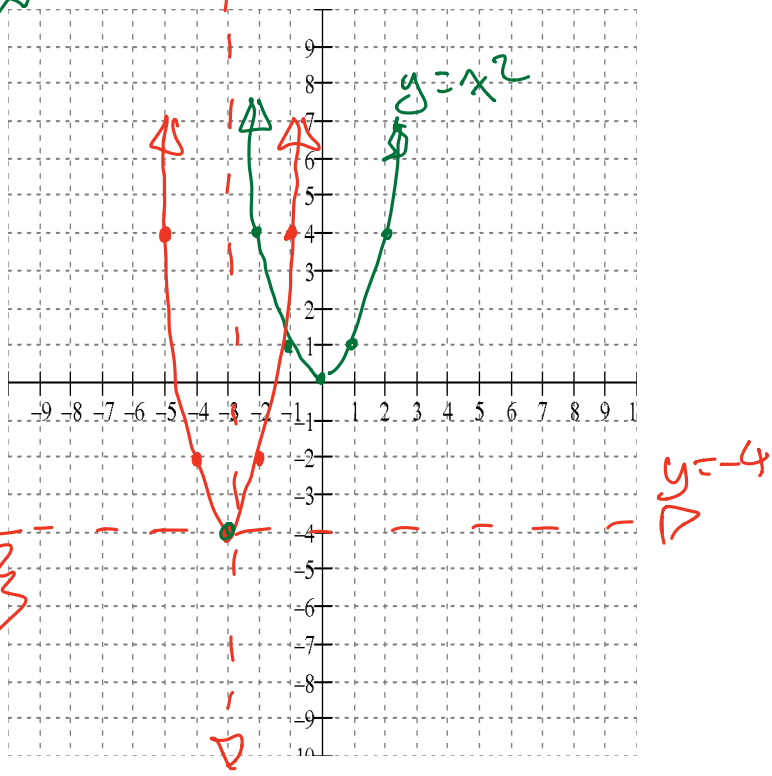
Vertex From: Again, Again...

Recall: A quadratic function in vertex form can be expressed by:

$$y = a(x - p)^2 + q$$

Ex. #1: Graph the equation $y = 2(x + 3)^2 - 4$ on the grid below and answer the following questions.



Vertex: (-3, -4)

Max or Min: y = -4

Axis of Symmetry: x = -3

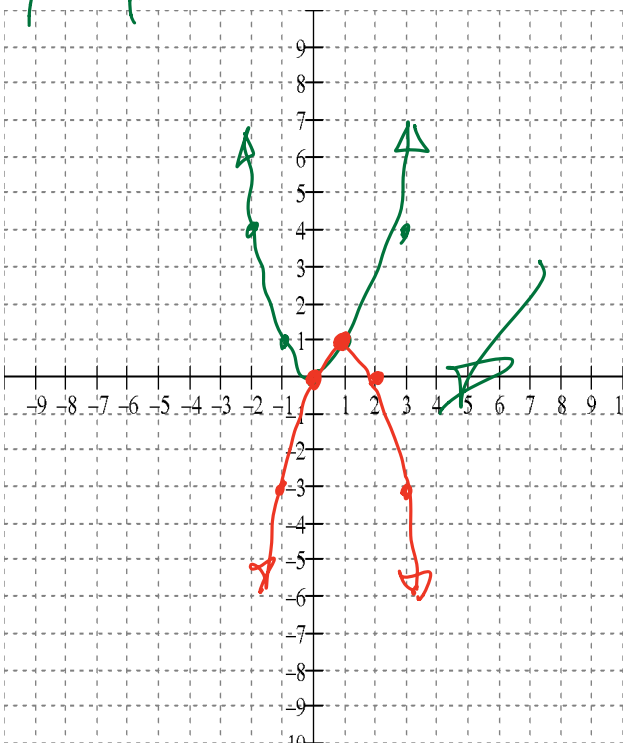
Domain: {x | x ∈ ℝ}

Range: {y | y ≥ -4, y ∈ ℝ}

Direction of Opening: up

$y = x^2$

Ex. #2: Graph the equation $y = -(x - 1)^2 + 1$ on the grid below and answer the following questions.



