Day #27a: Graphing and IDing Characteristics of Vertex Form

A **quadratic function** is a function that's largest exponent is 2.

The *graph* of a quadratic function is a U-shaped graph called a Parabola.

The Parent Function for the family of quadratic functions is $y = x^2$.

Vertex: Turning point of parabola

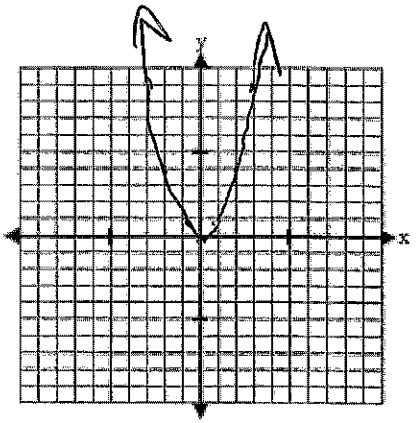
Axis of Symmetry: Line that cuts parabola in half

Minimum or Maximum Value highest/lowest point (AKA vertex)

Graph the quadratic functions on the same graph. We will always graph quadratics using FIVE points.

1. $y = x^2$

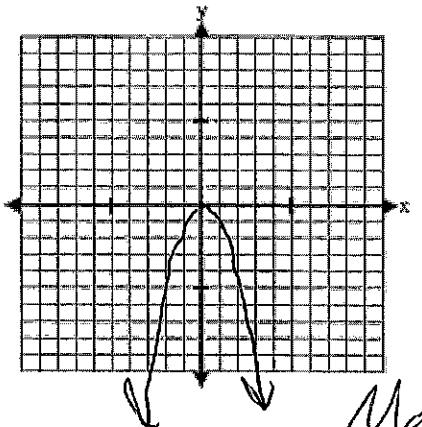
x	$y = x^2$
-2	4
-1	1
0	0
1	1
2	4



Vertex: (0,0) A.O.S. $x = 0$ Does this graph have a minimum or maximum point? Min

2. $y = -x^2$

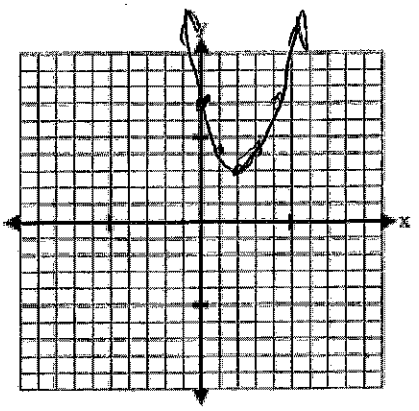
x	$y = -x^2$
-2	-4
-1	-1
0	0
1	-1
2	-4



Vertex: (0,0) A.O.S. $x = 0$ Does this graph have a minimum or maximum point? Max

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

x	$y = (x - 2)^2 + 3$
0	7
1	4
2	3
3	4
4	7



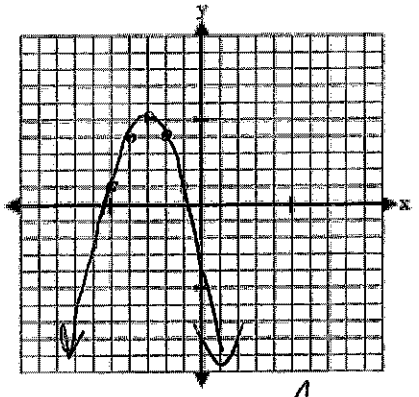
Vertex: (2,3)

