Algebra 1 Chapter 9.1 and 9.2 Homework Name: key

For the following Quadratic Equations Find the following Then Graph:

a. Axis of Symmetry
b. Vertex
c. If it Opens Up or Down
d. Is it a Max or Min
e. What is the Domain
f. What is the Range

1. $y = x^2 + 8x + 12$

a. $x = \frac{-8}{2} = \boxed{-4}$

b. $y = (-4)^2 + 8(-4) + 12$
$y = 16 - 32 + 12$
$y = -4 \rightarrow$ vertex $\boxed{(-4, -4)}$

2. $y = 3x^2 - 6x - 2$

a. $x = \frac{6}{6} = \boxed{1}$

b. $y = 3(1)^2 - 6(1) - 2$
$y = 3(1) - 6 - 2$
$y = 3 - 6 - 2$
$y = -5$
vertex $\boxed{(1, -5)}$

3. $y = -x^2 - 2x - 1$

a. $x = \frac{2}{-2} = \boxed{-1}$

b. $y = -(-1)^2 - 2(-1) - 1$
$y = -(1) + 2 - 1$
$y = -1 + 2 - 1$
$y = 0$
vertex $\boxed{(-1, 0)}$

4. $y = -x^2 - 10x - 31$

a. $x = \frac{10}{-2} = \boxed{-5}$

b. $y = -(-5)^2 - 10(-5) - 31$
$y = -(25) + 50 - 31$
$y = -25 + 50 - 31$
$y = -6$
vertex $\boxed{(-5, -6)}$

5. $y = 2x^2 - 4$

a. $x = \frac{0}{4} = \boxed{0}$

b. $y = 2(0)^2 - 4$
$y = 2(0) - 4$
$y = 0 - 4$
$y = -4$
vertex $\boxed{(0, -4)}$

6. $y = -2x^2 + 8x$

a. $x = \frac{-8}{-4} = \boxed{2}$

b. $y = -2(2)^2 + 8(2)$
$y = -2(4) + 16$
$y = -8 + 16$
$y = 8$
vertex $\boxed{(2, 8)}$

7. The height above water level of a bridge can be modeled by $f(x) = -0.007x^2 + 0.84x + 0.8$, where x is the distance in feet from where the arch support enters the water. Can a sailboat that is 24 feet tall pass under the bridge? Explain!!

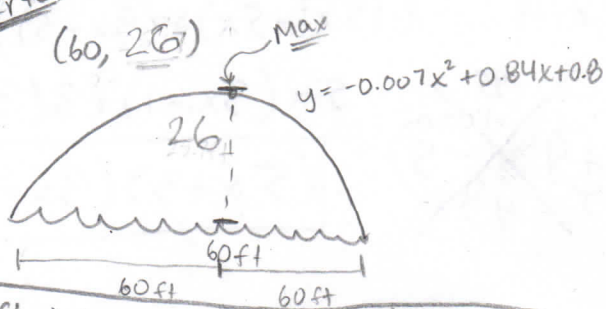
$a = -0.007$
$b = 0.84$
$c = 0.8$

$x = \frac{-b}{2a} = \frac{-0.84}{2(-0.007)}$

$x = 60$

$y = -0.007(60)^2 + 0.84(60) + 0.8$
$y = -25.2 + 50.4 + 0.8$
$y = 26$

vertex (60, 26)



Yes, a boat that is 24ft tall can pass under the bridge b/c the max height of the bridge is 26 ft.

8. The height of a small rise in a roller coaster track is modeled by $f(x) = -0.07x^2 + 0.42x + 6.37$ where x is the distance in feet from a support pole at ground level. Find the height of the rise.

$a = -0.07$
$b = 0.42$
$c = 6.37$

$x = \frac{-b}{2a}$

$x = \frac{-0.42}{2(-0.07)}$

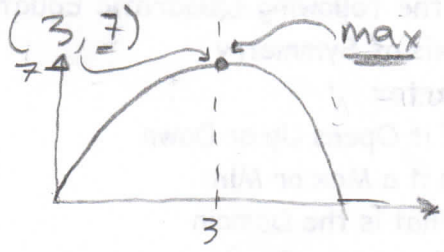
$x = 3$

$y = -0.07(3)^2 + 0.42(3) + 6.37$

$y = -0.63 + 1.26 + 6.37$

$y = 7$

vertex



The height of the rise is 7ft

9. The height in feet above the ground of an arrow t seconds after it is shot can be modeled by $y = -16t^2 + 63t + 4$. Can the arrow pass over a tree that is 68 feet tall? Explain!!!

