

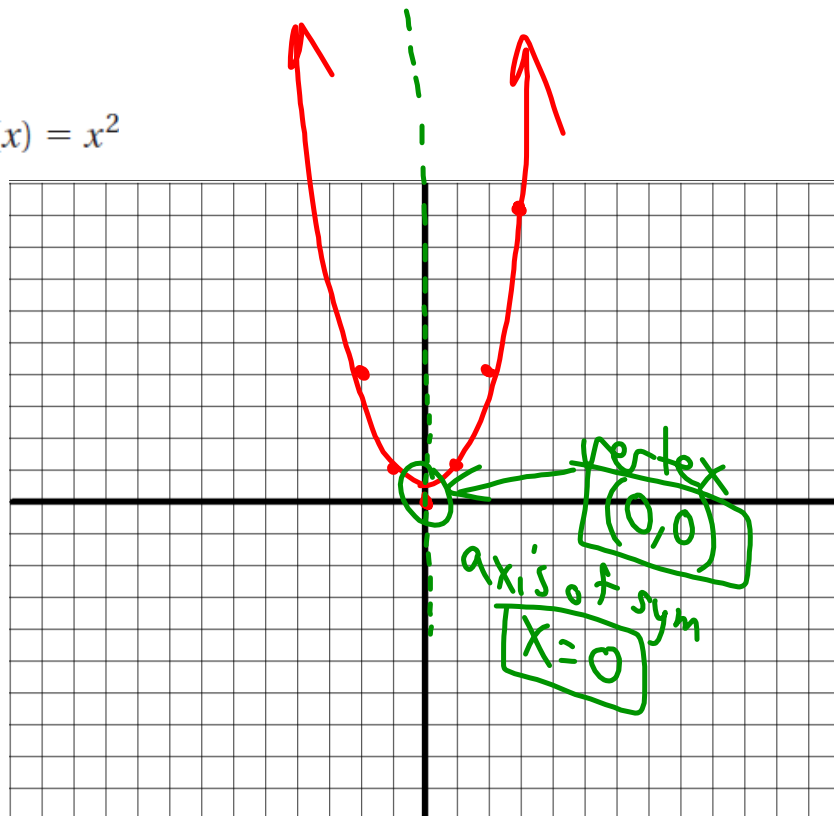
# 4.1 Graph Quadratic Functions in Standard Form

Quadratic:

