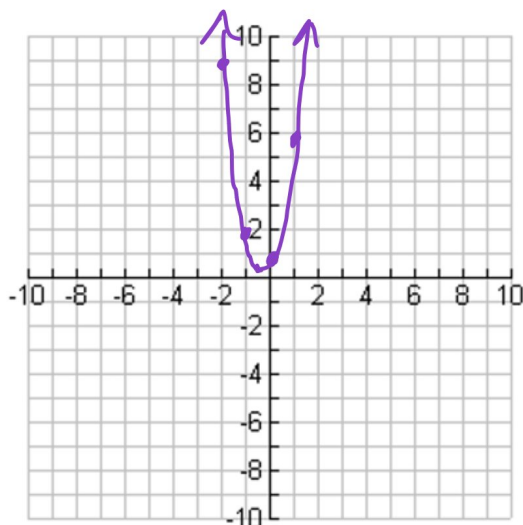


Graphing Quadratics: All Forms

Standard Form:

1) $f(x) = 3x^2 + 2x + 1$

Direction: upAxis of Symmetry: $x = -\frac{1}{3}$ $x = \frac{-2}{2(3)} = -\frac{1}{3}$ Vertex: $(-\frac{1}{3}, \frac{2}{3})$ Max or Min (and value): Min & $\frac{2}{3}$ y-intercept: $(0, 1)$ 

$$\begin{aligned} f\left(\frac{1}{3}\right) &= 3\left(\frac{1}{3}\right)^2 + 2\left(-\frac{1}{3}\right) + 1 \\ &= \frac{1}{3} - \frac{2}{3} + \frac{3}{3} \\ &= \frac{2}{3} \end{aligned}$$

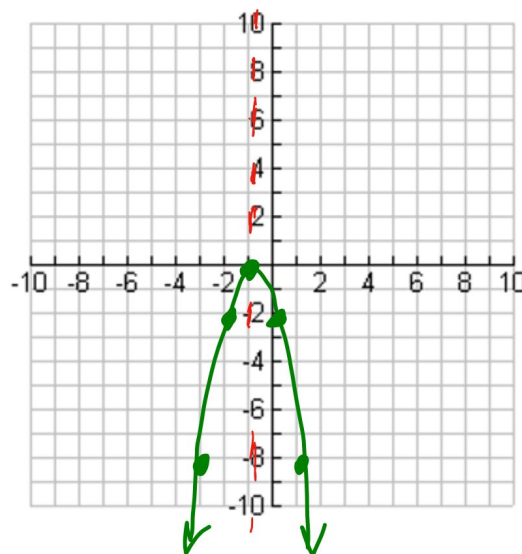
$$\text{vertex: } \left(-\frac{1}{3}, \frac{2}{3}\right)$$

Other Points:

$$f(-1) = 2, \quad f(1) = 6$$

$$f(-2) = 9$$

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

Direction: downAxis of Symmetry: $x = \frac{4}{2(-2)} = -1$ Vertex: $(-1, 0)$ Max or Min (and value): Max & 0y-intercept: -2 

$$\begin{aligned} f(-1) &= -2(-1)^2 - 4(-1) - 2 \\ &= -2 + 4 - 2 \\ &= 0 \end{aligned}$$

Other Point:

$$f(1) = -8$$

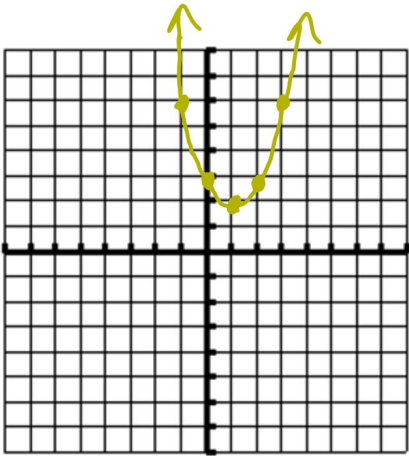
Vertex Form:

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

Vertex = (1, 2)

A.O.S. = $x = 1$

Is the vertex a max or min?

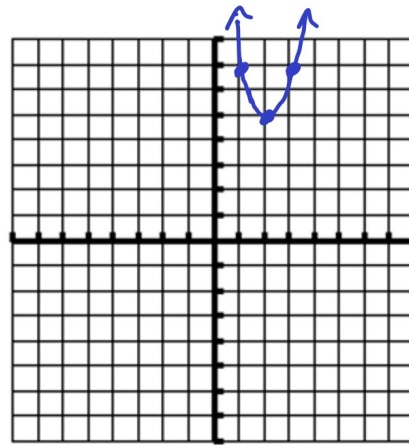


2. $y = 2(x-2)^2 + 5$

Vertex = (2, 5)

A.O.S. = $x = 2$

Is the vertex a max or min?