$a = -16$
$b = 63$
$c = 4$

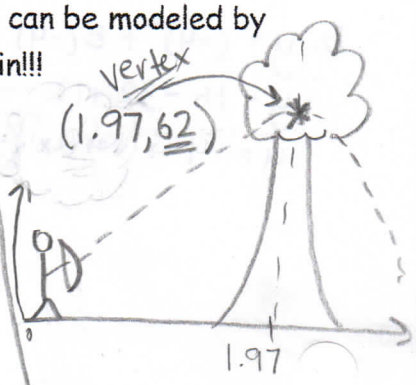
$x = \frac{-63}{2(-16)}$

$x = 1.96875$ # of seconds to reach max height

$y = -16(1.96875)^2 + 63(1.96875)$

$y = 62.02$ max height of the arrow

No, the arrow can not pass over the tree because the max height of the arrow is about 62ft and the tree is 68 ft tall



Factor Completely:

10. $8x^2 - 4x - 4$

$a = 8$
$b = -4$
$c = -4$

$8x^2 + 4x - 8x - 4$

$(8x^2 - 8x) + (4x - 4)$

$8x(x-1) + 4(x-1)$

$(8x+4)(x-1)$

$4(2x+1)(x-1)$

-32, +4, -8, -4

11. $12x^2 - 8x + 1$

$a = 12$
$b = -8$
$c = 1$

$12x^2 - 6x - 2x + 1$

$(12x^2 - 6x) + (-2x + 1)$

$6x(2x-1) + -1(2x-1)$

$(6x-1)(2x-1)$

12, -6, -2, -8

12. $3x^2 - 19x + 20$

$a = 3$
$b = -19$
$c = 20$

$3x^2 - 15x - 4x + 20$

$(3x^2 - 15x) + (-4x + 20)$

$3x(x-5) + -4(x-5)$

$(3x-4)(x-5)$

60, -15, -4, -19

13. $15x^2 + 4x - 3$

$a = 15$
$b = 4$
$c = -3$

$15x^2 + 9x - 5x - 3$

$(15x^2 - 5x) + (9x - 3)$

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

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

-45, +9, -5, 4

14. $x^2 + x - 12$

$a = 1$
$b = 1$
$c = -12$

$x^2 + 4x - 3x - 12$

$(x^2 + 4x) + (-3x - 12)$

$x(x+4) + -3(x+4)$

$(x-3)(x+4)$

-12, +4, -3, 1

15. $x^2 + 5x + 6$

$a = 1$
$b = 5$
$c = -6$

$x^2 + 6x - x - 6$

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

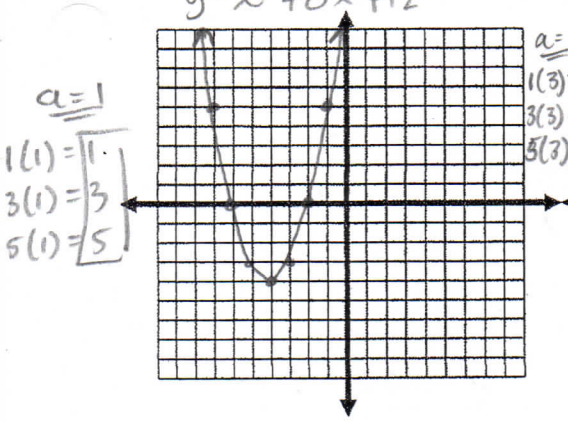
$x(x-1) + 6(x-1)$

$(x+6)(x-1)$

-6, +6, -1, 5

Name: Key

$y = x^2 + 8x + 12$



$a = 1$

$1(1) = 1$

$3(1) = 3$

$5(1) = 5$

