Algebra Ib- Mrs. Tilus Name: Lynne Tilus

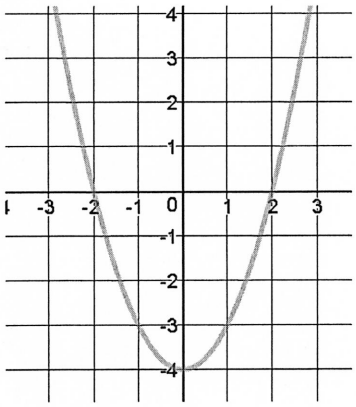
Unit 10 Assessment Review – Graphing Quadratic Functions

CCSS.MATH.CONTENT.HSF.IF.B.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.

Match each term the description

Term	**Description**
1. G. Quadratic Function	a. Set of all possible x - values
2. C. Parabola	b. Vertical line through the vertex
3. D. x - intercept	c. The shape of a quadratic function
4. E. Vertex	d. The point where the graph crosses the x axis
5. H. y-intercept	e. minimum or maximum point
6. I. 'a' value of the quadratic function	f. Set of all possible y - values
7. B. Axis of Symmetry	g. $y = ax^2 + bx + c$
8. F. Range	h. The point where the graph crosses the y axis
9. A. Domain	i. Determines is the function has a minimum or maximum point

10.



Vertex: (0, -4)

Minimum or Maximum: Minimum

a-value: positive ⇒ ∪

Axis of Symmetry: x = 0

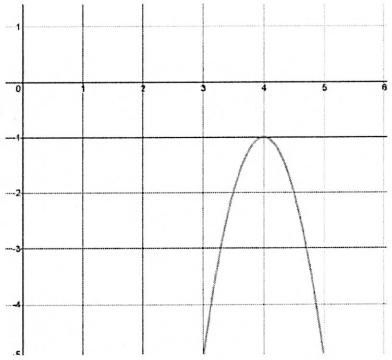
Domain: ℝ

Range: y ≥ -4

How many x-intercepts: 2 (-2,0)(2,0)

How many y-intercepts: 1 (0, -4)

11.



Vertex: (4, -1)

Minimum or Maximum: Maximum

a-value: negative ⇒ ∩

Axis of Symmetry: x = 4

Domain: ℝ

Range: y ≤ -1

How many x-intercepts: 0

How many y-intercepts: 1 (not shown)

Determine the coordinates of the x-intercepts, equation of the axis of symmetry, coordinates of the vertex, coordinates of the y-intercept, domain, and range for the quadratic function below. Then graph the function.

12. $y = x^2 - 8x + 7$

a.) x-intercepts: (7,0) (1,0)

b.) vertex: (4,-9)

Factoring: $-7 \times -1 = 7$, $-7 + -1 = -8$

$(x-7)(x-1)=0$

$x-7=0 \quad x-1=0$

$x=7 \quad x=1$

Quadratic: $a=1 \; b=-8 \; c=7$

$x = \frac{8 \pm \sqrt{(-8)^2-4(1)(7)}}{2(1)}$

$x = \frac{8 \pm \sqrt{36}}{2}$

$x = \frac{8+6}{2} \quad x = \frac{8-6}{2}$

$x = 7 \quad x = 1$

x-value: $x = \frac{7+1}{2}$

$x = \frac{8}{2}$

$x = 4$

y-value: $y = (4)^2 - 8(4) + 7$

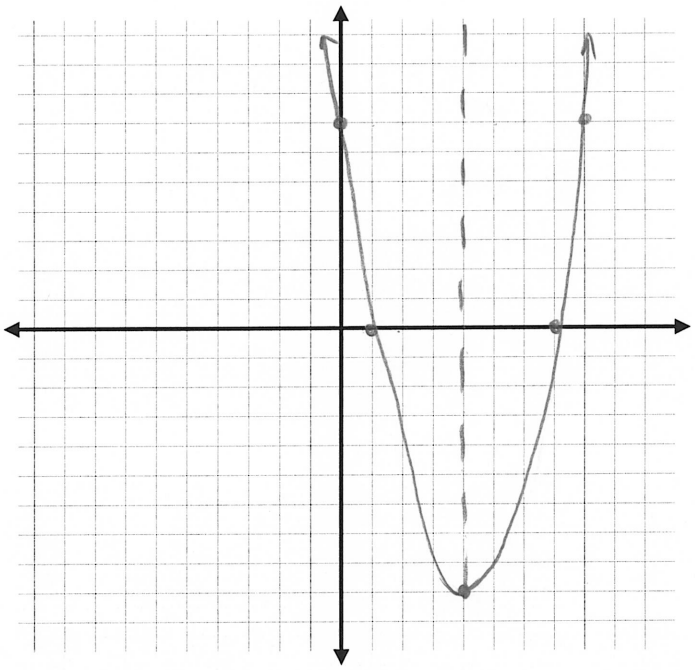
$y = 16 - 32 + 7$

$y = -9$

c.) y-intercept: (0,7)

