Quadratic Functions

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

Shape: Parabola

Vertex: (-h, k)

Stretch Factor: a

Direction: Look at stretch factor

(+) Up (-) Down

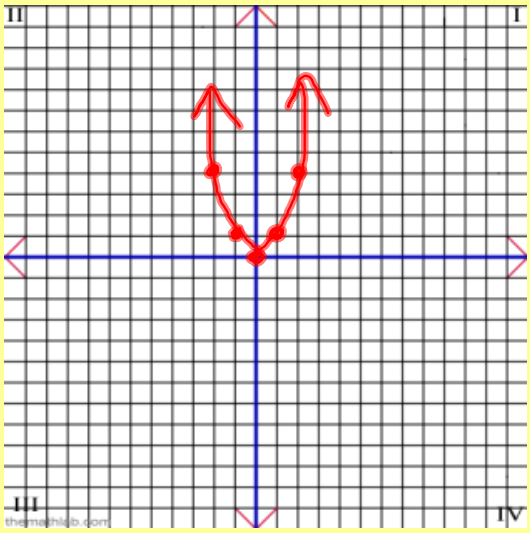
Example #1:

$$y = x^2$$

$y = 1(x+0)^2 + 0$

Lets find the pattern!!

x	y
-2	4
-1	1
0	0
1	1
2	4



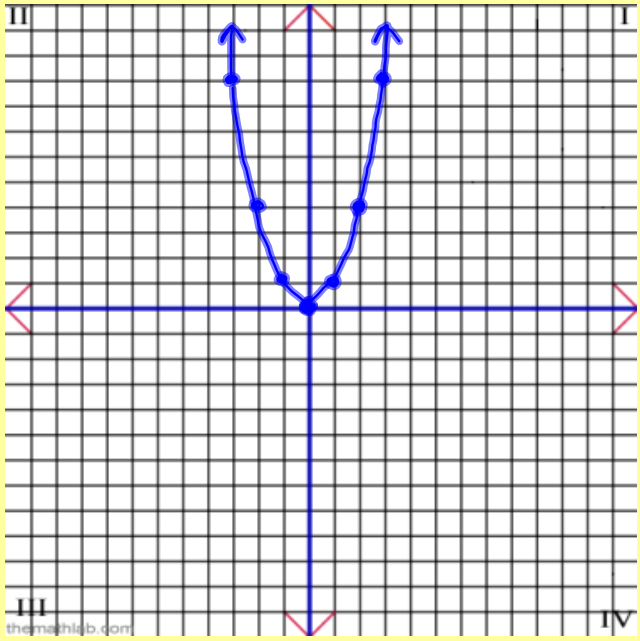
What is the Pattern ??

Over	Up
1	1
2	4
3	9

Vertex: (0,0)

Stretch Factor: 1

Direction: Up



Example #2 :

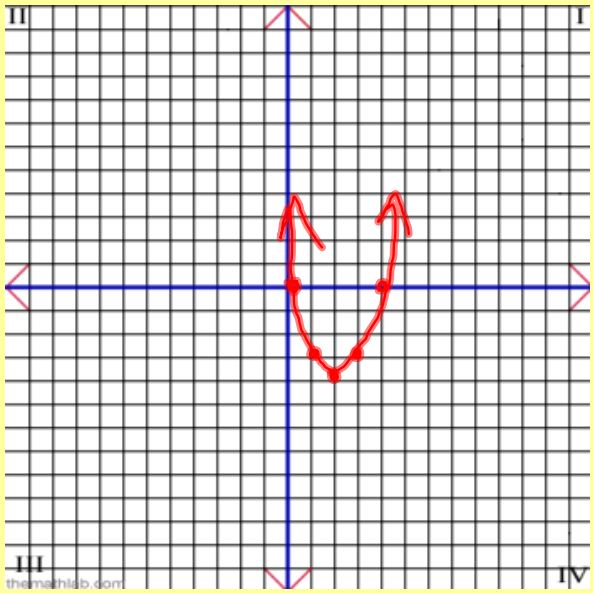
$$y = (x-2)^2 - 4$$

Vertex : (2, -4)

Stretch Factor: 1

Direction: up

Over	Up
1	$1 \times 1 = 1$
2	$4 \times 1 = 4$
3	$9 \times 1 = 9$



Example #3 :

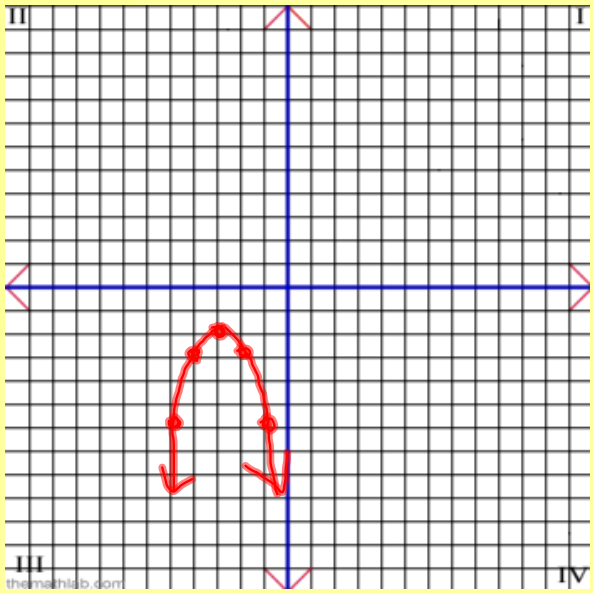
$$y = -(x+3)^2 - 2$$

Vertex : (-3, -2)

