

$$y = \overbrace{a}^{\text{the leading coefficient}} x^2$$

What does a do?

Examples:

$$y = x^2$$

$$y = 2x^2$$

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

All three quadratic relations have the same vertex which is $(0,0)$.

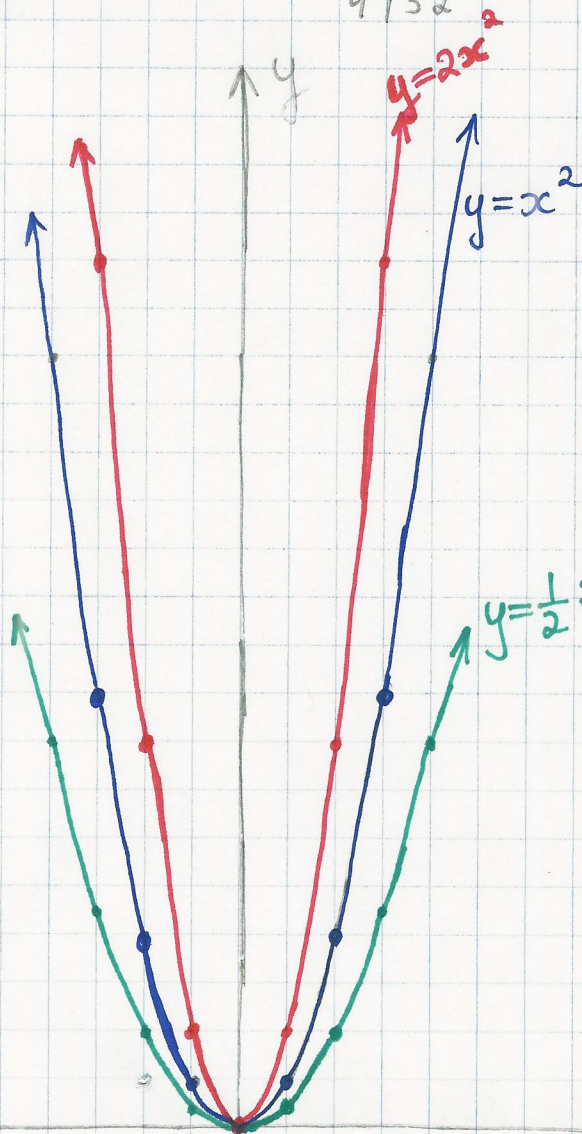
$y \geq 0$
for $a = 1, 2, \frac{1}{2}$

x	y
-4	32
-3	18
-2	8
-1	2
0	0
1	2
2	8
3	18
4	32

vertex →

x	y
-4	8
-3	$4\frac{1}{2}$
-2	2
-1	$\frac{1}{2}$
0	0
1	$\frac{1}{2}$
2	2
3	$4\frac{1}{2}$
4	8

← vertex



The graph of $y = 2x^2$ is more narrow/harower than that of $y = x^2$

The graph of $y = \frac{1}{2}x^2$ is wider than that of $y = x^2$