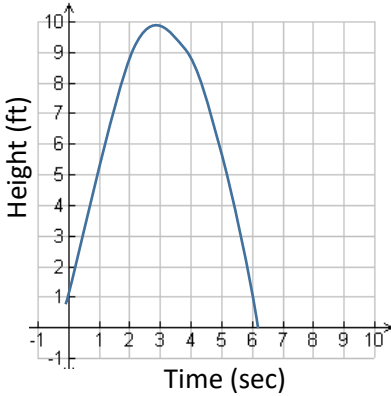


## 2.2 Quadratic Functions & Their Graphs (Day 1)

OBJ: To graph equations of quadratics written in standard form, find the vertex, axis of symmetry, and vertex form of a quadratic

The graph below shows the path of a frisbee thrown off of a 1 foot hill given by the equation  $h(t) = -(t - 3)^2 + 10$ . Use the graph to answer parts a-f.



- What is the starting height of the Frisbee? 1 foot
- How long does it take for the frisbee to reach its maximum height? 3 seconds
- What is the frisbee's maximum height? 10 feet
- What type of function is modeled by the graph—linear, quadratic, or absolute value?
- Find the vertex: (3, 10) Axis of symmetry: x = 3
- Interpret the vertex. It takes 3 seconds for the frisbee to reach a maximum height of 10 feet.

### Vertex Form of a Quadratic Function

$$y = a(x - h)^2 + k$$

Vertex: (h, k)  
 Axis of symmetry: x = h  
 Max/Min: k

### Standard Form of a Quadratic Function

$$y = ax^2 + bx + c$$

y-intercept: c  
 Vertex:  $(-\frac{b}{2a}, f(-\frac{b}{2a}))$   
 Axis of symmetry:  $x = -\frac{b}{2a}$   
 Max/Min:  $f(-\frac{b}{2a})$

Graph each function. Find the y-intercept, axis of symmetry, vertex, minimum or maximum value, domain and range of the parabola.

1.)  $y = -x^2 + 2x + 8$

$a = -1$   $b = 2$   $c = 8$

2.)  $y = -2x^2 - 8x - 4$

$a = -2$   $b = -8$   $c = -4$

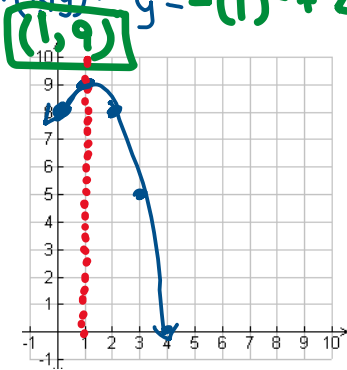
3.)  $y = 2x^2 - 4x + 3$

$y = 2(x - 1)^2 + 1$

y-int: (c) = 8

AOS:  $x = -\frac{b}{2a} = -\frac{2}{2(-1)} = 1$  X = 1

vertex (x, y):  $y = -(1)^2 + 2(1) + 8 = 9$

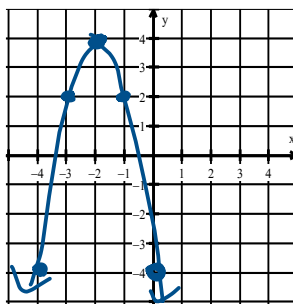


y-intercept: 8  
 Vertex: (1, 9)  
 Axis of symmetry: x = 1  
 Domain:  $\mathbb{R}$   
 Range:  $y \leq 9$  Max/Min: 9

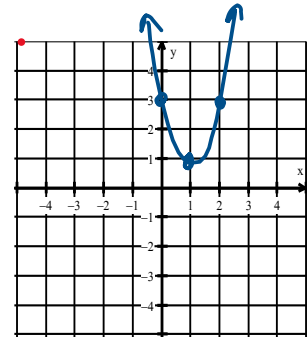
AOS:  $x = -\frac{b}{2a} = -\frac{-8}{2(-2)} = 2$

X = 2

vertex (x, y):  $y = -2(-2)^2 - 8(-2) - 4 = 4$



(c) y-intercept: -4  
 Vertex: (-2, 4)  
 Axis of symmetry: x = 2  
 Domain:  $\mathbb{R}$   
 Range:  $y \leq 4$  Max/Min: 4



y-intercept: 3  
 Vertex: (1, 1)  
 Axis of symmetry: x = 1  
 Domain:  $\mathbb{R}$   
 Range:  $y \geq 1$  Max/Min: 1

2.2 Quadratic Functions & Their Graphs HW

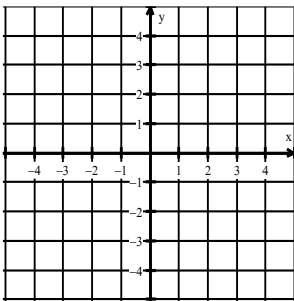
Name \_\_\_\_\_

Graph each function. Find the y-intercept, axis of symmetry, vertex, minimum or maximum value, domain and range of the parabola.

