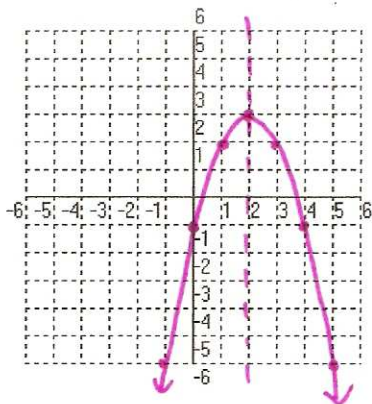


Pre-Calculus Worksheet
Section 2.1 - Parabolas DAY ONE

Name: Key
Period: _____

I. Use transformations to graph each of the following parabolas.

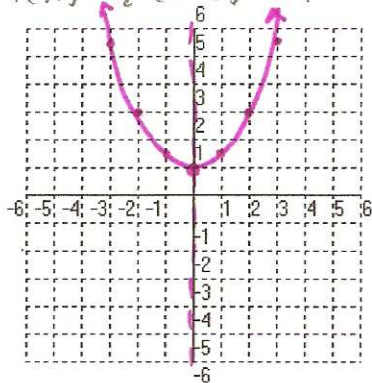
1. $f(x) = -(x-2)^2 + 3$
opens down



Vertex: (2, 3)

Axis of Symm.: x = 2

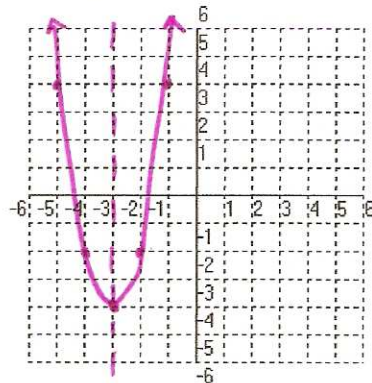
2. $f(x) = \frac{1}{2}x^2 + 1$ opens up
 $f(x) = \frac{1}{2}(x-0)^2 + 1$



Vertex: (0, 1)

Axis of Symm.: x = 0

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



Vertex: (-3, -4)

Axis of Symm.: x = -3

II. Find an equation of the parabola with the given points in the form $y = a(x-h)^2 + k$.

4. vertex $(6, -3)$ and passing through the point $(-2, 13)$

$$13 = a(-2-6)^2 + -3$$

$$13 = 64a - 3$$

$$16 = 64a$$

$$a = \frac{1}{4}$$

$$y = \frac{1}{4}(x-6)^2 - 3$$

5. vertex $(4, 0)$ and passing through the point $(-1, 20)$

$$20 = a(-1-4)^2 + 0$$

$$20 = 25a$$

$$a = \frac{4}{5}$$

$$y = \frac{4}{5}(x-4)^2$$

6. vertex $(-1, 4)$ and passing through the point $(2, -41)$

$$-41 = a(2-(-1))^2 + 4$$

$$-41 = 9a + 4$$

$$-45 = 9a$$

$$a = -5$$

$$y = -5(x+1)^2 + 4$$

III. Use the quadratic formula to find the zeros of the function, or in other words, when $f(x) = 0$.

7. $f(x) = x^2 - 2x - 1$
 $a=1$ $b=-2$ $c=-1$

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

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

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

$$x = 1 \pm \sqrt{2}$$

8. $f(x) = x^2 + 6x + 4$
 $a=1$ $b=6$ $c=4$

$$x = \frac{-6 \pm \sqrt{36 - 4(4)}}{2}$$

$$x = \frac{-6 \pm \sqrt{20}}{2}$$

$$x = \frac{-6 \pm 2\sqrt{5}}{2}$$

$$x = -3 \pm \sqrt{5}$$

9. $f(x) = 4x^2 - 16x + 13$
 $a=4$ $b=-16$ $c=13$

$$x = \frac{16 \pm \sqrt{256 - 4(52)}}{8}$$

$$x = \frac{16 \pm \sqrt{48}}{8}$$

$$x = \frac{16 \pm 4\sqrt{3}}{8}$$

$$x = \frac{4 \pm \sqrt{3}}{2}$$

IV. Rewrite the parabola in vertex form by completing the square. Then graph the parabola and find the requested information. SHOW YOUR WORK!

10. $y = 2x^2 - 12x + 13$

$$y = 2(x^2 - 6x + 9) + 13 - 2(9)$$

$$y = 2(x-3)^2 + 13 - 18$$

$$y = 2(x-3)^2 - 5$$

Equation in Vertex Form:

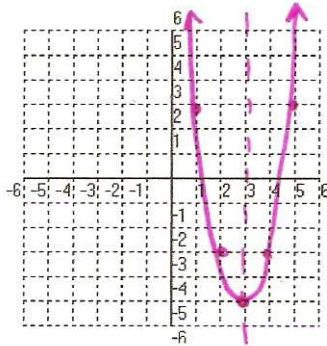
$$y = 2(x-3)^2 - 5$$

Vertex:

$$(3, -5)$$

Axis of Symm.:

$$x = 3$$



11. $y = -x^2 - 4x - 1$

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

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

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

Equation in Vertex Form:

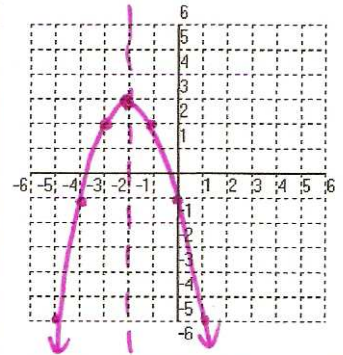
$$y = -(x+2)^2 + 3$$

Vertex:

$$(-2, 3)$$

Axis of Symm.:

$$x = -2$$



V. Rewrite the parabola in vertex form by first finding the vertex. HINT: Start with $x = -\frac{b}{2a}$.

Then graph the parabola and find the requested information. SHOW YOUR WORK!

12. $y = \frac{1}{2}x^2 - 2x - 4$

$$a = \frac{1}{2} \quad b = -2 \quad c = -4$$

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

$$x = \frac{2}{1} \quad x = 2$$

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

$$y = 2 - 4 - 4$$

$$y = -6$$

Equation in Vertex Form:

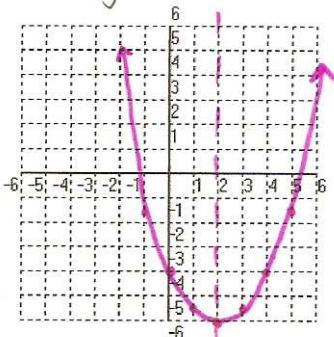
$$y = \frac{1}{2}(x-2)^2 - 6$$

Vertex:

$$(2, -6)$$

Axis of Symm.:

$$x = 2$$



13. $y = -x^2 + 10x - 21$

$$a = -1 \quad b = 10 \quad c = -21$$

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

$$x = \frac{-10}{-2}$$

$$x = 5$$

$$y = -(5)^2 + 10(5) - 21$$

$$y = -25 + 50 - 21$$

$$y = 4$$

Equation in Vertex Form:

$$y = -(x-5)^2 + 4$$

Vertex:

$$(5, 4)$$

Axis of Symm.:

$$x = 5$$

