Quadratic Graphs

Vertex Form : $y = a(x-h)^2 + k \quad a \neq 0$

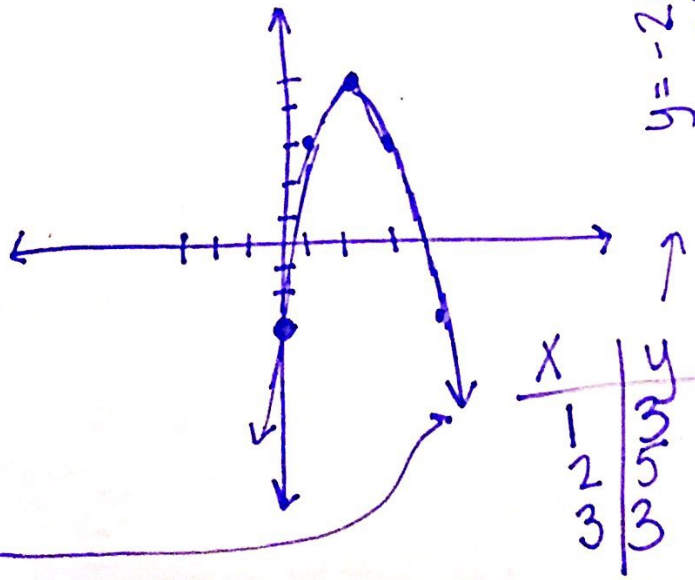
- vertex = (h, k)
- $|a| > 1$ → vertical stretch (narrower)
- $0 < |a| < 1$ → vertical compression (wider)
- neg a → reflection over x-axis
- Axis of Symmetry (A.O.S) → $x = h$
- y-int → plug in zero for x
- x-int → plug in zero for y

Example : Graph $y = -2(x-2)^2 + 5$

vertex : (2,5)
opens down
$|a| > 1$ → narrower
y-int → $y = -2(0-2)^2 + 5$
$y = -2(4) + 5$
$y = -3$ → (0,-3)
more pts → plug in table

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

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



x	y
1	3
2	5
3	3

Standard form: $y = ax^2 + bx + c$

A.O.S $\rightarrow x = \frac{-b}{2a}$

vertex $\rightarrow \left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$

↳ To find the vertex plug $\frac{-b}{2a}$ into the equation for x. This will give you the y-coordinate

★ a value "works" the same as a value in vertex form

Example: Graph $f(x) = 2x^2 - 4x - 1$

$a = 2$
$b = -4$
$c = -1$

vertex: $(1, -3)$

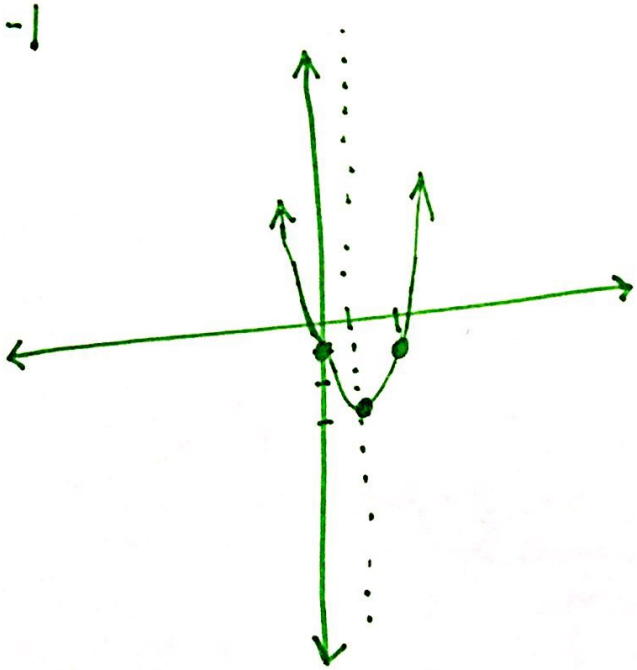
$f(1) = 2(1)^2 - 4(1) - 1$
$= 2 - 4 - 1$
$= -3$

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

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

$x = 1$

x	y
0	-1
1	-3
2	-1



$f(2) = 2(2)^2 - 4(2) - 1$
$= 8 - 8 - 1$