

# Unit 5 - Quadratic Functions

## Day 11 Quadratic Functions (PH 10-2)

### LINES

Parent Function: \_\_\_\_\_

Slope-Intercept Form: \_\_\_\_\_

Standard Form: \_\_\_\_\_

### PARABOLAS/QUADRATIC:

Parent Function: \_\_\_\_\_

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

Standard Form: \_\_\_\_\_

**To Graph**  $y = ax^2 + bx + c$

$a > 0$  opens **up**

$a < 0$  opens **down**

**Step 1-** Identify  $a$ ,  $b$ , and  $c$  for the equation

**Step 2-** Find the vertex:

First find  $x$  using the formula  $x = \frac{-b}{2a}$  then substitute this value to find  $y$

**Step 3-** Sketch the Axis of Symmetry (AOS):

**Step 4-** Put zero in for  $x$  and solve for the  $y$ -intercept

**Step 5-** Reflect over the line of symmetry to get another point on the parabola

**Example 1:** Graph the function  $y = -3x^2 + 6x + 5$

opens up or down?

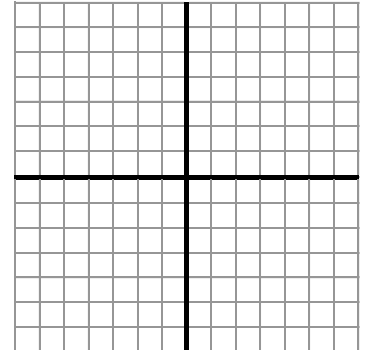
1.  $a =$  \_\_\_\_\_  $b =$  \_\_\_\_\_  $c =$  \_\_\_\_\_

2. Find the  $x$ -coordinate of the vertex. \_\_\_\_\_

Use the  $x$ -coordinate to find the  $y$ -coordinate. Vertex \_\_\_\_\_

3. Sketch & write an equation for the AOS. \_\_\_\_\_

4. Find the  $y$ -intercept. \_\_\_\_\_ 5. Reflect over the AOS. \_\_\_\_\_



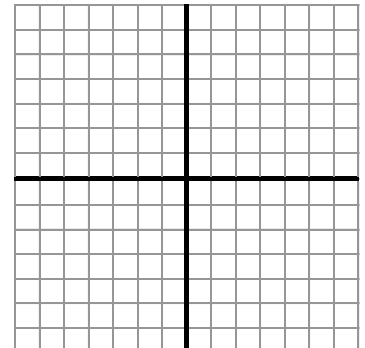
**Example 2:** Graph the quadratic inequality  $y < -3x^2 + 6x + 5$ .

Remember:

$y <$  or  $y \leq$  shade below

$y >$  or  $y \geq$  shade above

| $x$ | $y$ |
|-----|-----|
|     |     |
|     |     |
|     |     |



**Example 3:** Graph the function  $f(x) = x^2 - 6x + 9$

opens up or down?

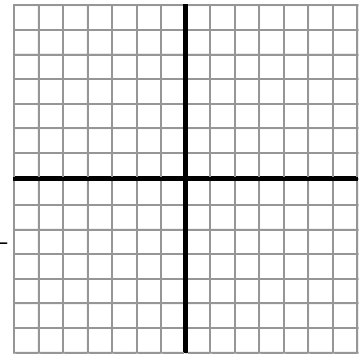
1.  $a = \underline{\hspace{2cm}}$      $b = \underline{\hspace{2cm}}$      $c = \underline{\hspace{2cm}}$

2. Find the x-coordinate of the vertex.  $\underline{\hspace{2cm}}$

Use the x-coordinate to find the y-coordinate. Vertex  $\underline{\hspace{2cm}}$

3. Draw & write an equation for the AOS.  $\underline{\hspace{2cm}}$

4. Find the y-intercept.  $\underline{\hspace{2cm}}$     5. Reflect over the AOS.  $\underline{\hspace{2cm}}$



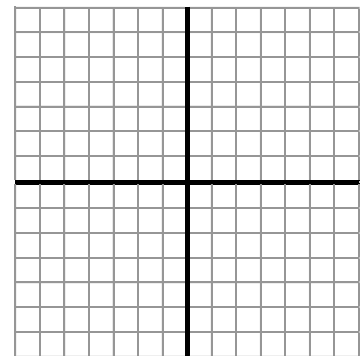
**Example 4:** Graph the quadratic inequality  $f(x) \geq x^2 - 6x + 9$ .

Remember:

$y <$  or  $y \leq$  shade below

$y >$  or  $y \geq$  shade above

| $x$ | $y$ |
|-----|-----|
|     |     |
|     |     |
|     |     |



**Example 5:** A ball is thrown into the air with an initial upward velocity of 48 ft/s. Its height  $h$  in feet after  $t$  seconds is given by the function  $h = -16t^2 + 48t + 4$ .

a. In how many seconds will the ball reach its maximum height?

b. What is the ball's maximum height?

**Homework:** Unit 5 Day 11 Worksheet



**Unit 5 - Quadratic Functions**  
**Day 11 Worksheet**

Name: \_\_\_\_\_

Date: \_\_\_\_\_ Hour: \_\_\_\_\_

**Exercise A:** Graph the function  $f(x) = x^2 + 2x + 3$

$a =$  \_\_\_\_\_  $b =$  \_\_\_\_\_  $c =$  \_\_\_\_\_

Find the x-coordinate of the vertex. \_\_\_\_\_

Use the x-coordinate to find the y-coordinate.

