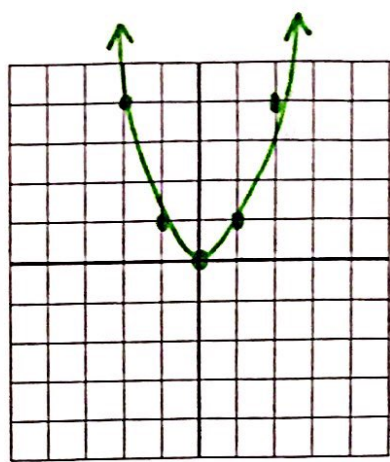


## Quadratic Function Transformations

Parent Function  $y = x^2$



Standard Form  $y = ax^2 + bx + c$

where the Y-Intercept is  $(0, c)$

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

where the Vertex Point (VP) is  $(h, k)$

"inside opposite  
outside same"

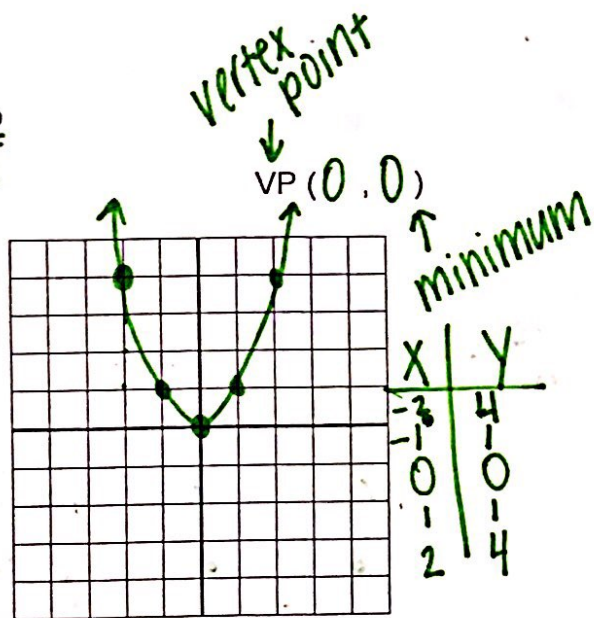
Domain:  $(-\infty, \infty)$

Range:  $[k, \infty)$   $(-\infty, k]$

$y \geq k$   
opens up!

$y \leq k$   
opens down!

Open Up  
 $y = x^2$

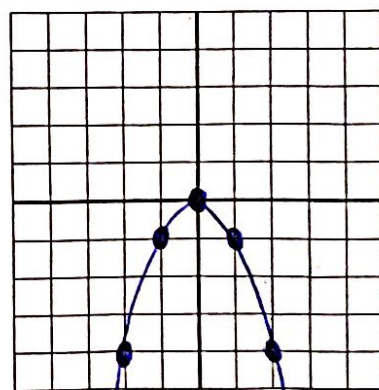


D:  $(-\infty, \infty)$  or  $\mathbb{R}$     R:  $[0, \infty)$  or  $y \geq 0$

Open Down (Reflection in x-axis)

$y = -(x)^2$

VP  $(0, 0)$



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

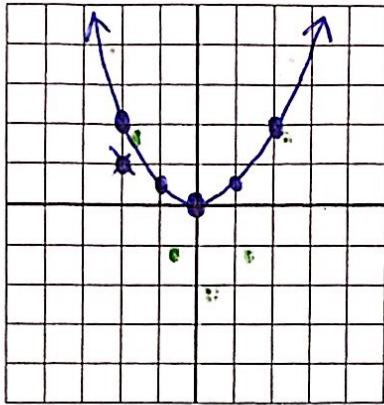
D:  $(-\infty, \infty)$  or  $\mathbb{R}$     R:  $(-\infty, 0]$  or  $y \leq 0$

$$|a| < 1$$

Vertical Compression (or Shrink)

$$y = \frac{1}{2}x^2$$

VP (0, 0)