$x^2$

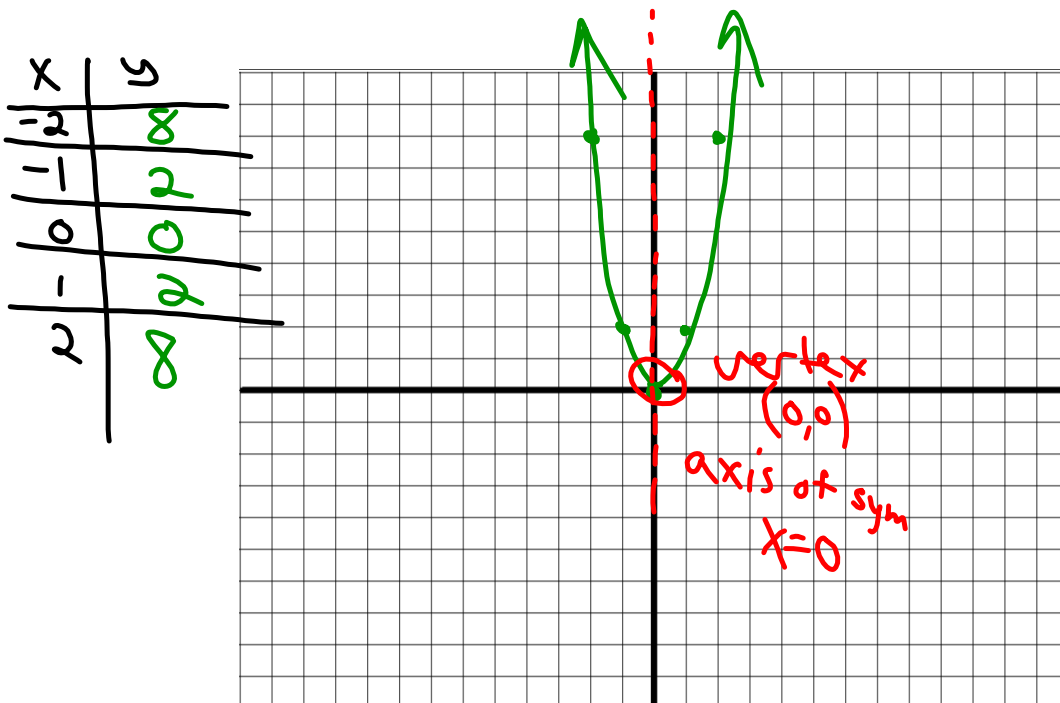
Parent Function:  $f(x) = x^2$

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



**EXAMPLE 1** Graph a function of the form  $y = ax^2$

Graph  $y = 2x^2$

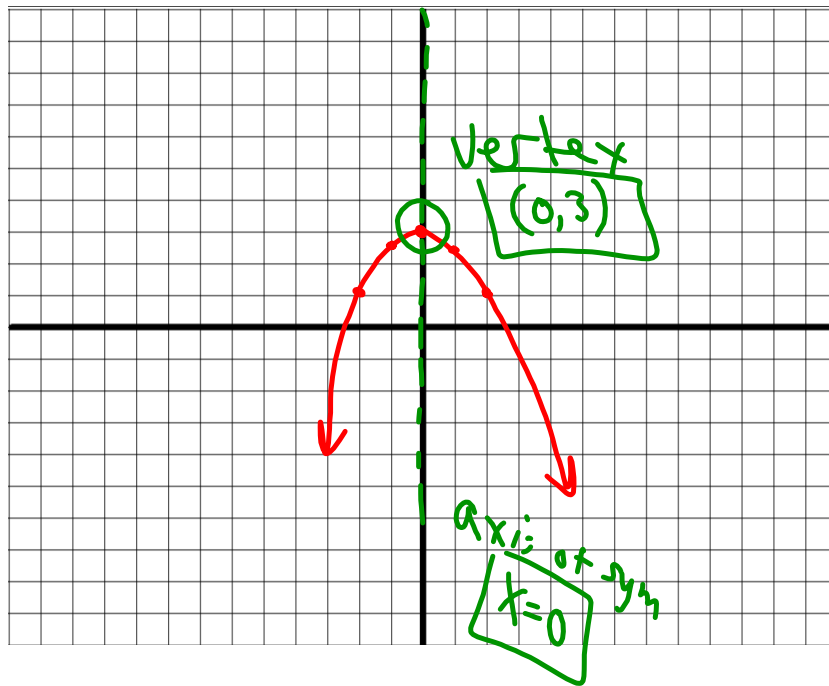


**EXAMPLE 2** Graph a function of the form  $y = ax^2 + c$

Graph  $y = -\frac{1}{2}x^2 + 3$

x	y
2	-1
0	3
-2	-1

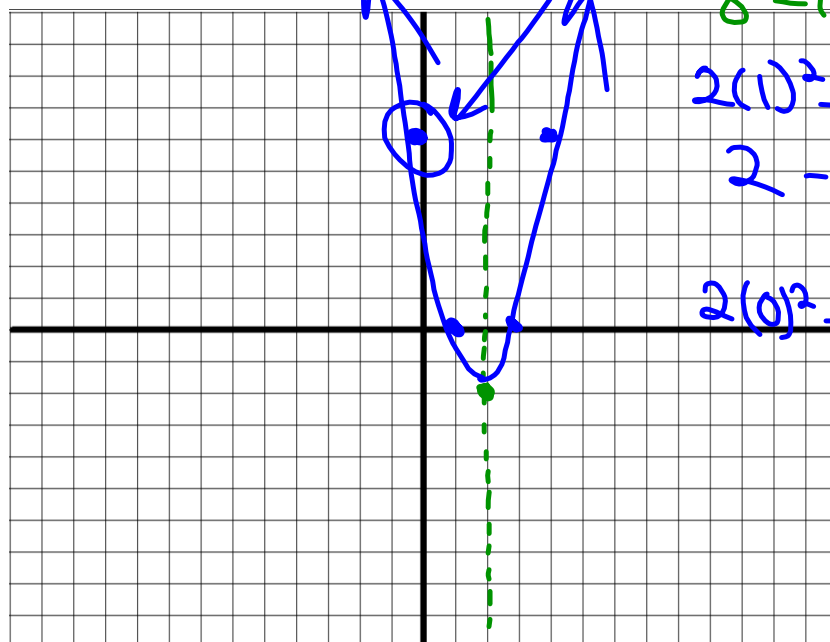
*Handwritten notes:*  
 - 2pts with -1  
 - 2pts with 3



**EXAMPLE 3**Graph a function of the form  $y = ax^2 + bx + c$ 

$$\frac{b}{2a} = \frac{-(-8)}{2(2)} = \frac{8}{4} = 2$$

vertex  
(2, -2)

Graph  $y = 2x^2 - 8x + 6$ .

