

Writing Equations of parabolas

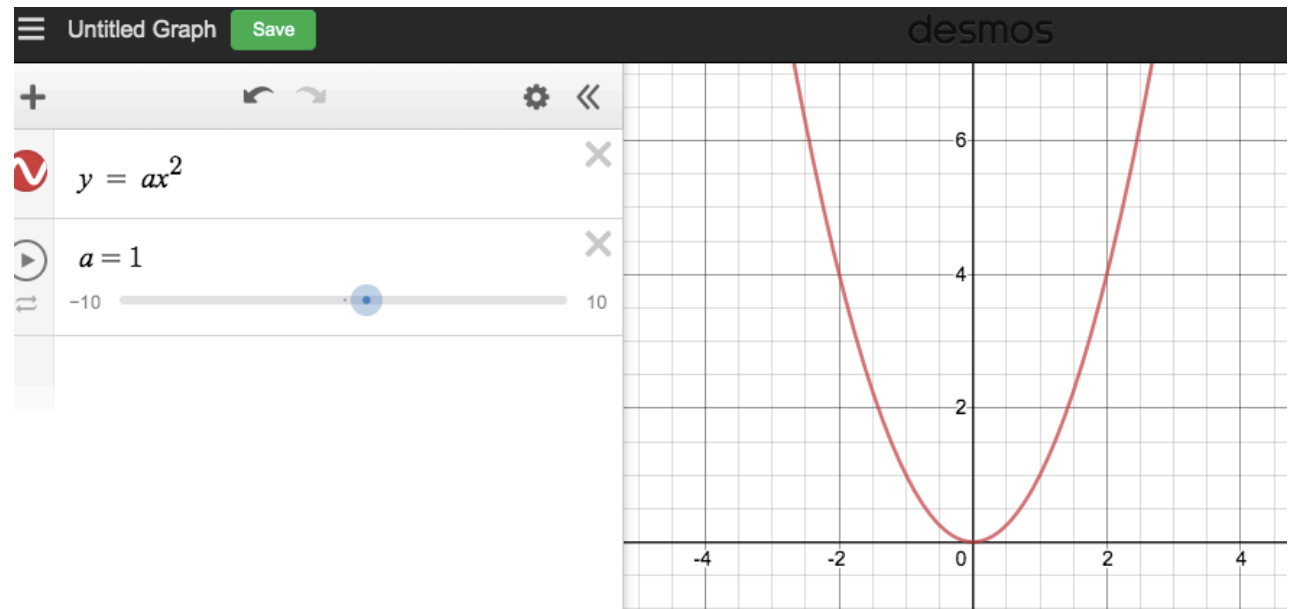
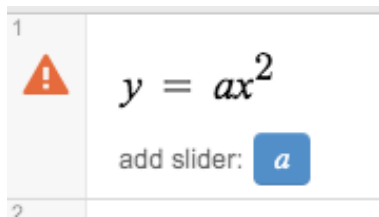
Learning Targets:

- Given a graph of a parabola, I can write its equation in vertex form.
- Given a graph of a parabola, I can write its equation in intercept form.



What is a ?

Go to Desmos and graph $y = ax^2$. Then click on “add slider a ”

