

FORMS OF QUADRATICS

Vertex Form	Standard Form	Intercept Form
$y = a(x-h)^2 + k$ ↑ Vertex: (h, k) Line of Sym: $x = h$ Direction: $+a$ up $-a$ down Width: narrow $ a > 1$ normal $ a = 1$ wide $0 < a < 1$	$y = ax^2 + bx + c$ ↑ Vertex: $x = -\frac{b}{2a}$ $y =$ sub x -coord in equation	$y = a(x-p)(x-q)$ Gives x -intercepts. Vertex: x -coord 1) $x-p=0$ $x-q=0$ $x=p$ $x=q$ 2) x -coord: $\frac{p+q}{2}$ 3) y -coord: sub in x -coord.

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

$$y = 5(x-3)^2 + 1 \quad \text{Vertex: } (3, 1)$$

$$y = 5(x-3)(x-3) + 1$$

$$= 5(x^2 - 3x - 3x + 9) + 1$$

$$= 5(x^2 - 6x + 9) + 1$$

$$= 5x^2 - 30x + 45 + 1$$

$$= 5x^2 - 30x + 46 \leftarrow$$

$$-\frac{b}{2a} \quad x = \frac{-(-30)}{2 \cdot 5} = 3 \quad y = 5(3)^2 - 30(3) + 46$$

$$= 45 - 90 + 46 = 1$$

$$\text{Vertex: } x = -\frac{b}{2a} \quad y = \text{sub in x-coord}$$

$$y \geq -\frac{1}{2}x^2 + 6x - 15$$

$\frac{1}{2}$
a
 6
b
 15
c

Vertex:

$$x = \frac{-b}{2a} = \frac{-6}{2(-\frac{1}{2})} = 6$$

$$y = -\frac{1}{2}(6)^2 + 6(6) - 15$$

$$= -\frac{1}{2} \cdot 36 + 36 - 15$$

$$= -18 + 36 - 15$$

$$= 3$$

Vertex: (6, 3)

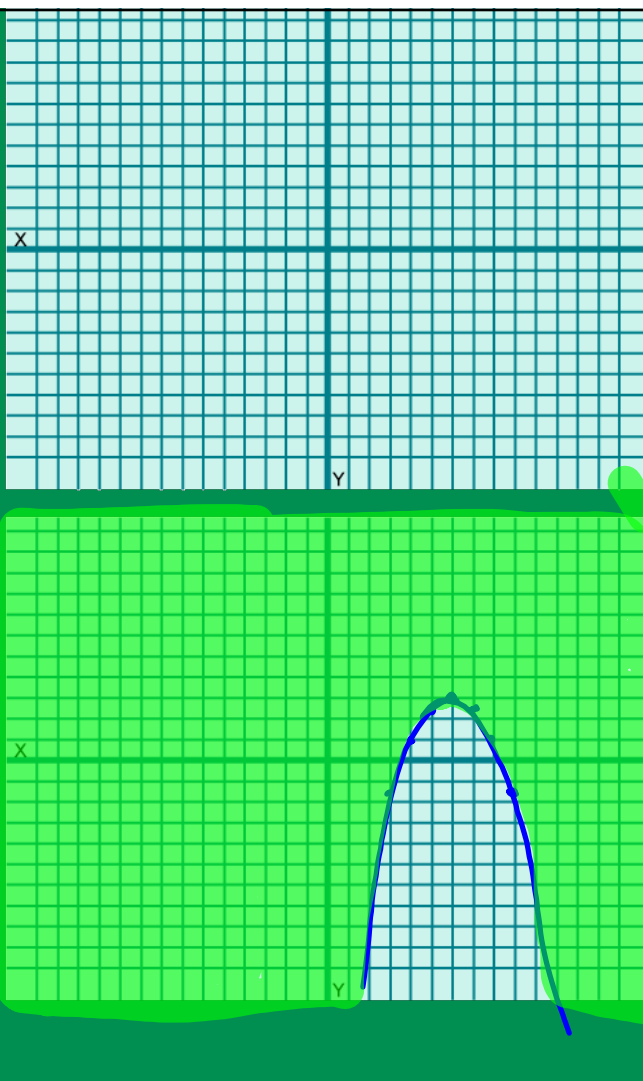
Direction: Down

Line of symm: $x = 6$

Wide

$$a = -\frac{1}{2}$$

0	6
1	$\times -1/2$
2	$\times -2$
3	$\times -4.5$



Intercept Form

$$y = a(x-p)(x-q)$$

$$y = 2(x-3)(x+7)$$

Find x-intercepts.