$y = (0)^2 - 8(0) + 7$

$y = 7$



d.) Equation of the axis of symmetry: $x = 4$

e.) Maximum or Minimum

f.) a-value: positive ⇒ ↗↖

e.) Domain: $\mathbb{R}$

f.) Range: $y \geq -9$

13. $y = -3x^2 - 6x + 9$

a.) x-intercepts: (1,0) (-3,0)

b.) vertex: (-1, 12)

Factoring:

$0 = -3(x^2 + 2x - 3)$ GCF

$0 = -3(x-1)(x+3)$

$x - 1 = 0$ $\quad x + 3 = 0$

$x = 1$ $\quad x = -3$

Quadratic: $a = -3$, $b = -6$, $c = 9$

$$x = \frac{+6 \pm \sqrt{(-6)^2 - 4(-3)(9)}}{2(-3)}$$

$$x = \frac{6 \pm \sqrt{144}}{-6}$$

$x = \frac{6+12}{-6}$ $\quad x = \frac{6-12}{-6}$

$x = -3$ $\quad x = 1$

x-value: $x = \frac{-3+1}{2}$

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

$x = -1$

y-value: $y = -3(-1)^2 - 6(-1) + 9$

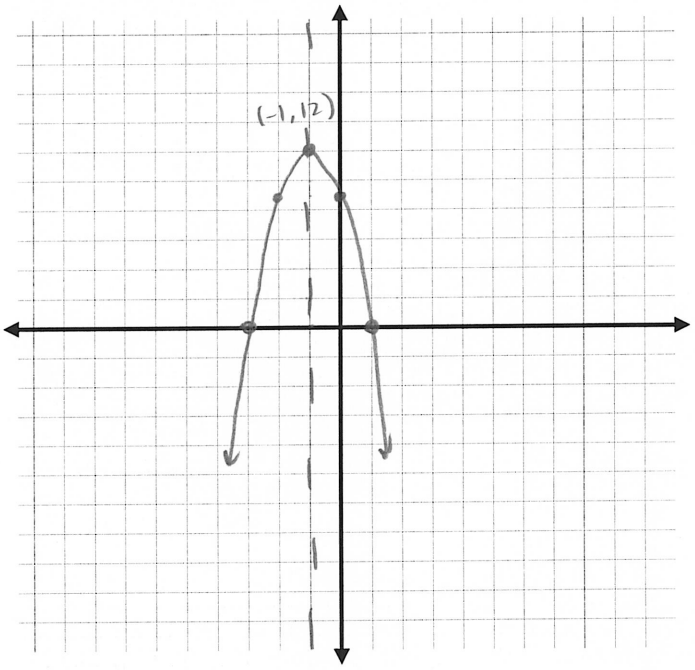
$y = -3 + 6 + 9$

$y = 12$

c.) y-intercept: (0,9) $(x = 0)$

$y = -3(0)^2 - 6(0) + 9$

$y = 9$



d.) Equation of the axis of symmetry: $x = -1$

e.) Maximum or Minimum

f.) a-value: negative →

e.) Domain: $\mathbb{R}$

g.) Range: $y \leq 12$

14. $y = x^2 - 16$

a.) x-intercepts: (4,0) (-4,0)

Factoring: Diff of Squares

$0 = x^2 - 16$

$0 = (x-4)(x+4)$

$x-4=0$ $x+4=0$

$x=4$ $x=-4$

Quadratic

$a=1$ $b=0$ $c=-16$

$x = \frac{-0 \pm \sqrt{0^2-4(1)(-16)}}{2(1)}$

$x = \frac{0 \pm \sqrt{64}}{2}$

$x = \frac{0+8}{2}$ $x = \frac{0-8}{2}$

$x=4$ $x=-4$

b.) vertex: (0,-16)

x-value: $x = \frac{4+(-4)}{2}$

$x = \frac{0}{2}$

$x=0$

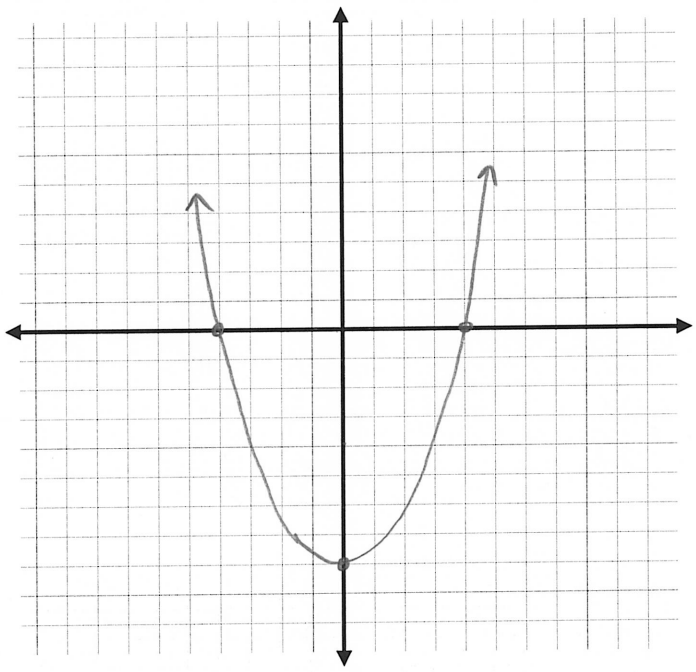
y-value: $y=(0)^2-16$

$y=-16$

c.) y-intercept: (0,-16) (x=0)

