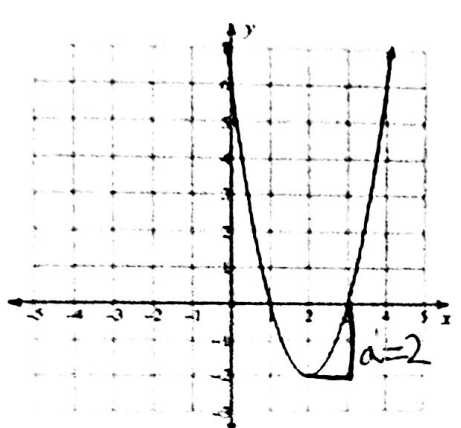


5.6 Writing Equations from a Graph

When a graphing standpoint, we are going to focus on writing equations from graphs in vertex and intercept form.

<p>1) Write the function that the graph represents.</p> 	<p><u>Vertex Form</u></p> $y = a(x-h)^2 + k$ <p><u>Info Needed</u> a-value Vertex (h, k)</p> <p><u>Equation</u> a=2 Vertex (2, -2)</p> $\boxed{y = 2(x-2)^2 - 2}$	<p><u>Intercept Form</u></p> $y = a(x-p)(x-q)$ <p><u>Info Needed</u> a-value x-intercepts (p, 0), (q, 0)</p> <p><u>Equation</u> a=2 x-int: (1, 0), (3, 0)</p> $\boxed{y = 2(x-1)(x-3)}$
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2) Using the equations that you wrote above, write the function that the graph represents in standard form.

From Vertex Form

$$y = 2(x-2)^2 - 2$$

$$y = 2(x-2)(x-2) - 2$$

$$y = 2(x^2 - 4x + 4) - 2$$

$$y = 2x^2 - 8x + 8 - 2$$

$$\boxed{y = 2x^2 - 8x + 6}$$

From Intercept Form

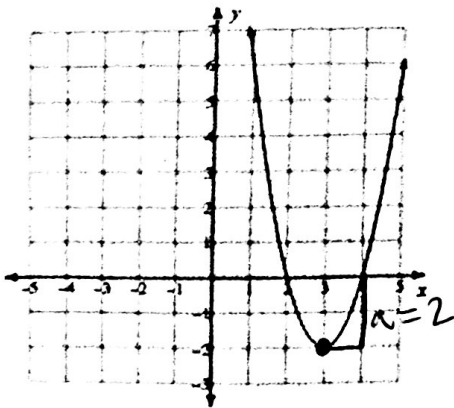
$$y = 2(x-1)(x-3)$$

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

$$\boxed{y = 2x^2 - 8x + 6}$$

3) Write the function that the graph represents in all three forms.

a.



Vertex form: Vertex: (3, -2) a=2

$$\boxed{y = 2(x-3)^2 - 2}$$

Intercept form: x-int: (2, 0), (4, 0) a=2

$$\boxed{y = 2(x-2)(x-4)}$$

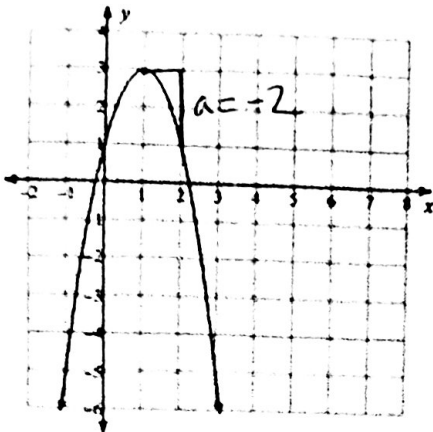
Standard form:

$$y = 2(x-2)(x-4)$$

$$y = 2(x^2 - 6x + 8)$$

$$\boxed{y = 2x^2 - 12x + 16}$$

b.



Vertex form: Vertex: $(1, 3)$ $a = -2$

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

Intercept form:

If the intercepts don't land on a nice point, don't worry about intercept form.

Standard form:

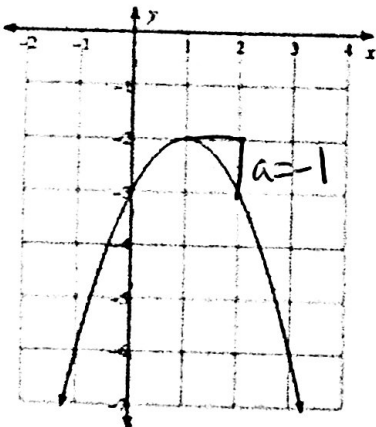
$$y = -2(x-1)(x-1) + 3$$

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

$$y = -2x^2 + 4x - 2 + 3$$

$$y = -2x^2 + 4x + 1$$

c.



Vertex form: Vertex: $(1, -2)$ $a = -1$

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

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

Intercept form:

N/A - no x-intercepts

Standard form:

$$y = -(x-1)(x-1) - 2$$

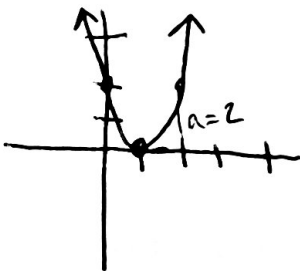
$$y = -(x^2 - 2x + 1) - 2$$

$$y = -x^2 + 2x - 1 - 2$$

$$y = -x^2 + 2x - 3$$

* If the vertex is the x-intercept, then vertex form & intercept form will be the same

ex:



Vertex: $(1, 0)$ $a = 2$ $y = 2(x-1)^2$

Intercepts: $(1, 0)$ $a = 2$ $y = 2(x-1)^2$
 ↑
 $(1, 0)$

Repeated root; needs to be counted for twice to meet fundamental theorem of algebra