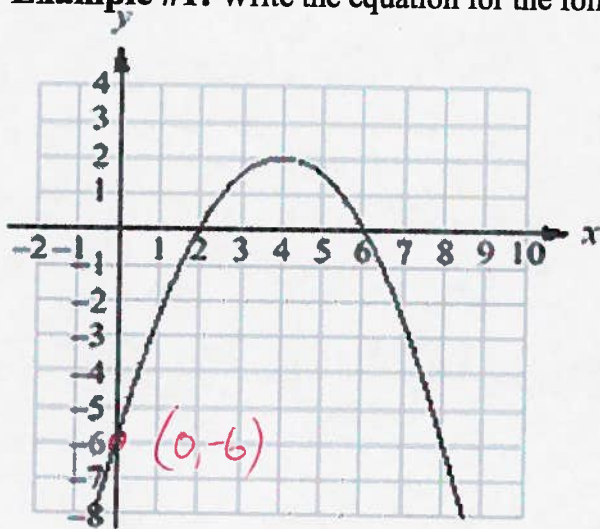


## Chapter 7: Quadratics

Name: Key

### Lesson 7.3 Writing an Equation

**Example #1:** Write the equation for the following parabola



$$y = a(x-p)^2 + q$$

$$y = a(x-4)^2 + 2$$

Pick a point (ex. (0, -6))

$$-6 = a(0-4)^2 + 2$$

Solve for 'a'

$$-6 = a(16) + 2$$

$$-8 = 16a$$

$$-\frac{1}{2} = a$$

$$y = -\frac{1}{2}(x-4)^2 + 2$$

**Example #2:** A parabola has a y-intercept of -4 and a vertex at (3, -7). Write the equation for this quadratic

(0, -4)

$$y = a(x-p)^2 + q$$

$$y = a(x-3)^2 - 7$$

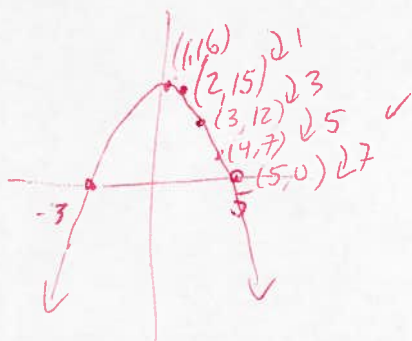
$$-4 = a(0-3)^2 - 7$$

$$3 = 9a$$

$$\frac{1}{3} = a$$

$$y = \frac{1}{3}(x-3)^2 - 7$$

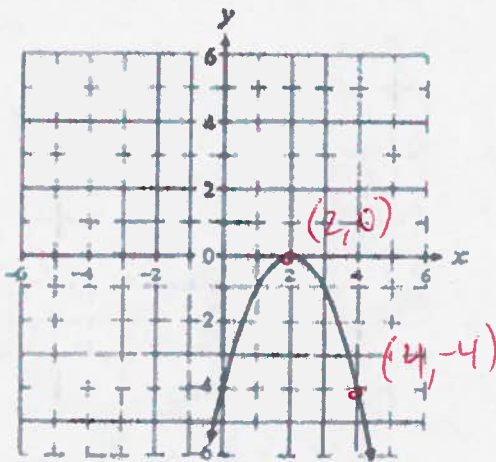
**Example #3:** A parabola has x-intercepts of -3 and 5 and goes through the point (2, 15). Write the equation for this quadratic



$$y = -(x-1)^2 + 16$$

**Assignment:** Write the equation for each of the following parabola graphs

1)



$$y = a(x-p)^2 + q$$

$$y = a(x-2)^2 + 0$$

$$-4 = a(4-2)^2 + 0$$

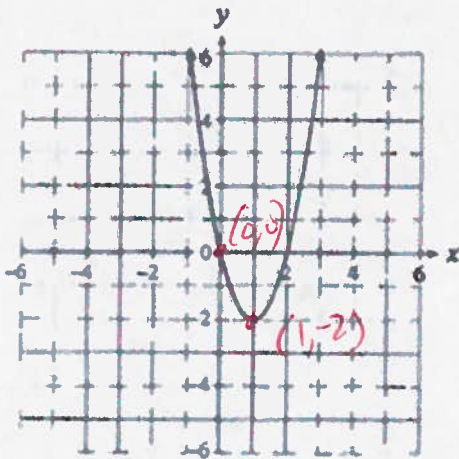
$$-4 = a(4)$$

$$-1 = a$$

$$y = -1(x-2)^2 + 0$$

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

2)



$$y = a(x-p)^2 + q$$

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

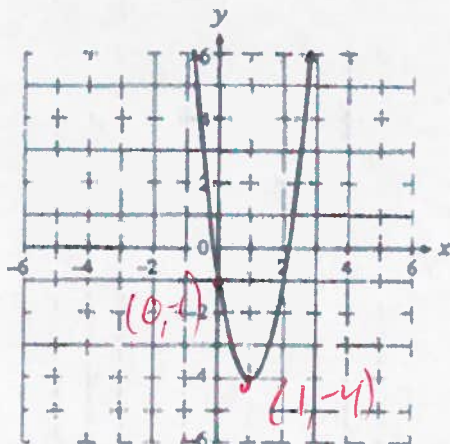
$$0 = a(0-1)^2 - 2$$

$$0 = a(1) - 2$$

$$2 = a$$

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

3)



