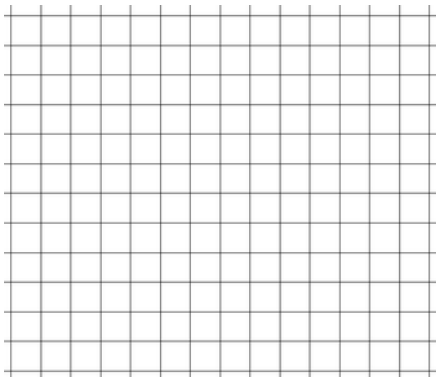
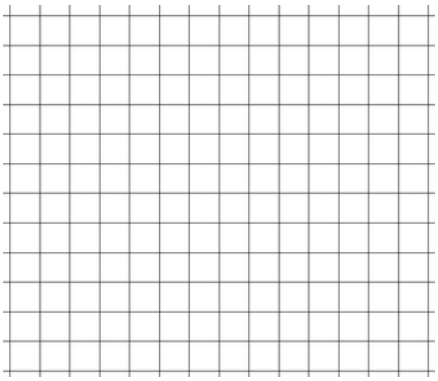
Quadratic Equations: Standard and Vertex Forms

Name: _____ Period: _____

Your Notes: **DO NOT TURN THIS IN!**

Absolute Value	**Quadratic**
$f(x) = \|x\|$ 	$f(x) = x^2$ 
$f(x) = a\|x + b\| + c$ Transformations a – reflection: over the x-axis when a is a negative b – horizontal shift: opposite the sign along the x-axis c – vertical shift: with the sign up/down the y-axis	$f(x) = a(x - h)^2 + k$ Transformations a – reflection: over the x-axis when a is a negative h – horizontal shift: opposite the sign along x-axis k – vertical shift: with the sign up/down the y-axis

x	|x|

x	x^2

Quadratic Equations

Standard Form

$f(x) = ax^2 + bx + c$

a, b and c are real numbers

Axis of symmetry is the line that runs down the center of the parabola through the vertex.

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

Example 1

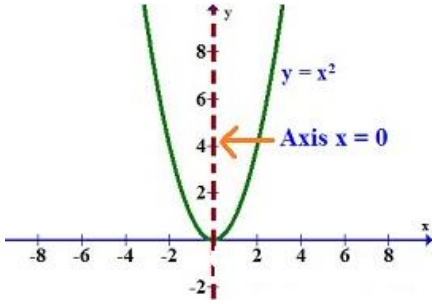
Find the axis of symmetry

$$y = x^2 + 16x + 71$$

$f(x) = 1x^2 + 16x + 71$

$$x = -\frac{b}{2a} = -\frac{16}{2(1)} = -\frac{16}{2} = -8$$

The axis of symmetry is x = -8.



1. Rewrite the equation in standard form if needed.
2. Identify the values for a and b.
3. Apply the formula and solve for x.

Practice 1

Find the axis of symmetry

$$y = 2x^2 + 36x + 170$$

Example 2
Find the axis of symmetry

$$162x + 731 = -y - 9x^2$$

Rewrite the equation in standard form:

1. Add $9x^2$ to both sides of the equations.

   $9x^2 + 162x + 731 = -y$

2. Divide/multiply both sides of the equation by -1.

   $-9x^2 - 162x - 731 = y$

3. Switch the equation around.
   $y = -9x^2 - 162x - 731$

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

1. Rewrite the equation in standard form if needed.
2. Identify the values for a and b.
3. Apply the formula and solve for x.

Practice 2
Find the axis of symmetry

$$6x^2 + 12x + y + 13 = 0$$

Example 3
Find axis of symmetry

$$\frac{1}{2}(y+4) = (x-7)^2$$

$y + 4 = 2(x - 7)^2$

$y = 2(x - 7)^2 - 4$

Practice 3
Find axis of symmetry and the vertex.

$-4y + 16 = (x - 1)^2$

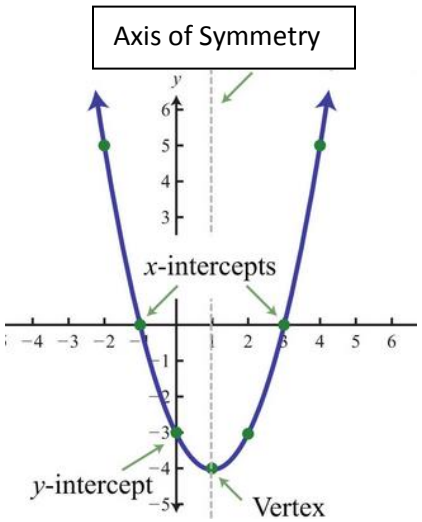
Vertex Form
$f(x) = a(x - h)^2 + k$

The **vertex** is (h, k).
The axis of symmetry is h.

Example 2
Describe the transformations

$$f(x) = -2(x+5)^2 - 3$$

1. Vertical shift down by 3 units
2. Horizontal shift left by 5 units,
3. Compress/expand by 2 units
4. Reflect over the x-axis.



[Axis of Symmetry and Vertex]

[Axis of Symmetry and Vertex]