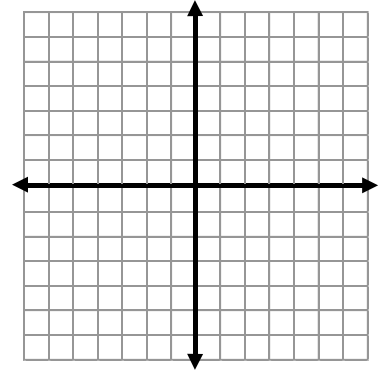
Vertex \_\_\_\_\_

Draw & write an equation for the AOS. \_\_\_\_\_

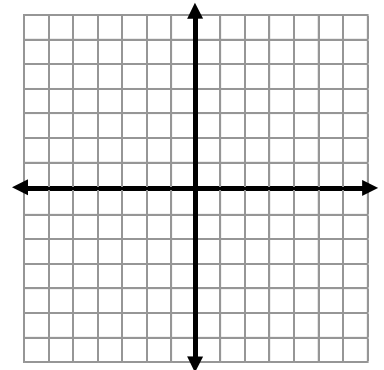
Find the y-intercept. \_\_\_\_\_

Reflect over the AOS. \_\_\_\_\_

Graph the quadratic inequality  $f(x) \geq x^2 + 2x + 3$ .



| $x$ | $y$ |
|-----|-----|
|     |     |
|     |     |
|     |     |



**Exercise B:** Graph the function  $f(x) = -x^2 + 4x - 2$

$a =$  \_\_\_\_\_  $b =$  \_\_\_\_\_  $c =$  \_\_\_\_\_

Find the x-coordinate of the vertex. \_\_\_\_\_

Use the x-coordinate to find the y-coordinate.

Vertex \_\_\_\_\_

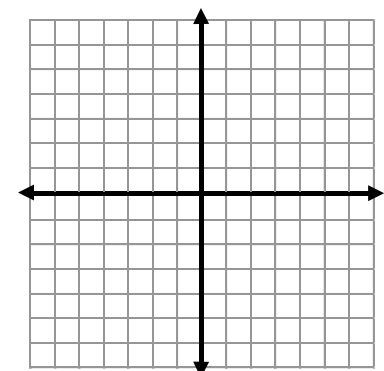
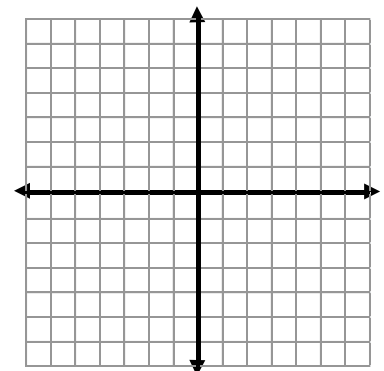
Draw & write an equation for the AOS. \_\_\_\_\_

Find the y-intercept. \_\_\_\_\_

Reflect over the AOS. \_\_\_\_\_

Graph the quadratic inequality  $f(x) \leq -x^2 + 4x - 2$ .

| $x$ | $y$ |
|-----|-----|
|     |     |
|     |     |
|     |     |



Find the equation of the axis of symmetry and the coordinates of the vertex of the graph of each function.

1.  $y = 2x^2 + 4$

2.  $f(x) = 2x^2 + 4x - 5$

3.  $y = x^2 - 8x - 9$

Match each graph with its function.

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

B.  $y = x^2 + 6x$

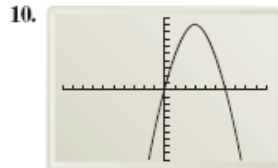
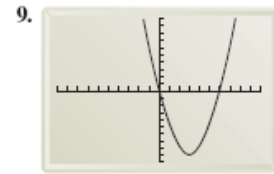
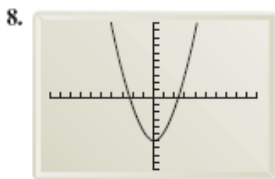
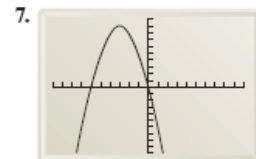
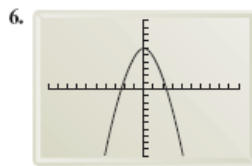
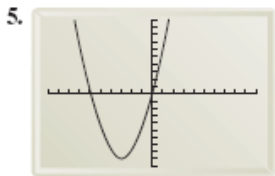
C.  $y = -x^2 - 6x$

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

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

F.  $y = x^2 - 6$

Hint: Find the vertex.  
Does it open up or down?



16. A ball is thrown into the air with an upward velocity of 40 ft/s. Its height  $h$  in feet after  $t$  seconds is given by the function  $h = -16t^2 + 40t + 6$ .

a. In how many seconds does the ball reach its maximum height?

b. What is the ball's maximum height?

Graph each function. Label the axis of symmetry and the vertex.

24.  $f(x) = -x^2 - 4x - 6$

25.  $f(x) = x^2 - 2x + 1$