Vertex: (1, 1)

Max or Min: $y = 1$

	x	y
+1	3	-3
+1	2	0
	1	1 ← vertex
-1	0	0
-1	-1	-3

Axis of Symmetry: $x = 1$

Domain: $\{x \mid x \in \mathbb{R}\}$

Range: $\{y \mid y \leq 1, y \in \mathbb{R}\}$

Direction of Opening: down

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

$y = -(2-1)^2 + 1$

$= -(1)^2 + 1$

$= 0$

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

$= -(-1-1)^2 + 1$

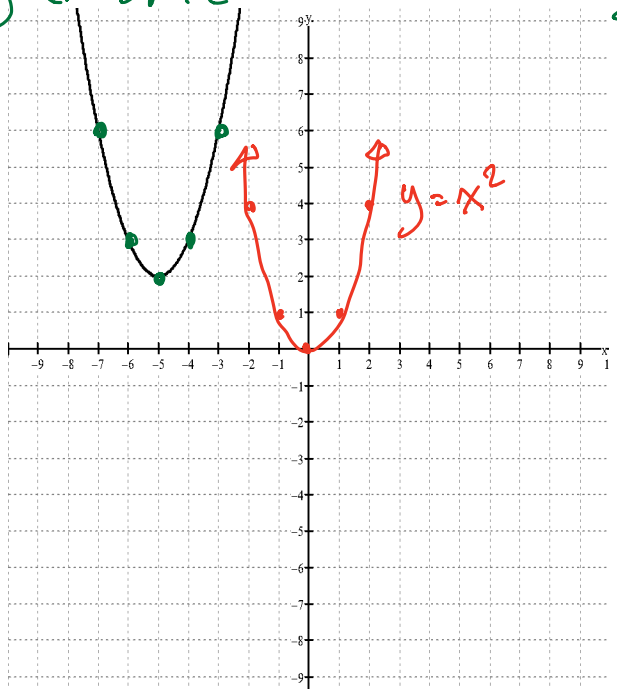
$= -(-2)^2 + 1$

$= -4 + 1$

$= -3$

Ex. #3: State the equation in vertex form for the given graph.

$y=(x+5)^2+2$



$y=1(x+5)^2+2$

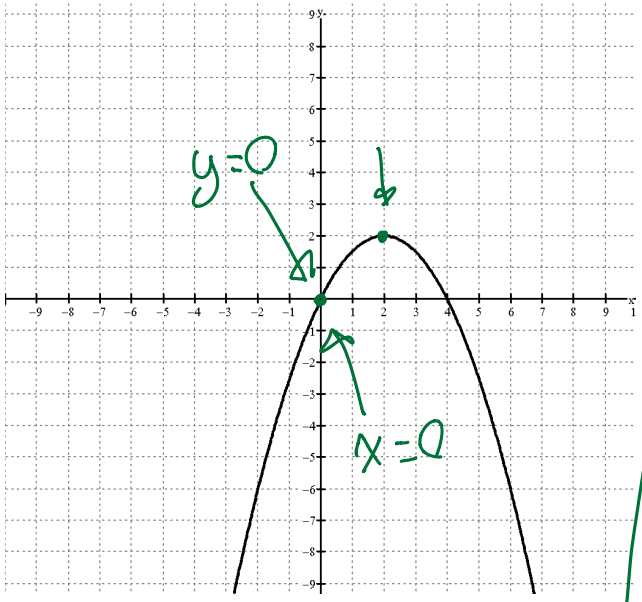
+ because it opens up

1 because it is not stretched or squashed

+5 because it has gone 5 left

+2 because it has gone 2 up.

Ex. #4: State the equation in vertex form for the given graph.



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

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

$0=a(0-2)^2+2$

$0=a(-2)^2+2$

$0=a(4)+2$

$4a=-2$

$a=\frac{-2}{4}$

$=-\frac{1}{2}$

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

Ex. #5: For the function $f(x) = -2(x + 6)^2 - 11$ determine each of the following, without graphing.

Vertex: $(-6, -11)$

Axis of Symmetry: $x = -6$

Direction of Opening: Down

Max or Min: $y = -11$

Domain: $\{x \mid x \in \mathbb{R}\}$

Range: $\{y \mid y \leq -11, y \in \mathbb{R}\}$

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#3 b, c, d

4

7 a, c, d

8

10