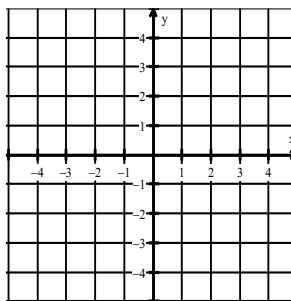
1.)  $y = -x^2 + 4x - 3$

2.)  $y = 2x^2 + 8x + 5$

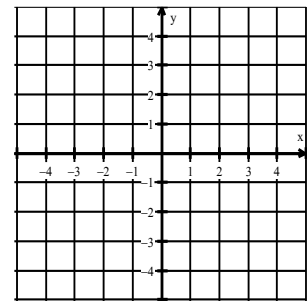
3.)  $y = -x^2 - 6x - 4$



y-intercept: \_\_\_\_\_  
 Vertex: \_\_\_\_\_  
 Axis of symmetry: \_\_\_\_\_  
 Domain: \_\_\_\_\_  
 Range: \_\_\_\_\_ Max/Min: \_\_\_\_\_

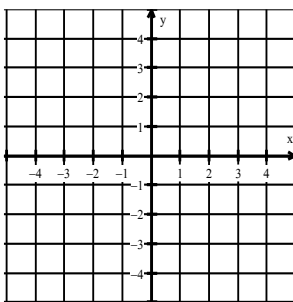


y-intercept: \_\_\_\_\_  
 Vertex: \_\_\_\_\_  
 Axis of symmetry: \_\_\_\_\_  
 Domain: \_\_\_\_\_  
 Range: \_\_\_\_\_ Max/Min: \_\_\_\_\_



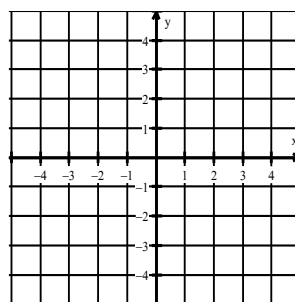
y-intercept: \_\_\_\_\_  
 Vertex: \_\_\_\_\_  
 Axis of symmetry: \_\_\_\_\_  
 Domain: \_\_\_\_\_  
 Range: \_\_\_\_\_ Max/Min: \_\_\_\_\_

8.) Graph  $y = (x - 1)^2 - 3$



y-intercept: \_\_\_\_\_  
 Vertex: \_\_\_\_\_  
 Axis of symmetry: \_\_\_\_\_  
 Domain: \_\_\_\_\_  
 Range: \_\_\_\_\_ Max/Min: \_\_\_\_\_

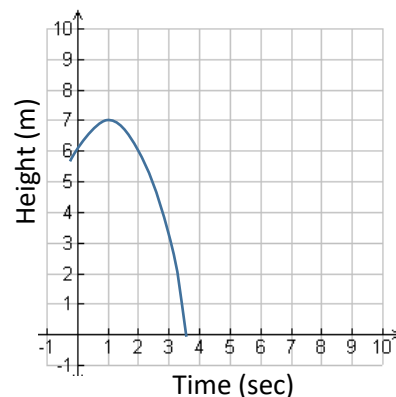
6.) Graph  $y = -(x + 2)^2 + 4$



y-intercept: \_\_\_\_\_  
 Vertex: \_\_\_\_\_  
 Axis of symmetry: \_\_\_\_\_  
 Domain: \_\_\_\_\_  
 Range: \_\_\_\_\_ Max/Min: \_\_\_\_\_

7) The graph below shows the path of a missile launched from a 6 meter hill given by the equation  $h(t) = -t^2 + 2t + 6$ . Use the graph to answer parts a-d.

- a) Interpret the y-intercept.
- b) How long does it take for the missile to reach its maximum height?
- c) What is the missile's maximum height?
- d) Interpret the vertex.

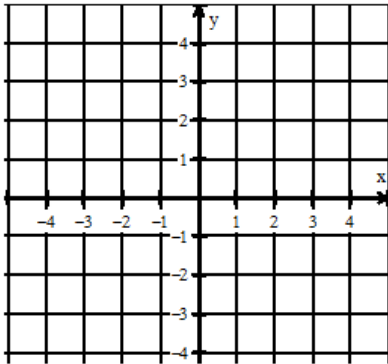


## 2.2 Quadratic Functions & Their Graphs (Day 1)

OBJ: To graph equations of quadratics written in standard form, find the vertex, axis of symmetry, and vertex form of a quadratic

### Warm-Up

Graph  $y = (x - 1)^2 + 2$



Vertex: \_\_\_\_\_

Axis of symmetry: \_\_\_\_\_

Domain: \_\_\_\_\_

How is the vertex related to the equation?