix}$$

$$(0, -7)(1, -6)$$

68.) Solve the system of equations by substitution

$$\begin{cases} x^2 = y + 7 \\ 6x + y = -16 \end{cases} \quad \begin{matrix} y = x^2 - 7 \\ y = -6x - 16 \end{matrix} \quad \begin{matrix} x^2 - 7 = -6x - 16 \\ x^2 + 6x + 9 = 0 \end{matrix}$$

$$\frac{-6 \pm \sqrt{6^2 - 4(1)(9)}}{2(1)} = \frac{-6 \pm 0}{2} = \begin{matrix} x = -3 \\ y = 2 \end{matrix}$$

$$(-3, 2)$$

69.) A jar containing only nickels and dimes contains a total of 30 coins. The value of the coins in the jar is \$2.00. Solve by elimination to find the number of nickels and dimes that are in the jar.

$$\begin{array}{r} -.05n + d = 30 \\ .05n + .1d = 2.00 \\ \hline -.05n - .05d = -1.50 \\ \hline .05d = .50 \\ d = 10 \end{array}$$

10 dimes
20 nickels

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70.) A jar containing only nickels and dimes contains a total of 80 coins. The value of the coins in the jar is \$6.75. Solve by elimination to find the number of nickels and dimes that are in the jar.

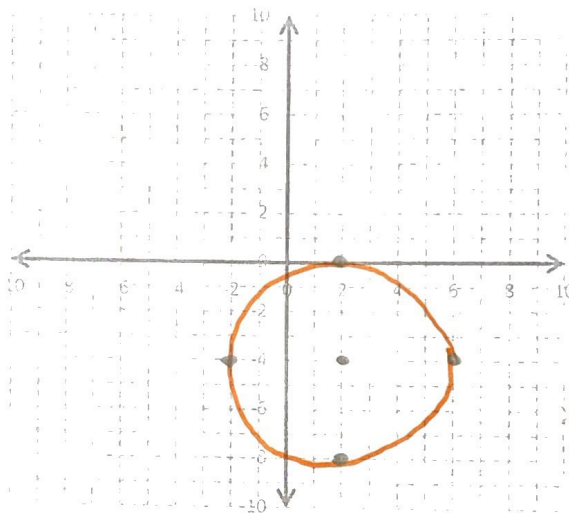
$$\begin{array}{r} -0.05n \\ \left\{ \begin{array}{l} n + d = 80 \\ 0.05n + 0.1d = 6.75 \end{array} \right. \\ -0.05n - 0.05d = -4 \\ \hline 0.05d = 2.75 \end{array}$$

