GRAPHING QUADRATICS GUIDED NOTES

Goal: SWBAT Graph Quadratic equations

Key Vocabulary

Quadratic Function: Non linear and can be written in the standard form $y = ax^2 + bx + c$.

Parabola: U shaped graph of a quadratic function.

Parent Function: The most basic quadratic function in the family of quadratic functions

Vertex: The lowest or highest point on the parabola
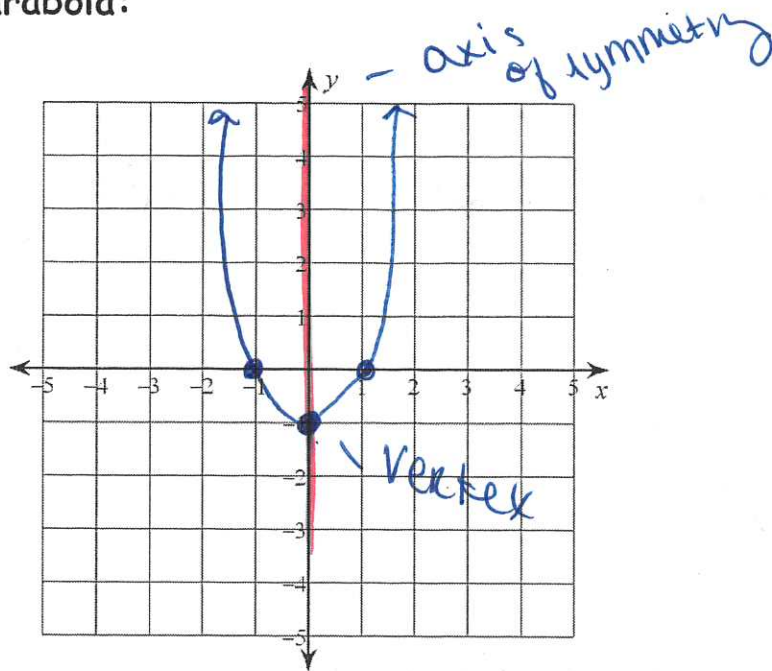
Minimum Vertex:

Maximum Vertex:

Axis of Symmetry: The line that passes through the vertex. It divides the parabola evenly. * Always the x-value.

Let's look at a parabola:

axis of symmetry

vertex

How do we find the vertex of a parabola?

REMEMBER:

Vertex: $x = \dfrac{-b}{2a}$

this formula gives the x-value of the vertex.

Find the vertex of: $f(x) = 2x^2 + 12x + 22$

$a = 2 \quad b = 12 \quad c = 22$

$x = \dfrac{-b}{2a} = \dfrac{-12}{2(2)} = \dfrac{-12}{4} = -3$

$2(-3)^2 + 12(-3) + 22$

$2(9) - 36 + 22$

$18 - 36 + 22$
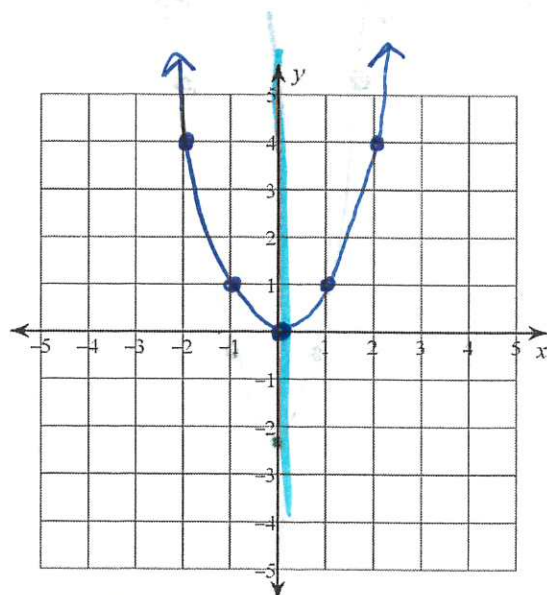4

$(-3, 4)$

1) Identify a, b, c

2) Plug in a, b, c

3) Substitute the x-value to get y.

1.) find the vertex

2.) Pick two x-values smaller than the vertex and two x-values larger than the vertex

3.) Plug in x value to get y-value

4.) Plot the points and connect with a smooth curve.

