

Warm up:

Identify the following functions as linear or non-linear.

$$f(x) = \frac{1}{x} \text{ nonlinear} \quad x = 7 \text{ linear}$$

$$b(x) = 5x - 2 \text{ linear} \quad r(x) = 4 \text{ linear}$$

$$g(x) = 3x^2 + 5 \text{ nonlinear} \quad a(x) = x \text{ linear}$$

$$h(x) = |x| \text{ nonlinear} \quad t(x) = 4x^4 \text{ nonlinear}$$

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

$$f(2) = 4$$

$$f(1) = 1$$

$$f(8) = 64$$

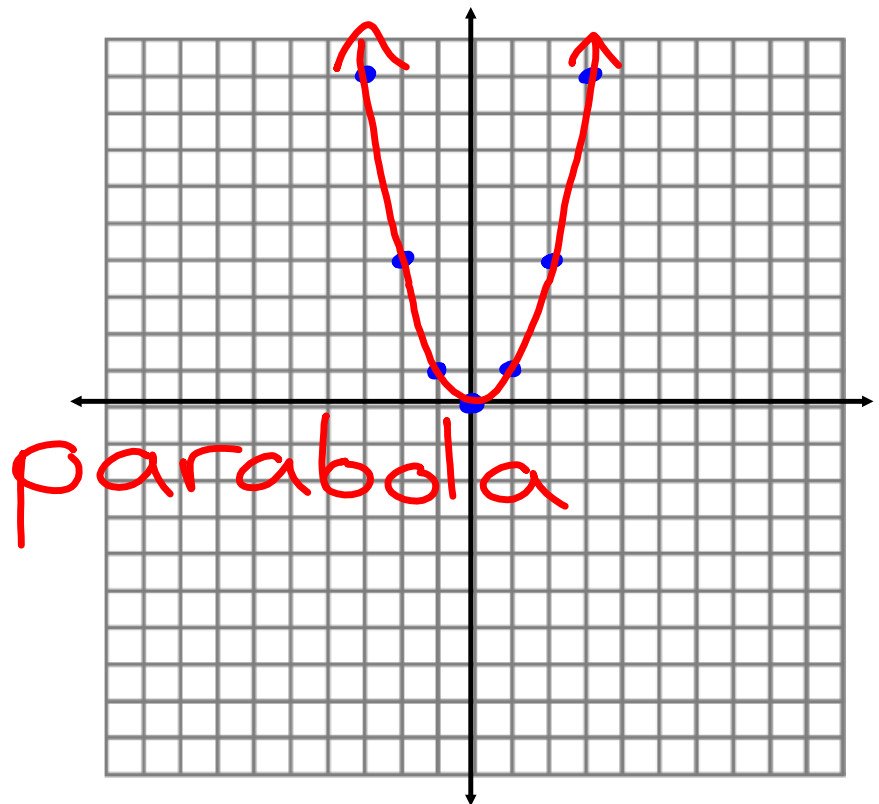
$$f(-1) = 1$$

$$f(-2) = 4$$

$$f(3) = 9$$

$$f(-3) = 9$$

$$f(0) = 0$$



$$f(x) = 2x^2 - 8x + 3$$

$$f(1) = -3$$

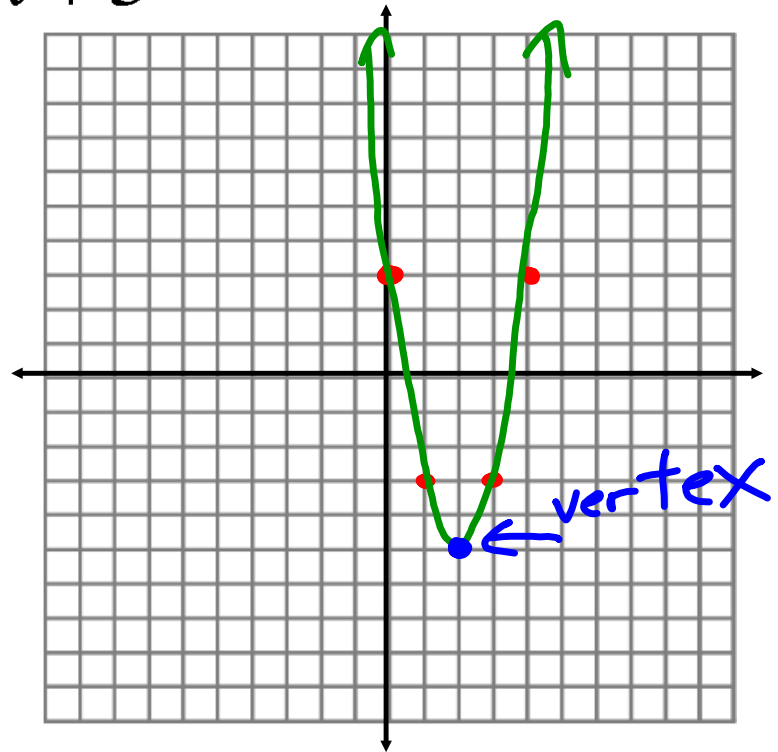
$$f(0) = 3$$

$$f(-1) = 13$$

$$f(2) = -5$$

$$f(3) = -3$$

$$f(4) = 3$$



To graph a parabola in the form...