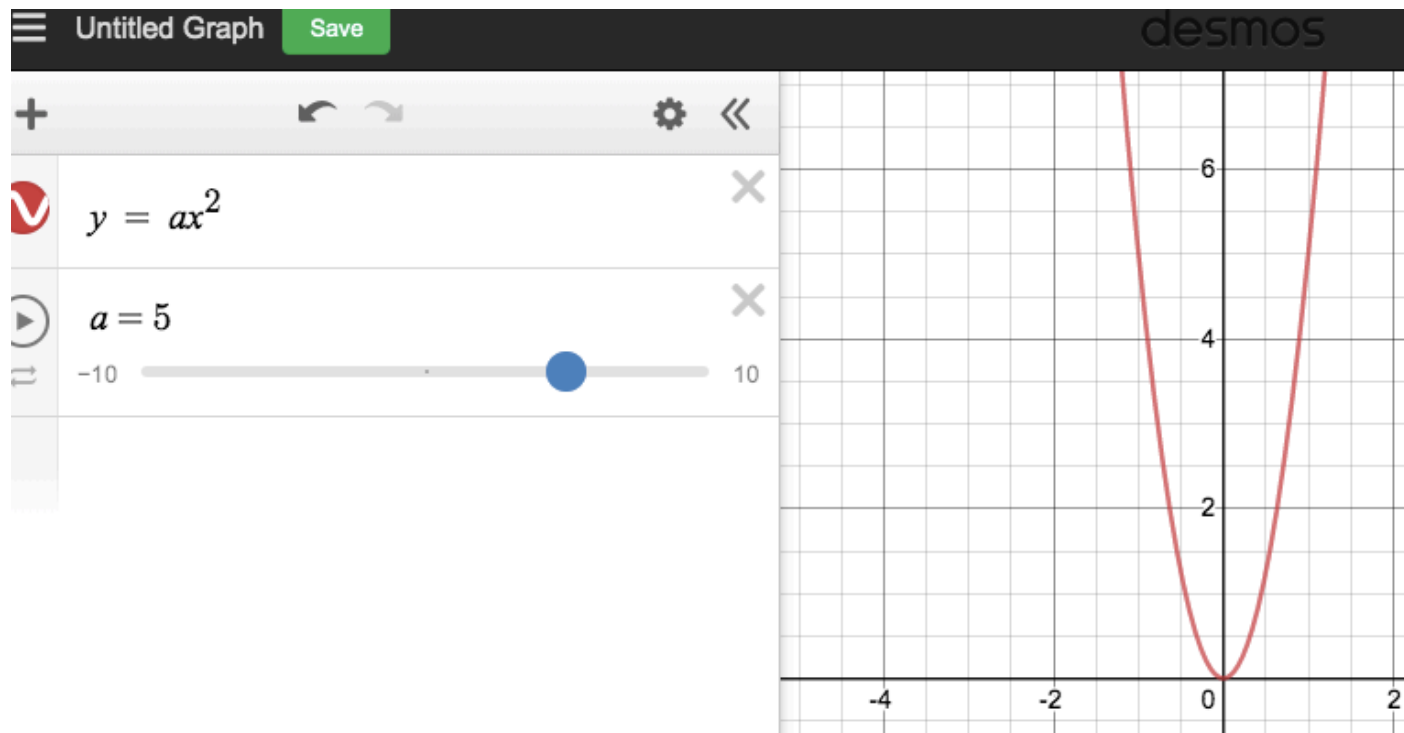


Drag the slider around to see what happens to the parabola as the value of a changes.



What is a ?

As the value of a increases, the parabola becomes more narrow.