$$2(2)^2 - 8(2) + 6$$

$$8 - 16 + 6$$

$$-2$$

$$2(1)^2 - 8(1) + 6$$

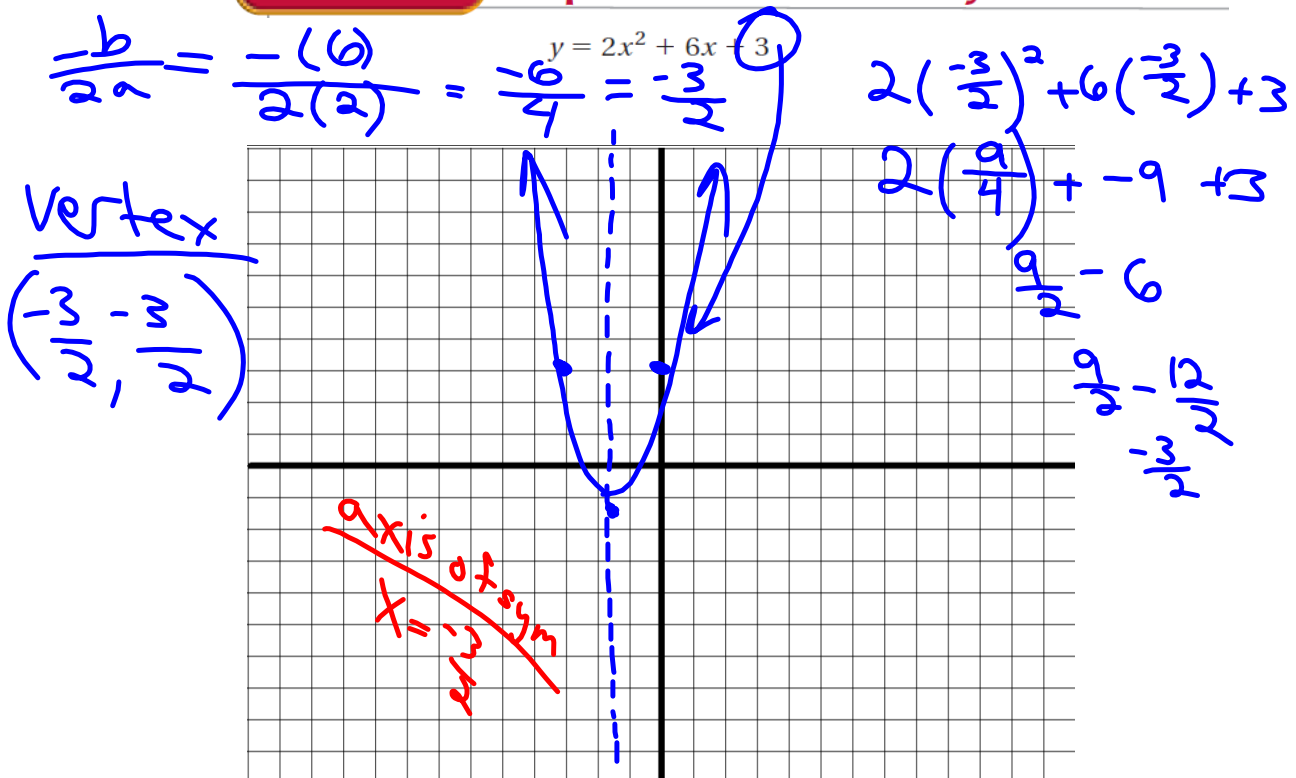
$$2 - 8 + 6$$

$$0$$

$$2(0)^2 - 8(0) + 6$$

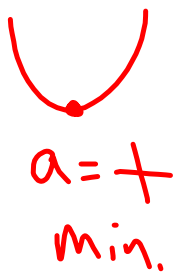
$$6$$

**EXAMPLE 3** Graph a function of the form  $y = ax^2 + bx + c$

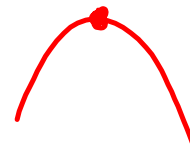


**EXAMPLE 4** Find the minimum or maximum value

Tell whether the function  $y = 3x^2 - 18x + 20$  has a *minimum value* or a *maximum value*. Then find the minimum or maximum value.



minimum



$a = -$   
max

$$\frac{-b}{2a} = \frac{-(-18)}{2(3)} = \frac{18}{6} = 3$$

min @ (3, -7)

$$\begin{aligned} 3(3)^2 - 18(3) + 20 \\ 27 - 54 + 20 \\ -7 \end{aligned}$$

**EXAMPLE 4** Find the minimum or maximum valueFind the minimum value of  $y = 4x^2 + 16x - 3$ .

$$\frac{-b}{2a} = \frac{-16}{2(4)} = \frac{-16}{8} = -2$$

$$\text{Min @ } (-2, -19)$$

$$4(-2)^2 + 16(-2) - 3$$

$$16 - 32 - 3$$

$$-19$$