$$f(x) = ax^2 + bx + c$$

The x-coordinate of the vertex will be...

$$-\frac{b}{2a}$$

$$f(x) = 2x^2 - 8x + 3 \quad a=2 \quad b=-8$$

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

$$f(2) = -5$$

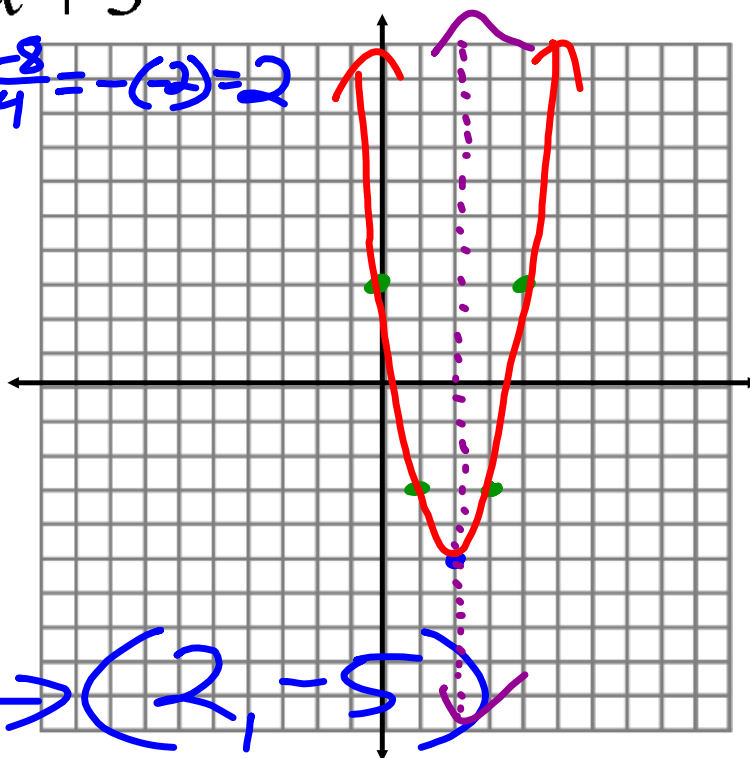
$$f(1) = -3$$

$$f(3) = -3$$

$$f(0) = 3$$

$$f(4) = 3$$

vertex $\rightarrow (2, -5)$



What is the axis of symmetry?

$$x = 2$$

What is the maximum/minimum value?

$$\text{min val} = -5$$

What is the domain?

$$D = \{x : x \in \mathbb{R}\}$$

What is the range?

$$R = \{y : y \geq -5\}$$

$$r(x) = x^2 + 4x - 6$$

$$\begin{aligned} &(-2)^2 + 4(-2) - 6 \\ &4 - 8 - 6 \\ &-4 - 6 = -10 \end{aligned}$$