Ex. Graph $F(x) = x^2$ $a = 1$ $x = \dfrac{0}{2(1)} = \dfrac{0}{2} = 0$
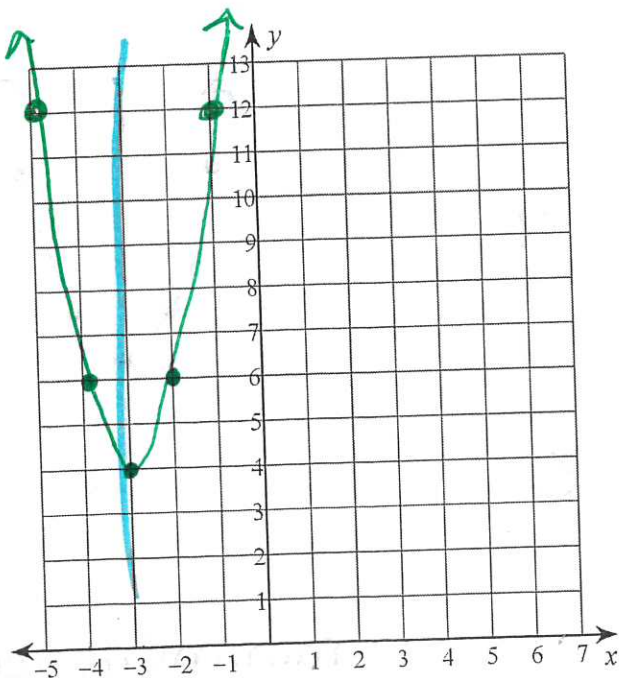
Vertex: $x = \dfrac{-b}{2a}$ $b = 0$

$c = 0$

x	work	y
-2	$(-2)^2$	4
-1	$(-1)^2$	1
0	$x^2 = 0^2$	0
1	1^2	1
2	2^2	4

minimum vertex

Graph the Function $2x^2 + 12x + 22$

x	work	y
-5	$2(-5)^2 + 12(-5) + 22$ $2(25) - 60 + 22$ $50 - 60 + 22$	12
-4	$2(-4)^2 + 12(-4) + 22$ $2(16) - 48 + 22$	6
-3		4
-2	$2(-2)^2 + 12(-2) + 22$ $2(4) - 24 + 22$ $8 - 24 + 22$	6
-1	$2(-1)^2 + 12(-1) + 22$ $2 - 12 + 22$	12

minimum

Graph the function $f(x) = x^2 + 8x + 17$

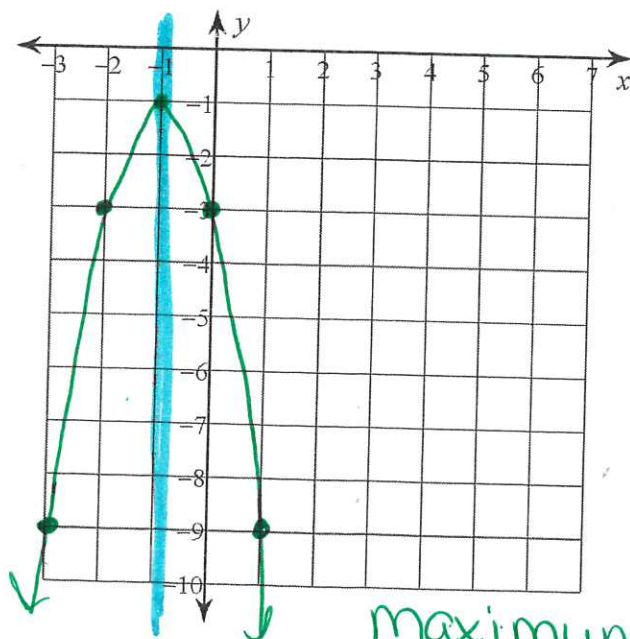| x	work	y
-6	$-6^2 + -48 + 17$ $36 + -48 + 17$	5
-5	$(-5)^2 + 8(-5) + 17$ $25 - 40 + 17$	2
-4	$(-4)^2 + 8(-4) + 17$ $16 - 32 + 17$	1
-3	$(-3)^2 + 8(-3) + 17$ $9 - 24 + 17$	2
-2	$(-2)^2 + 8(-2) + 17$ $4 - 16 + 17$	5

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

$a = 1$
$b = 8$
$c = 17$

$\dfrac{-8}{2(1)} = -\dfrac{8}{2} = -4$

minimum

axis of symmetry $= -4$

Graph the function: $f(x) = -2x^2 - 4x - 3$

X	work	y
-3	$-2(-3)^2 - 4(-3) - 3$ $-2(9) + 12 - 3$ $-18 + 12 - 3$	-9
-2	$-2(-2)^2 - 4(-2) - 3$ $-2(4) + 8 - 3 = -8 + 8 - 3$	-3
-1	$-2(-1)^2 - 4(-1) - 3$ $-2(1) + 4 - 3 = -2 + 4 - 3 = 2 - 3$	-1
0	$-2(0)^2 - 4(0) - 3$	-3
1	$-2(1)^2 - 4(1) - 3$ $-2 - 4 - 3$	-9

Vertex: $x = -\dfrac{b}{2a}$

$a = -2$
$b = -4$
$c = -3$

$\dfrac{-(-4)}{2(-2)} = \dfrac{4}{-4} = -1$

maximum vertex $(-1, -1)$
axis of symmetry $= -1$

Graph the function: $f(x) = x^2 - 6x + 7$

x	work	y