$y=(0)^2-16$

$y=-16$



d.) Equation of the axis of symmetry: $x=0$

e.) Maximum or Minimum

f.) a-value: positive ↑

e.) Domain: $\mathbb{R}$

h.) Range: $y \geq -16$

15. A rocket is shot into the air with an upward velocity of 32 ft/sec. The rocket's height h in feet after t seconds is given by the function $h(t) = -16t^2 + 32t + 48$.

a.) Graph the height of the rocket over time.

x-int: Quadratic $a=-16$ $b=32$ $c=48$

$$x = \frac{-32 \pm \sqrt{(32)^2 - 4(-16)(48)}}{2(-16)}$$

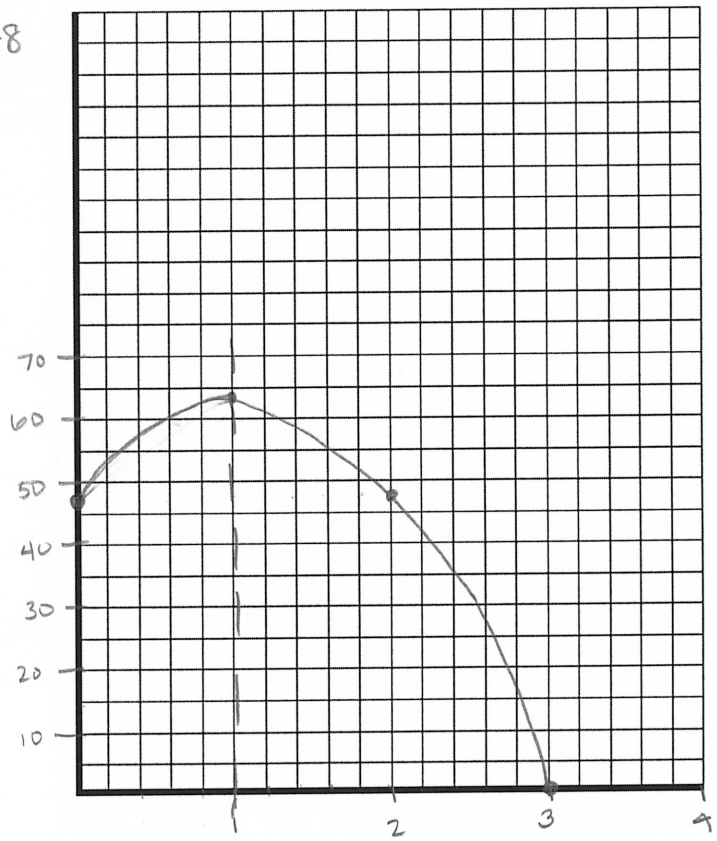
$$x = \frac{-32 \pm \sqrt{4096}}{-32}$$

$$x = \frac{-32+64}{-32} \qquad x = \frac{-32-64}{-32}$$

$$x = \frac{32}{-32} \qquad x = 3$$

$$x = -1$$

x-int: $(-1,0)$ $(3,0)$



Vertex: x-value: $x = \frac{-1+3}{2}$

$x = 1$

y-value: $y = -16(1)^2 + 32(1) + 48$

$y = -16 + 32 + 48$

$y = 64$

Vertex: $(1, 64)$

y-int: $(x=0)$

$y = -16(0)^2 + 32(0) + 48$

$y = 48$

y-int: $(0, 48)$

b.) What is the maximum height the rocket reaches? Look @ vertex ⇒ y-value

64 ft

c.) How long does it take the rocket to reach the maximum height? Look @ vertex ⇒ x-value

1 second

d.) How long does it take the rocket to hit the ground? Look @ x-intercept

3 seconds

16.) Suppose $h(t) = -5t^2 + 14t + 3$ is the height of a diver above the water (in meters), t seconds after the diver leaves the springboard.

a.) How high above the water is the springboard? Explain how you know. Look @ y-int ($x=0$)

$y = -5(0)^2 + 14(0) + 3$

$y = 3$ meters above the water

b.) When does the diver hit the water? Look @ x-int

$a = -5 \quad b = 14 \quad c = 3$

$$x = \frac{-14 \pm \sqrt{(14)^2 - 4(-5)(3)}}{2(-5)}$$

$$x = \frac{-14 \pm \sqrt{256}}{-10}$$

$x = \frac{-14+16}{-10} \quad x = -0.2$ ← time cannot be negative

$x = \frac{-14-16}{-10} \quad x = 3$ seconds

c.) When does the diver reach the peak of the dive? Look @ Vertex ⇒ x-value

x-value: $x = \frac{-0.2+3}{2}$

$x = \frac{2.8}{2}$

$x = 1.4$ seconds

d.) What is the peak of the dive? Look @ Vertex ⇒ y-value

y-value: $y = -5(1.4)^2 + 14(1.4) + 3$

$y = -9.8 + 19.6 + 3$

$y = 12.8$ meters