Name_____ Activity 4.1

Graphing Quadratic Equations in Standard Form: $y = ax^2 + bx + c$

Section 1 – The Role of "a."
Graph each equation on a graphing calculator. Record the value of *a* and the direction in which the graph of the equation opens. When entering fractions, be sure to enter the fractions in parentheses.

1. $y = 7x^2$ a = _____ opens: *up* or *down*

2. $y = \frac{1}{2}x^2$ a = _____ opens: *up* or *down*

3. $y = -\frac{1}{6}x^2$ a = _____ opens: *up* or *down*

4. $y = -3x^2$ a = _____ opens: *up* or *down*

Graph the following equations on the same set of axes:
$y_1 = x^2$ $y_2 = 7x^2$ $y_3 = \frac{1}{2}x^2$

5. Order the equations from widest to narrowest:

Graph the following equations on the same set of axes:
$y_1 = -x^2$ $y_2 = -3x^2$ $y_3 = -\frac{1}{6}x^2$

6. Order the equations from widest to narrowest:

Summarize the effect of **a** on the appearance of the graph compared to $y = x^2$ by completing the following statements.

a. If $|a| > 1$ then...
(if $a > 1$ or $a < -1$)

b. If $|a| < 1$ then...
(if a is between -1 and 1)

c. If $a > 0$ then...

d. If $a < 0$ then...

Section 2: The Role of "c."

Graph each equation. Record the value of **c** and the y-intercept of the graph.

7. $y = x^2 + 2$ c = _____ y-intercept: _____

8. $y = 2x^2 - 5$ c = _____ y-intercept: _____

9. $y = -\frac{1}{2}x^2 + 6$ c = _____ y-intercept: _____

10. $y = -x^2 - 7$ c = _____ y-intercept: _____

11. Summarize the effect that **c** has on the graph:

Section 3: The role of "b."

<u>Using your calculator, work through</u> the example on page 244 of your book. Complete the practice problems at the bottom of the page. Record your answers below:

1. $y = x^2 - 6x + 4$ (circle one) **max** or **min** **value** _____ **x-value where this occurs** _____

2. $y = x^2 - 3x + 3$ (circle one) **max** or **min** **value** _____ **x-value where this occurs** _____

3. $y = -3x^2 + 9x + 2$ (circle one) **max** or **min** **value** _____ **x-value where this occurs** _____

4. $y = 0.5x^2 + 0.8x - 2$ (circle one) **max** or **min** **value** _____ **x-value where this occurs** _____

5. $y = \frac{1}{2}x^2 - 3x + 2$ (circle one) **max** or **min** **value** _____ **x-value where this occurs** _____

6. $y = -\frac{3}{8}x^2 + 6x - 5$ (circle one) **max** or **min** **value** _____ **x-value where this occurs** _____

Complete the following table. Leave the last two columns blank for now.

Equation	Vertex (x , y)	unsimplified	simplified
$y = x^2 - 4x + 5$			
$y = \frac{1}{2}x^2 + 3x - 4$			
$y = 2x^2 - 6x + 5$			
$y = -3x^2 + 3x + 7$			
$y = \frac{1}{4}x^2 - 2x + 1$			
$y = 3x^2 + 9x + 2$			
$y = 5x^2 - 8x - 1$			

Can you predict the x-coordinate of the vertex of a quadratic equation in standard form? For example, can you predict the x-coordinate of $y = \frac{1}{3}x^2 - 6x + 5$

If not, get a hint from your teacher and complete the last two columns of the table.

<u>Without graphing</u>, give the following information about each graph.

a. Whether it opens up or down
b. Whether it is wider or narrower than $y = x^2$
c. What the y-intercept is
d. The coordinates of the vertex.

Then *roughly* sketch the graph based on your answers above.

1. $y = 3x^2 - 6x + 4$ Rough sketch:

Opens *up* or *down*

Wider or *narrower* than $y = x^2$

y-intercept_____

Vertex _____

2. $y = 0.5x^2 - 2x + 3$ Rough sketch:

Opens *up* or *down*

Wider or *narrower* than $y = x^2$

y-intercept_____

Vertex _____

3. $y = -6x^2 - 4x - 5$ Rough sketch:

Opens *up* or *down*

Wider or *narrower* than $y = x^2$

y-intercept_____

Vertex _____