$$y = a(x-p)^2 + q$$

$$y = a(x-1)^2 - 4$$

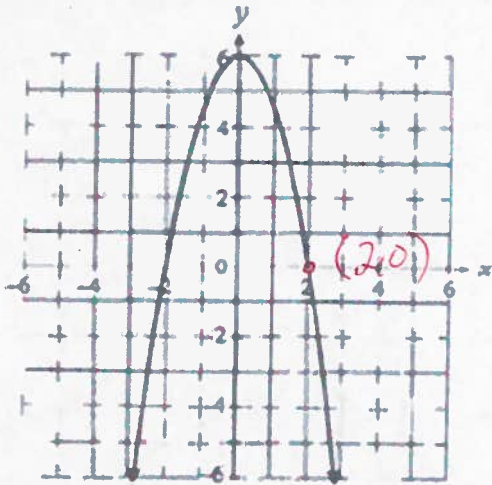
$$-1 = a(0-1)^2 - 4$$

$$3 = a(1)$$

$$3 = a$$

$$y = 3(x-1)^2 - 4$$

4)



$$y = a(x-p)^2 + q$$

$$y = a(x-0)^2 + 6$$

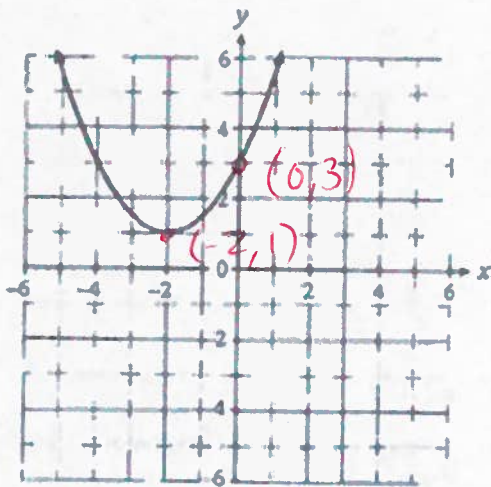
$$0 = a(2-0)^2 + 6$$

$$-6 = a(4)$$

$$-\frac{3}{2} = a$$

$$y = -\frac{3}{2}(x)^2 + 6$$

5)



$$y = a(x-p)^2 + q$$

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

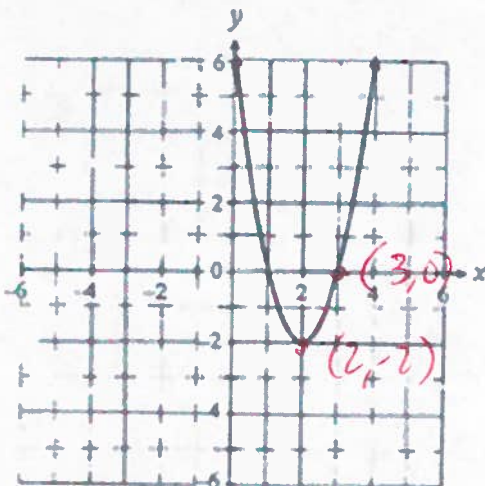
$$3 = a(0+2)^2 + 1$$

$$2 = 4a$$

$$\frac{1}{2} = a$$

$$y = \frac{1}{2}(x+2)^2 + 1$$

6)



$$y = a(x-p)^2 + q$$

$$y = a(x-2)^2 - 2$$

$$0 = a(3-2)^2 - 2$$

$$2 = a(1)^2$$

$$2 = a$$

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

7) A parabola has a vertex at (2,1) and goes through the origin

$$y = a(x-p)^2 + q \quad (0,0)$$

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

$$0 = a(0-2)^2 + 1$$

$$-1 = 4a$$

$$-1/4 = a$$

$$y = -\frac{1}{4}(x-2)^2 + 1$$

8) A parabola has a vertex at (-2,-5) and a y-intercept of 3

$$y = a(x+2)^2 - 5 \quad (0,3)$$

$$3 = a(0+2)^2 - 5$$

$$8 = a(4)$$

$$2 = a$$

$$y = 2(x+2)^2 - 5$$

9) A parabola has a vertex at (-1,6) and an x-intercept of -4

$$y = a(x-1)^2 + 6 \quad (-4,0)$$

$$0 = a(-4-1)^2 + 6$$

$$-6 = a(4)$$

$$-3/2 = a$$

$$y = -\frac{3}{2}(x-1)^2 + 6$$

10) A parabola has a vertex at (-4,0) and goes through the point (-2,12)

$$y = a(x+4)^2 + 0$$

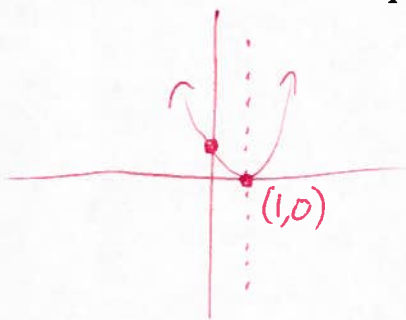
$$12 = a(-2+4)^2$$

$$12 = 4a$$

$$3 = a$$

$$y = 3(x+4)^2$$

11) A parabola has an axis of symmetry at  $x=1$ , a y-intercept of 2, and only one x-intercept



$$y = a(x-1)^2 + 0$$

$$2 = a(0-1)^2$$

$$2 = a$$

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



**Answer Key**

- 1)  $y = -(x - 2)^2$
- 2)  $y = 2(x - 1)^2 - 2$
- 3)  $y = 3(x - 1)^2 - 4$
- 4)  $y = -\frac{3}{2}x^2 + 6$
- 5)  $y = \frac{1}{2}(x + 2)^2 + 1$
- 6)  $y = 2(x - 2)^2 - 2$
- 7)  $y = -\frac{1}{4}(x - 2)^2 + 1$
- 8)  $y = 2(x + 2)^2 - 5$
- 9)  $y = -\frac{2}{3}(x + 1)^2 + 6$
- 10)  $y = 3(x + 4)^2$
- 11)  $y = 2(x - 1)^2$