55 dimes
25 nickels

71.) Graph the circle. $(x - 2)^2 + (y + 4)^2 = 16$

$$(2, -4)$$

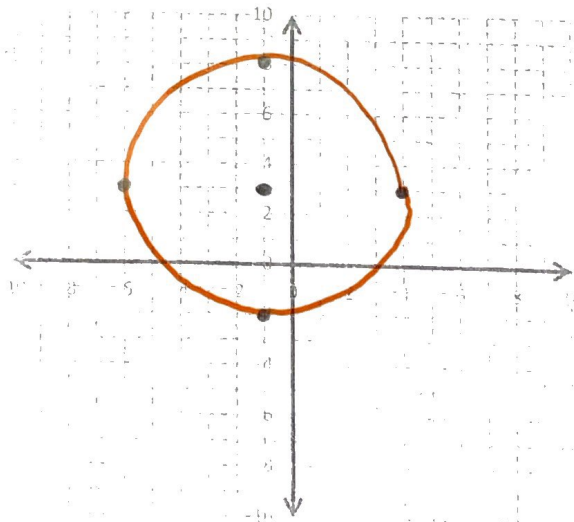
$$r = 4$$



72.) Graph the circle. $(x + 1)^2 + (y - 3)^2 = 25$

$$(-1, 3)$$

$$r = 5$$

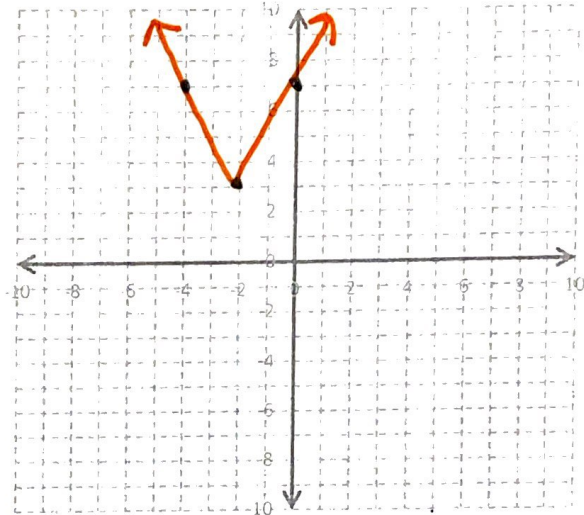


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73.) Graph the absolute value function $g(x) = 2|x + 2| + 3$

$-2-2$	$2(2)+3$
$0-2$	$0+3$
$2-2$	$2(2)+3$

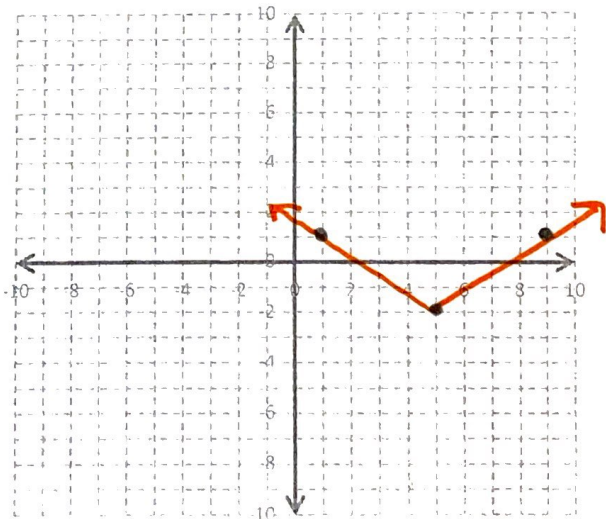
$(-4, 7)(-2, 3)(0, 7)$



74.) Graph the absolute value function $g(x) = \frac{3}{4}|x - 5| - 2$

$-4+5$	$4\left(\frac{3}{4}\right)-2$
$0+5$	$0\left(\frac{3}{4}\right)-2$
$4+5$	$4\left(\frac{3}{4}\right)-2$

$(1, 1)(5, -2)(9, 1)$

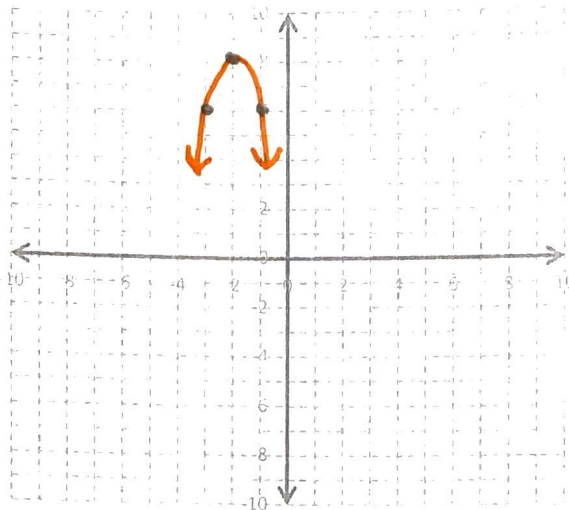


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75.) Graph the quadratic function $g(x) = -2(x + 2)^2 + 8$

-1-2	$1(-2) + 8$
0-2	$0 + 8$
1-2	$1(-2) + 8$

$(-3, 6)(-2, 8)(-1, 6)$



76.) Graph the quadratic function $g(x) = 2(x - 3)^2 - 2$

-1+3	$1(2) - 2$
0+3	$0 - 2$
1+3	$1(2) - 2$

$(2, 0)(3, -2)(4, 0)$