X	Y
-2	2
-1	0.5
0	0
1	0.5
2	2

D:  $(-\infty, \infty)$

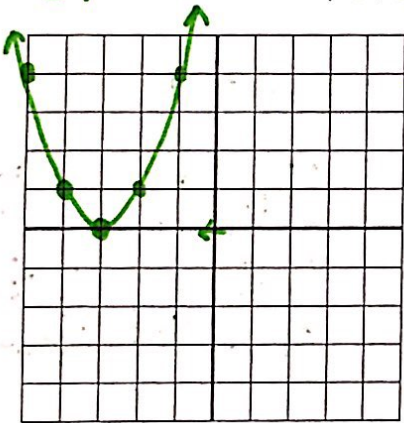
R:  $[0, \infty)$

or  $\mathbb{R}$   
Shift Left

or  $y \geq 0$

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

VP (-3, 0)



X	Y
-5	4
-4	1
-3	0
-2	1
-1	4

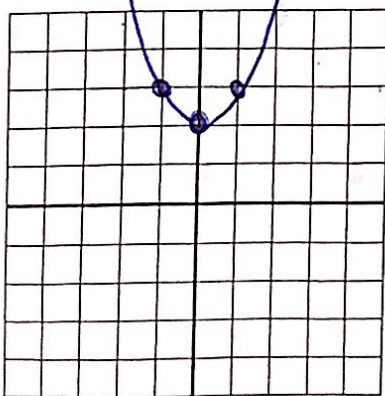
D:  $(-\infty, \infty)$

R:  $[0, \infty)$

Shift Up

$$y = x^2 + 2$$

VP (0, 2)



X	Y
-2	6
-1	3
0	2
1	3
2	6

D:  $(-\infty, \infty)$

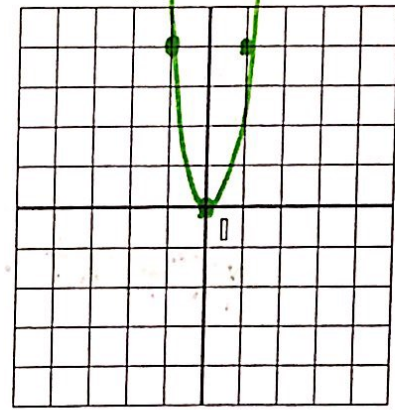
R:  $[2, \infty)$

$$|a| > 1$$

Vertical Stretch

$$y = 4x^2$$

VP (0, 0)



X	Y
-2	16
-1	4
0	0
1	4
2	16

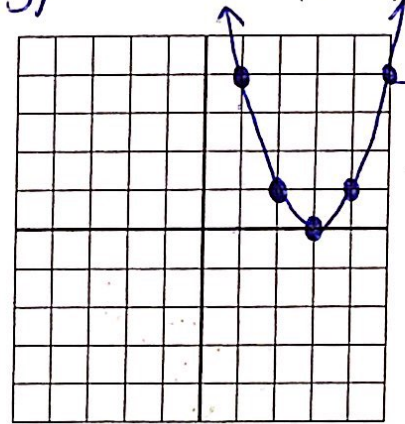
D:  $(-\infty, \infty)$

R:  $[0, \infty)$

Shift Right

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

VP (3, 0)



X	Y
1	4
2	1
3	0
4	1
5	4

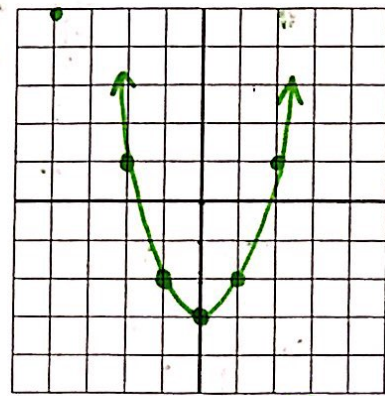
D:  $(-\infty, \infty)$

R:  $[0, \infty)$

Shift Down

$$y = x^2 - 3$$

VP (0, -3)



X	Y
-2	1
-1	-2
0	-3
1	-2
2	1

D:  $(-\infty, \infty)$

R:  $[-3, \infty)$