A.O.S. $x = 2$

Does this graph have a minimum or maximum point? Min

4. $y = -(x + 3)^2 + 5$

x	$y = -(x + 3)^2 + 5$
-5	1
-4	4
-3	5
-2	4
-1	1



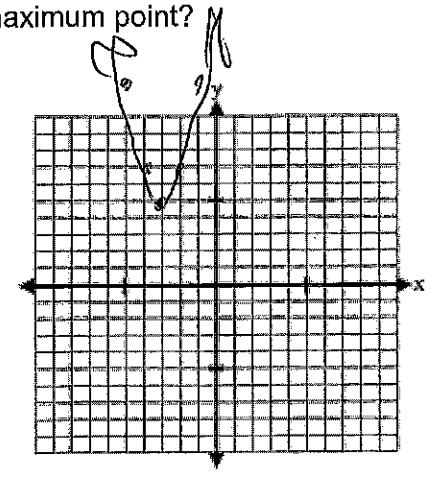
Vertex: (-3,5)

A.O.S. $x = -3$

Does this graph have a minimum or maximum point? Max

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

x	$y = 2(x + 3)^2 + 5$
-5	13
-4	7
-3	5
-2	7
-1	13



Vertex: (-3,5)

A.O.S. $x = -3$

Does this graph have a minimum or maximum point? Min

Summarize by looking at your work on p.1-2

1. How can you know by just looking at an equation if a quadratic will have a **minimum or maximum** point?

   If it starts w/ a positive or negative

2. How can you know by just looking at an equation what the **vertex** is?

   look inside and outside the parentheses

3. How can you know by just looking at an equation what the **axis of symmetry** is?

   Inside the parentheses.

VERTEX FORM: $y = a(x-h)^2 + k$

If $a > 0$, opens up

If $a < 0$, opens down

(h, k) is vertex

5. Remember from WS#24 when DeAndre and Bree were kicking a football and it could be modeled by the function $y = -16(x - 2)^2 + 64$.

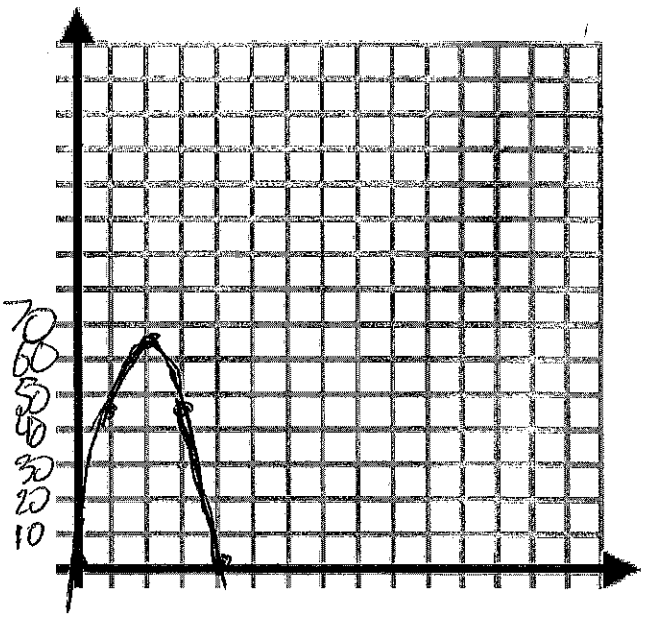
   a. What is the vertex? (2 , 64)

   b. What is the axis of symmetry? $x = 2$

   c. Will it have a minimum or maximum? Max

   d. Now figure out what **values for x** should go in the table so you have two numbers on either side of the vertex, and make the table. Then, graph the function. Make sure to label your axes with numbers.

x	$y = -16(x - 2)^2 + 64$
0	0
1	48
2	64
3	48
4	0



6. How would the graph of $y = (x - 2)^2 + 3$ be affected if the function were changed to $y = -(x - 2)^2 + 4$?

   Flipped over and up 1.

Solving Practice

Solve each equation.

1. $x^2 = 25$

$x=5, x=-5$

2. $(x + 3)^2 = 25$

$x=2, x=-8$

3. $(x + 3)^2 - 14 = 11$

$(x+3)^2=25$

$x=2, x=-8$

4. $3(x + 3)^2 - 11 = 64$

$+11 \quad +11$

$\frac{3(x+3)^2}{3}=\frac{75}{3}$

$(x+3)^2=25$

$x=2, x=-8$