

Notes:

# Graphs of Quadratic Equations

Created for you by Ms. Nhotsouearh

## Definitions:

**Quadratic:** a function with an exponent of 2

**Parabola:** is a graph of a quadratic function. It looks like an arch. A **parabola** tends to look like a smile or a frown, depending on the quadratic function.

If  $ax^2$  is negative, then the parabola opens downward.

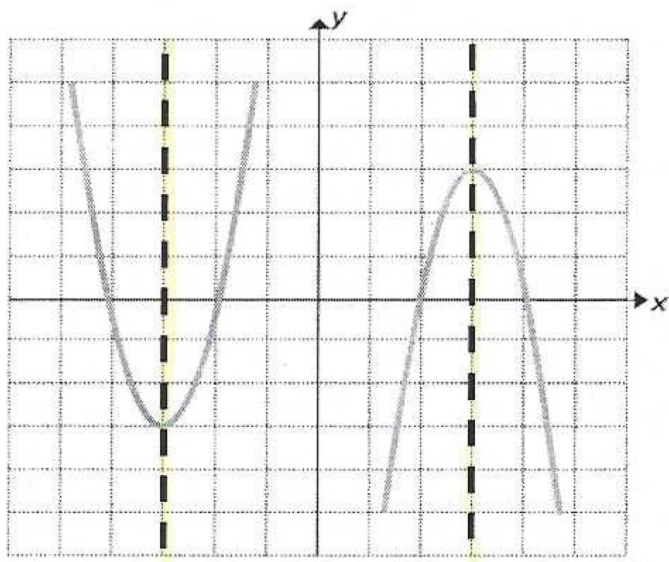
If  $ax^2$  is positive, then the parabola opens upward.

### \*\*\* To sketch a quadratic equation without intervals,

1. Find the axis of symmetry (using the formula).
2. Set up a table of values and place the value of the axis of symmetry in step 1, in the middle of the table (the 4<sup>th</sup> # in the x column). Get 3 #s above and 3 #s below the axis of symmetry. Those #s will be your intervals.
3. Type the equation into the calculator then go to 2<sup>nd</sup> table to get the values of y for your table.

input output

x	y
domain	range
axis of sym	



The line of symmetry ALWAYS passes through the vertex.

Example 1: Sketch the graph of the function:  $y = x^2 + 6x + 5$  using the intervals:  $-6 \leq x \leq 0$ .

x	$x^2 + 6x + 5$	y
-6	$(-6)^2 + 6(-6) + 5$	5
-5	$(-5)^2 + 6(-5) + 5$	0
-4	$(-4)^2 + 6(-4) + 5$	-3
-3	$(-3)^2 + 6(-3) + 5$	-4
-2	$(-2)^2 + 6(-2) + 5$	-3
-1	$(-1)^2 + 6(-1) + 5$	0
0	$(0)^2 + 6(0) + 5$	5

$$x = \frac{-b}{2a} \quad a=1, b=6, c=5$$

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

$x = -3$  axis of symmetry  
 (the 4th # in the table)

root  
axis of sym  
root

Vertex:  $(-3, -4)$  Roots:  $\{-5, -1\}$

Max or min point? min pt b/c it has a low point & opens upward

Example 2: Sketch the graph of the function:  $y = -x^2 + 4x + 5$  on the interval  $[-1, 5]$ .

x	$-x^2 + 4x + 5$	y
-1	$-(-1)^2 + 4(-1) + 5$	0
0	$- (0)^2 + 4(0) + 5$	5
1	$- (1)^2 + 4(1) + 5$	8
2	$- (2)^2 + 4(2) + 5$	9
3	$- (3)^2 + 4(3) + 5$	8
4	$- (4)^2 + 4(4) + 5$	5
5	$- (5)^2 + 4(5) + 5$	0

$$a = -1, b = 4, c = 5$$

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

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

$$x = 2$$

vertex

root  
axis of sym  
root

Vertex:  $(2, 9)$  Roots:  $\{-1, 5\}$

Max or min point? max pt b/c it has a high point & opens downward