$a = 2$
So over 1, up 2
over 2, up 8

OTHER POINTS:

Since $a = 1$

From vertex go over 1 up 1
over 2 up 2

then reflect.

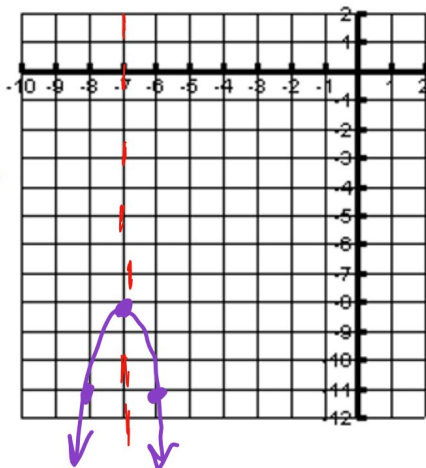
3. $y = -3(x+7)^2 - 8$

Vertex = $(-7, -8)$

A.O.S. = $x = -7$

Is the vertex a max or min? max

$a = -3$
over 1, down 3

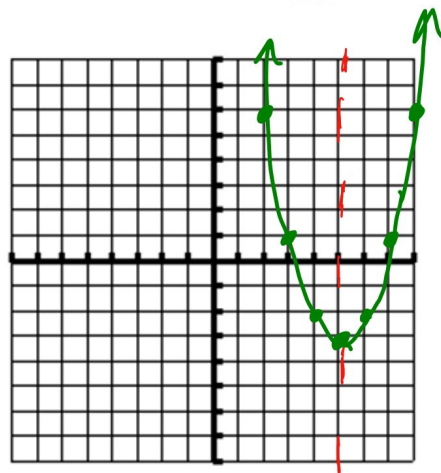


4. $y = (x-5)^2 - 3$

Vertex = $(5, -3)$

A.O.S. = $x = 5$

Is the vertex a max or min? min



Factored Form:

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

Opens Up or Down?

Is the vertex a Max or Min?

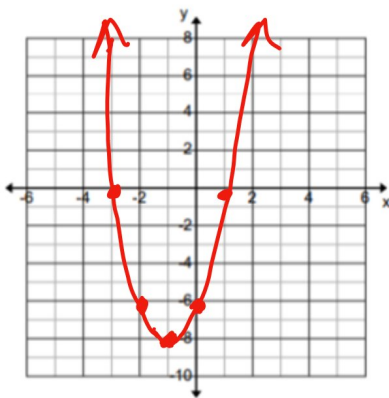
x-intercepts: -3 and 1

Axis of symmetry is $x = \underline{-1}$

Vertex: (-1, -8)

Domain: $\mathbb{R}$

Range: $[-8, \infty) \approx y \geq -8$



2. $y = -\frac{1}{2}(x-4)(x-8)$

Opens Up or Down?

Is the vertex a Max or Min?

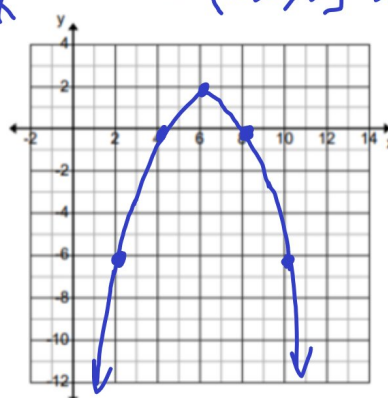
x-intercepts: 4 and 8

Axis of symmetry is $x = \underline{6}$

Vertex: (6, 2)

Domain: $\mathbb{R}$

Range: $(-\infty, 2] \approx y \leq 2$



AoS:

$$\frac{-3+1}{2}$$

Vertex:

$$\begin{aligned} 2(-1+3)(-1-1) \\ = 2(2)(-2) \\ = -8 \end{aligned}$$

$$y\text{-int: } 2(-3)(1) = -6$$

$$\text{AoS: } \frac{4+8}{2} = 6$$

$$f(6) = -\frac{1}{2}(6-4)(6-8) = 2$$

$$\text{vertex: } (6, 2)$$

other:

$$f(2) = -\frac{1}{2}(2-4)(2-8) = -6$$

$$(2, -6)$$