Stretch Factor: 1

Direction: Down

Over	Down
1	1
2	4
3	9



Example #4 :

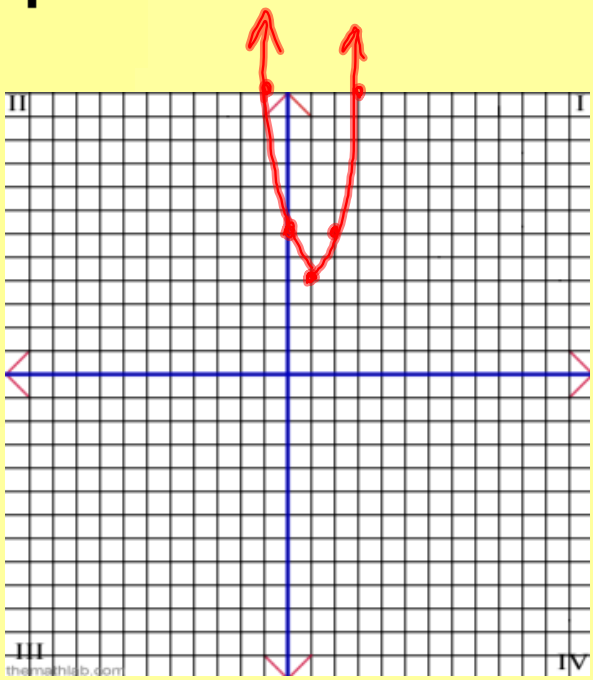
$$y = 2(x-1)^2 + 4$$

Vertex : (1, 4)

Stretch Factor: 2

Direction: up

Over	Up
1	1 x 2 = 2
2	4 x 2 = 8
3	9 x 2 = 18



Example #5:

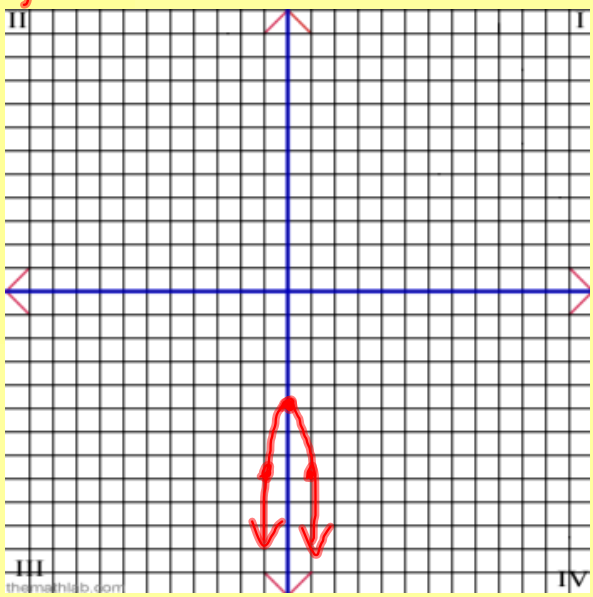
$y = -3(x)^2 - 5$ a

$y = -3(x+0)^2 - 5$

Vertex: (0, −5)

Stretch Factor: 3

Direction: Down



Over	Down
1	$1 \times 3 = 3$
2	$4 \times 3 = 12$
3	$9 \times 3 = 27$

Example #6:

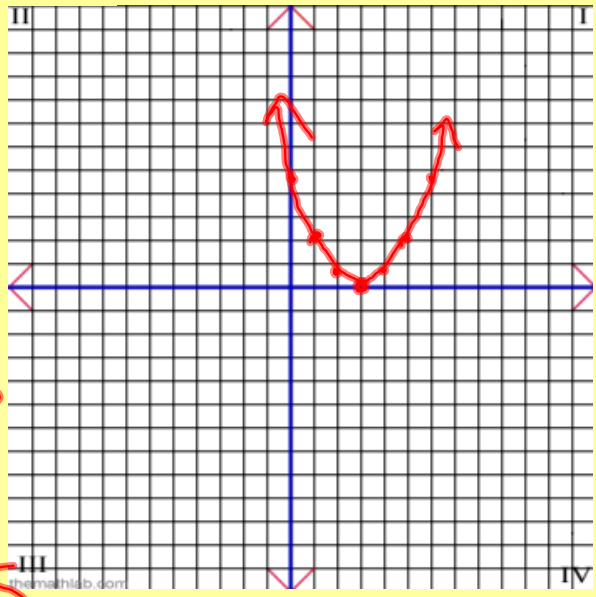
$$y = \frac{1}{2}(x-3)^2 + 0$$

Vertex: (3, 0)

Stretch Factor: $\frac{1}{2}$

Direction: Up

Over	Up
1	$1 \times 0.5 = 0.5$
2	$4 \times 0.5 = 2$
3	$9 \times 0.5 = 4.5$



Example #7:

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

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

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

$\frac{-2y}{-2} = \frac{4(x-3)^2}{-2} - \frac{2}{-2}$

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

Vertex : (3,1)

Stretch Factor: 2

Direction: Down

Over	Down
1	$1 \times 2 = 2$
2	$4 \times 2 = 8$
3	$9 \times 2 = 19$