

## Spiral Review:

Solve.

1.  $x^2 - 4x - 5 = 0$

$(x-5)(x+1) = 0$   
 $x=5 \quad x=-1$

2.  $x^2 + 6x - 9 = 0$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$\frac{-6 \pm \sqrt{6^2 - 4(1)(-9)}}{2(1)}$$
$$\frac{-6 \pm \sqrt{72}}{2} = \frac{-6 \pm 6\sqrt{2}}{2}$$

Identify the parent function and the transformations.

3.  $f(x) = -\frac{1}{2}(x-3)^2 - 8$

parent:  $y = x^2$   
right 3, down 8,  
vertical shrink, reflection  
over x-axis

4.  $f(x) = 3(x+2)^2 + 6$

parent:  $y = x^2$   
vertical stretch,  
up 6, left 2

$$\frac{-3 \pm 3\sqrt{2}}{2}$$

## p.90 2.1 Quadratic Functions

**Definition of Quadratic:**  $f(x) = ax^2 + bx + c$

**Standard Form:**  $f(x) = a(x-h)^2 + k, a \neq 0$

**Vertex:** (h, k)

**"a":** (+) opens upward, (-) opens downward

**Finding x-intercepts:** Solve  $ax^2 + bx + c = 0$  by factoring, if it does not factor use the Quadratic Formula.

Students will be able to describe the transformations of the graph and identify the vertex of the quadratic function.

**Example 1:** Describe the graph of the function and identify the vertex.

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

vertex: (0, 8)  
 up 8  
 opens up

b.)  $f(x) = -6 - \frac{1}{4}x^2$

d.)  $f(x) = (x^2 + 3x) + \frac{1}{4}$   
 $= (x^2 + 3x + \frac{9}{4}) + \frac{1}{4} - \frac{9}{4}$

$f(x) = (x + \frac{3}{2})^2 - 2$   
 vertex:  $(-\frac{3}{2}, -2)$   
 down 2, left  $\frac{3}{2}$ , opens up

c.)  $f(x) = (x - 7)^2 + 2$

vertex: (7, 2)  
 right 7, up 2, opens up

Students will be able to describe the transformations of the graph, identify the vertex, and x-intercepts.

**Example 2:** Describe the graph of the quadratic function. Identify the vertex and x-intercepts.

a.)  $f(x) = (x^2 + 10x) + 14$   
 $= (x^2 + 10x + 25) + 14 - 25$   
 $= (x+5)^2 - 11$

vertex: (-5, -11)  
 left 5, down 11, opens up

$$0 = (x+5)^2 - 11$$

$$+11 \quad +11$$

$$\sqrt{11} = \sqrt{(x+5)^2}$$

$$-5 \pm \sqrt{11} = x + 5$$

$$-5 \pm \sqrt{11} - 5 = x$$

b.)  $f(x) = -(x^2 + 3x) - 4$

$= -(x^2 + 3x + \frac{9}{4}) + 4 - \frac{9}{4}$   
 $= -(x + \frac{3}{2})^2 + \frac{25}{4}$

vertex:  $(-\frac{3}{2}, \frac{25}{4})$   
 up  $\frac{25}{4}$ , left  $\frac{3}{2}$ , opens down,  
 reflection over x-axis

$f(x) = -x^2 - 3x + 4$  (use original)

$$\frac{3 \pm \sqrt{(-3)^2 - 4(1)(4)}}{2(-1)}$$

$$\frac{3 \pm \sqrt{9-16}}{-2} = \frac{3 \pm 5}{-2}$$

$x = -4$   
 $x = 1$

Students will be able to write the standard form of the function given the vertex and a point on the graph.

**Example 3:** Write the standard form of the quadratic function that has the indicated vertex and whose graph passes through the given point.

a.) vertex:  $(4, 1)$   
 point:  $(6, -7)$

b.) vertex:  $(-\frac{1}{4}, -1)$   
 point:  $(0, -\frac{17}{16})$

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

$$-7 = a(6-4)^2 + 1$$

\*Plug in  
 a, h, k

$$\begin{array}{r} -7 = 4a + 1 \\ -1 \quad -1 \\ \hline -8 = 4a \end{array}$$

$$\frac{-8}{4} = \frac{4a}{4}$$

$$a = -2$$

$$f(x) = -2(x-4)^2 + 1$$

Students will be able to given the x-intercepts on the graph, find a function that opens upwards and downwards.

**Example 4:** Find two quadratic functions one that opens upward and one that opens downward and have the given x-intercepts.

$$\left(-\frac{5}{2}, 0\right) \quad (2, 0)$$

$$f(x) = (ax+5)(x-2)$$

FOIL

$$= 2x^2 - 4x + 5x - 10$$

$$f(x) = 2x^2 + x - 10$$

opens up

$$f(x) = -2x^2 - x + 10$$

opens down

Turn-in:

p.96 (24, 30, 42, 48)

HW Assignment:

p.96 (17-47, 55, 57, 67, 69 odds)