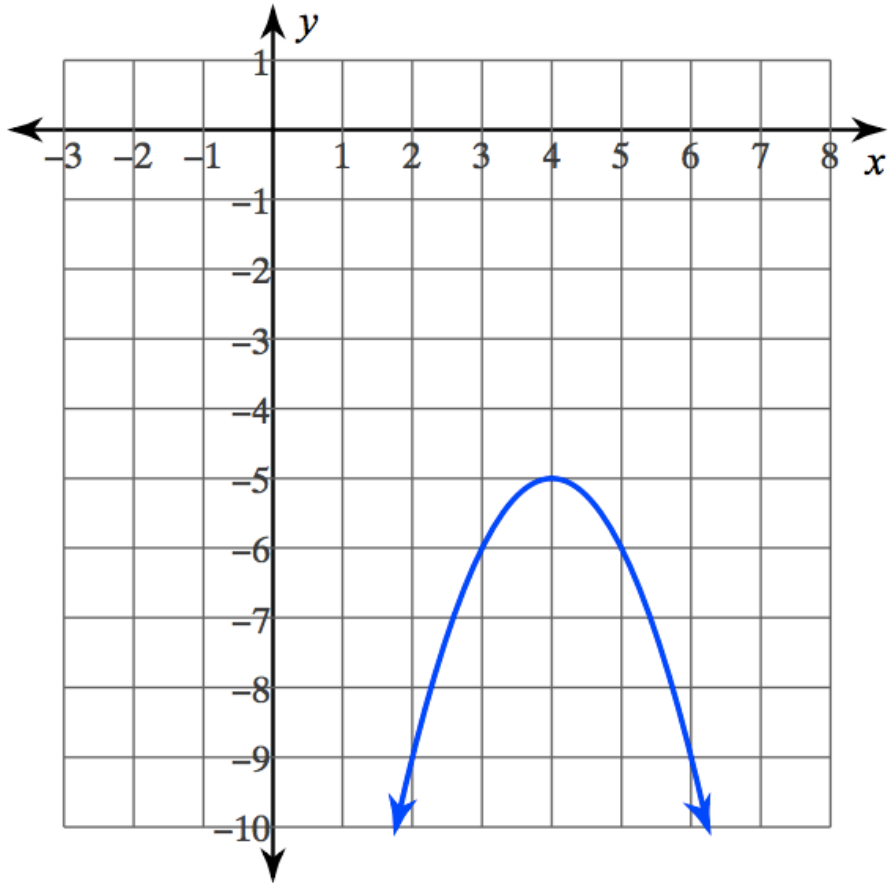


What is a ?

As the value of a gets closer to zero, the parabola becomes wider.



Writing in Vertex Form



Write the equation of the graph in vertex form.

First find the coordinate of the vertex.