$$0 = 2(x-3)(x+7)$$

$$x-3=0 \quad x+7=0$$

$$x=3 \quad x=-7$$

Vertex:

$$x\text{-word: } \frac{3+(-7)}{2} = -\frac{4}{2} = -2$$

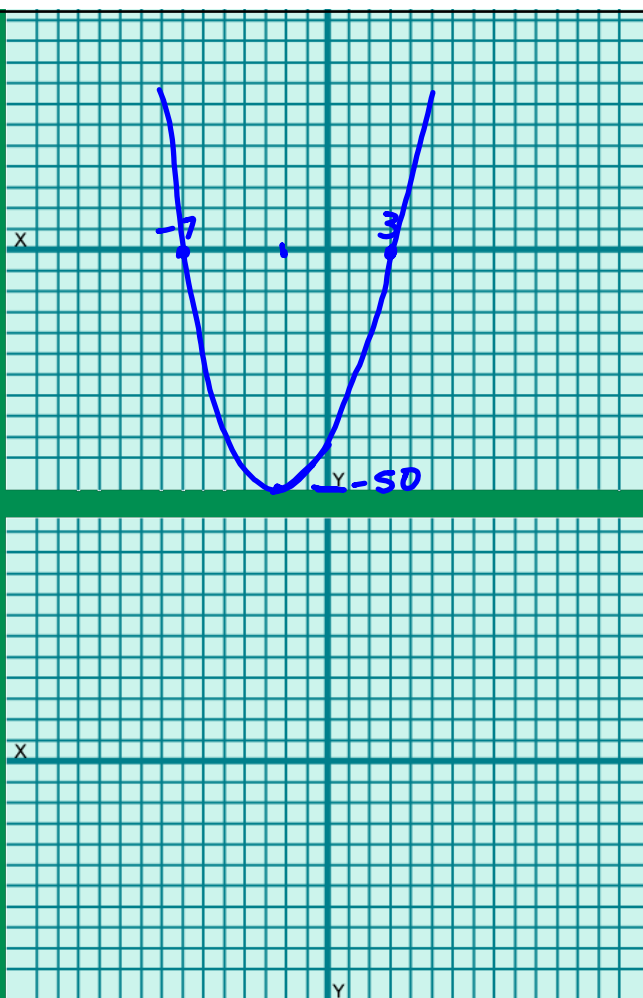
$$y\text{-word: } y = 2(-2-3)(-2+7)$$

$$= 2 \cdot -5 \cdot 5$$

Vertex:

$$(-2, -50)$$

$$= -50$$



$$y > 3(x+2)(x+4)$$

$$x+2=0 \quad x+4=0$$

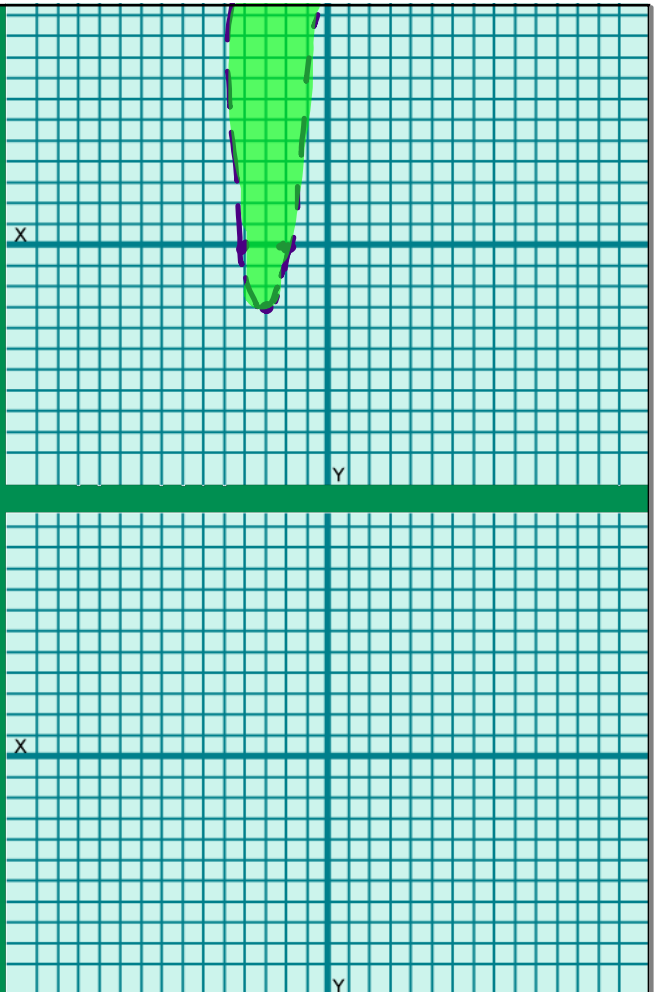
$$x = -2 \quad x = -4$$

$$\text{Vertex: } x = \frac{-2 + -4}{2} = -3$$

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

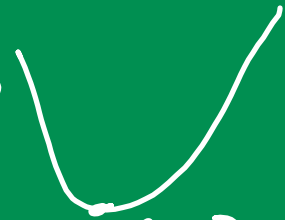
$$= 3 \cdot -1 \cdot 1$$

$$= -3 \quad (-3, -3)$$



1972, Mercury Comet = \$3200

$$V(t) = 18.75t^2 - 450t + 3200$$



When did it reach its lowest value?

$$\text{Vertex: } t = \frac{-b}{2a} = \frac{450}{2(18.75)} = 12 \text{ yrs.}$$

1984

What was its lowest value

$$\begin{aligned} V(12) &= 18.75(12)^2 - 450(12) + 3200 \\ &= \$500 \end{aligned}$$