$$-\frac{b}{2a} = -\frac{4}{2(1)} = -\frac{4}{2} = -2$$

$$r(-2) = -10$$

$$r(-1) = -9$$

$$r(-3) = -9$$

$$r(0) = -6$$

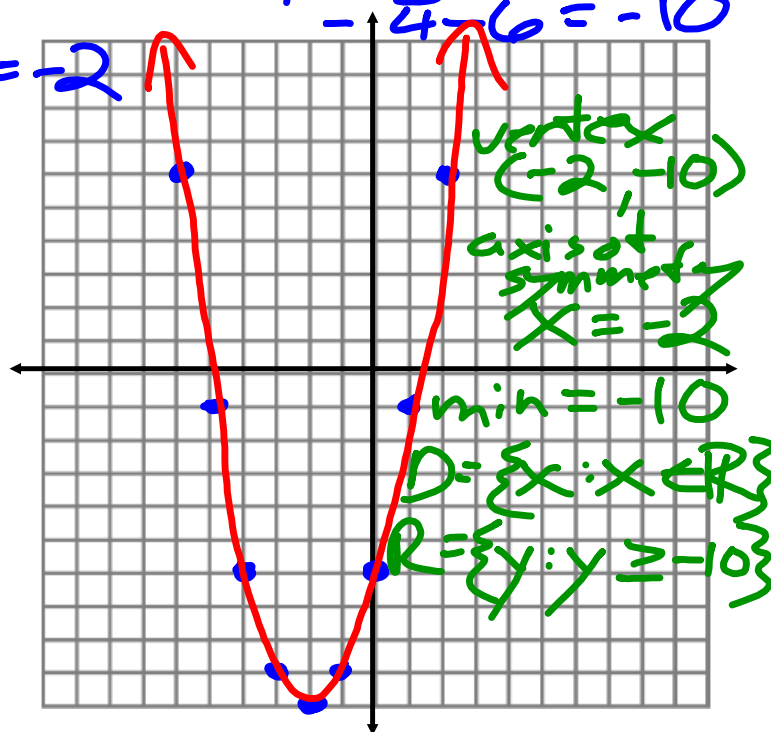
$$r(-4) = -6$$

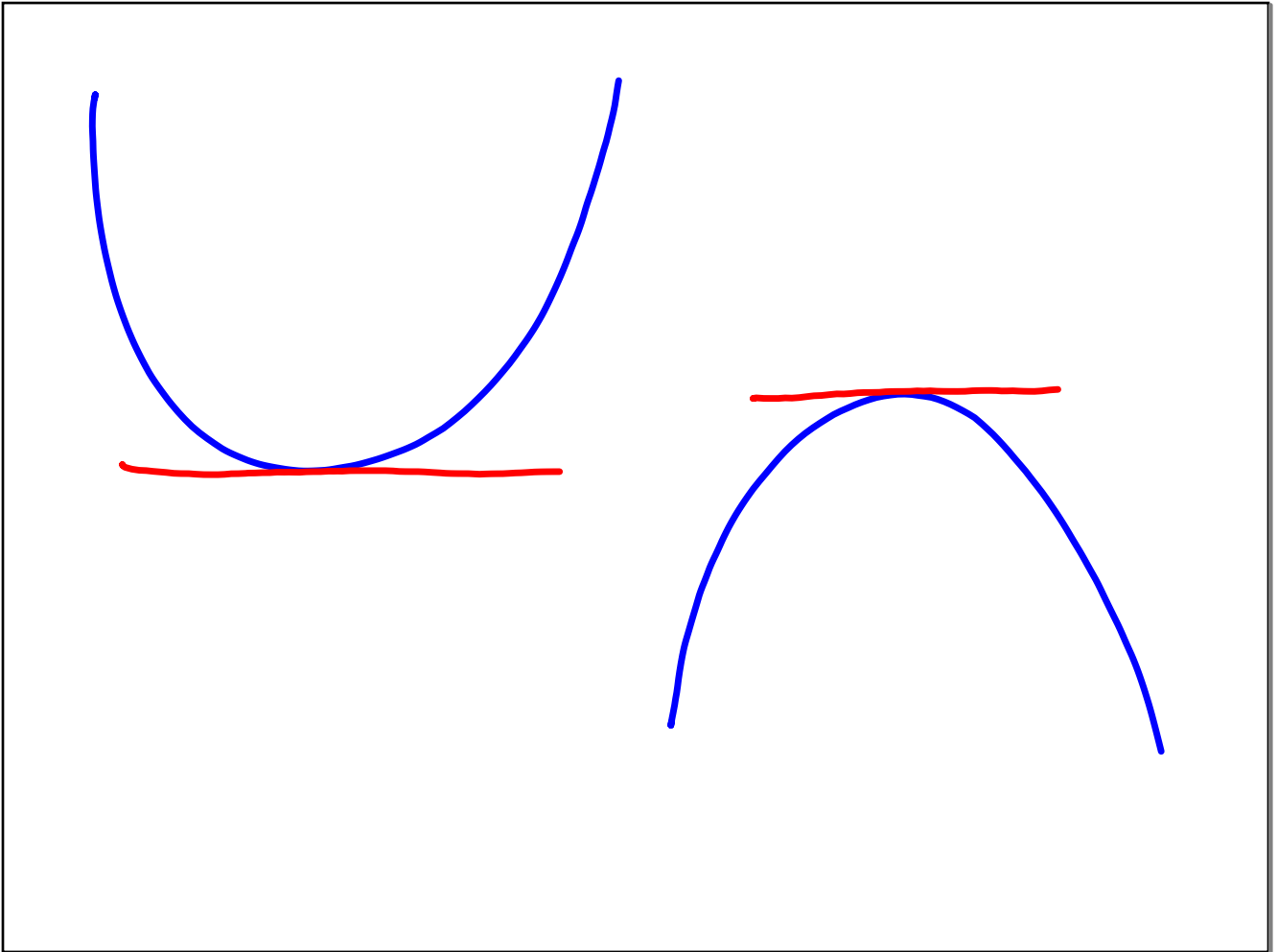
$$r(-1) = -1$$

$$r(-5) = -1$$

$$r(2) = 6$$

$$r(-6) = 6$$





$$h(x) = -2x^2 + 7$$

$$-\frac{b}{2a} = -\frac{0}{2(-2)} = -\frac{0}{-4} = 0$$

$$h(0) = 7$$

$$h(1) = 5$$

$$h(-1) = 5$$

$$h(2) = -1$$

$$h(-2) = -1$$