Axis of Symmetry: $x = -4$

Vertex: $(-4, -4)$

Zeros: _____

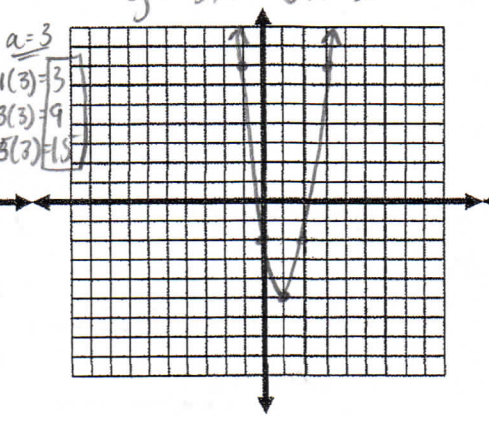
Opens Up or Down: up

Max or Min: Min

Domain: $(-\infty, \infty)$

Range: _____

$y = 3x^2 - 6x - 2$



$a = 3$

$1(3) = 3$

$3(3) = 9$

$5(3) = 15$

Axis of Symmetry: $x = 1$

Vertex: $(1, -5)$

Zeros: _____

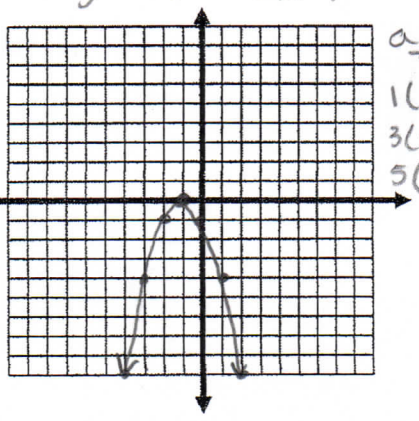
Opens Up or Down: up

Max or Min: Min

Domain: $(-\infty, \infty)$

Range: $y \geq -5$

$y = -x^2 - 2x - 1$



$a = -1$

$1(-1) = -1$

$3(-1) = -3$

$5(-1) = -5$

Axis of Symmetry: $x = -1$

Vertex: $(-1, 0)$

Zeros: _____

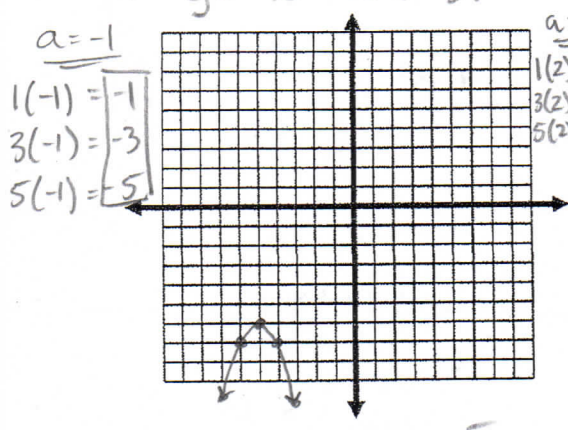
Opens Up or Down: down

Max or Min: Max

Domain: $(-\infty, \infty)$

Range: $y \leq 0$

$y = -x^2 - 10x - 31$



$a = -1$

$1(-1) = -1$

$3(-1) = -3$

$5(-1) = -5$

Axis of Symmetry: $x = -5$

Vertex: $(-5, -6)$

Zeros: _____

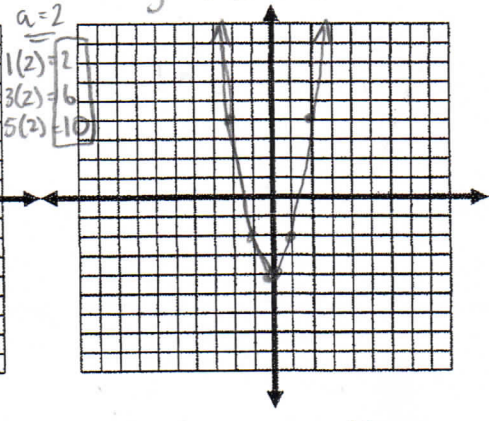
Opens Up or Down: down

Max or Min: Max

Domain: $(-\infty, \infty)$

Range: $y \leq -6$

$y = 2x^2 - 4$



$a = 2$

$1(2) = 2$

$3(2) = 6$

$5(2) = 10$

Axis of Symmetry: $x = 0$

Vertex: $(0, -4)$

Zeros: _____

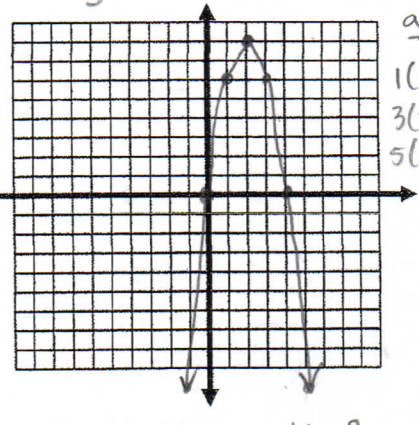
Opens Up or Down: up

Max or Min: Min

Domain: $(-\infty, \infty)$

Range: $y \geq -4$

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



$a = -2$

$1(-2) = -2$

$3(-2) = -6$

$5(-2) = -10$

Axis of Symmetry: $x = 2$

Vertex: $(2, 8)$

Zeros: _____

Opens Up or Down: down

Max or Min: Max

Domain: $(-\infty, \infty)$

Range: $y \leq 8$