vertex: $(4, -5)$



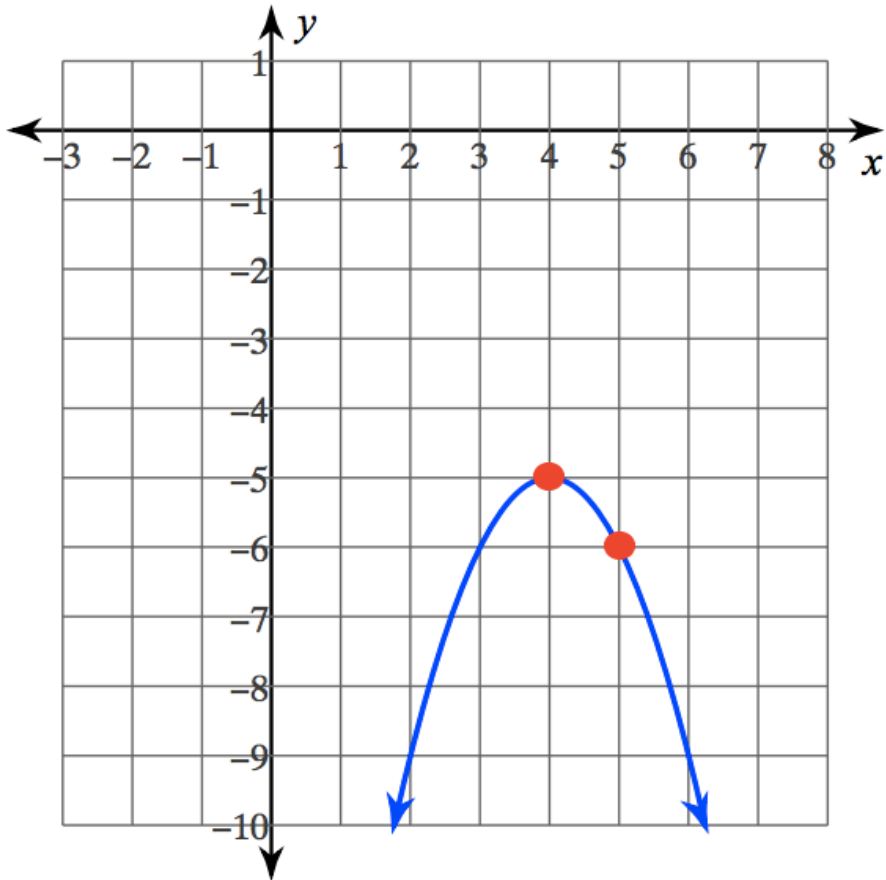
So,

$$y = a(x - 4)^2 - 5$$

We can use our graph to find the value of a .



Writing in Vertex Form



Write the equation of the graph in vertex form.

$$y = a(x - 4)^2 - 5$$

To find the value of a , start at the vertex.

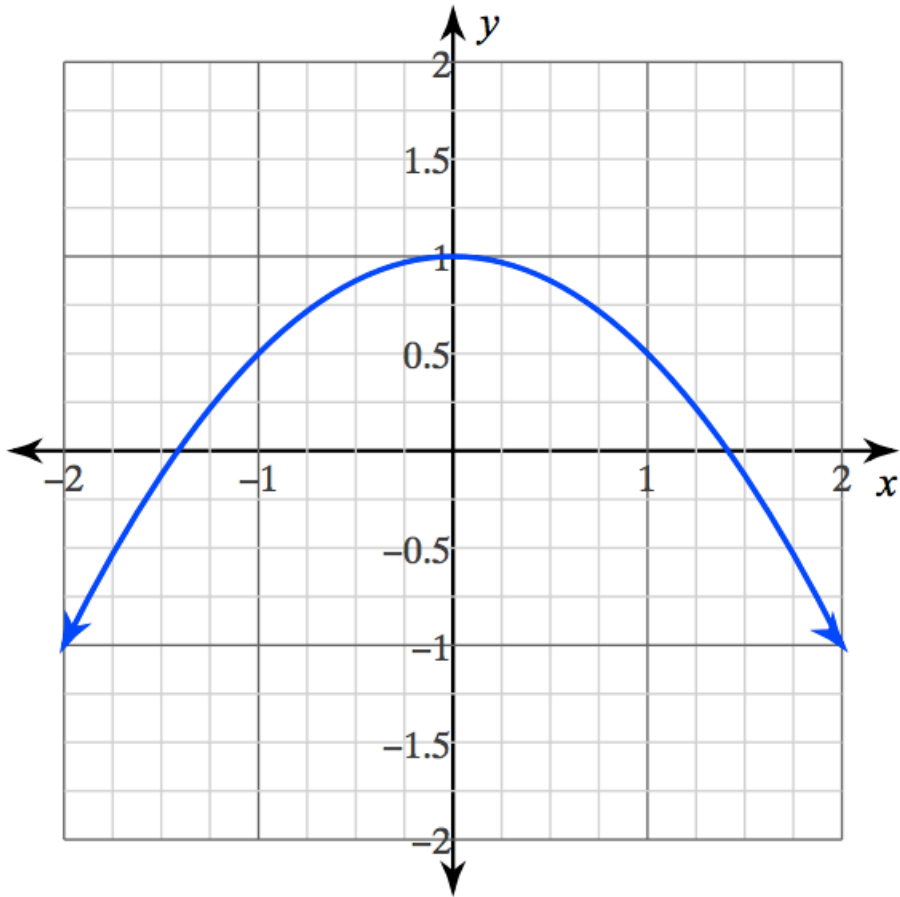
Count how many vertical units you need to move to go one full unit to the right.

Here, to go right 1, you need to go **down 1**.

So, $a = -1$ \longrightarrow $y = -1(x - 4)^2 - 5$



Writing in Vertex Form



Write the equation of the graph in vertex form.

First find the coordinate of the vertex.

vertex: $(0, 1)$



So,

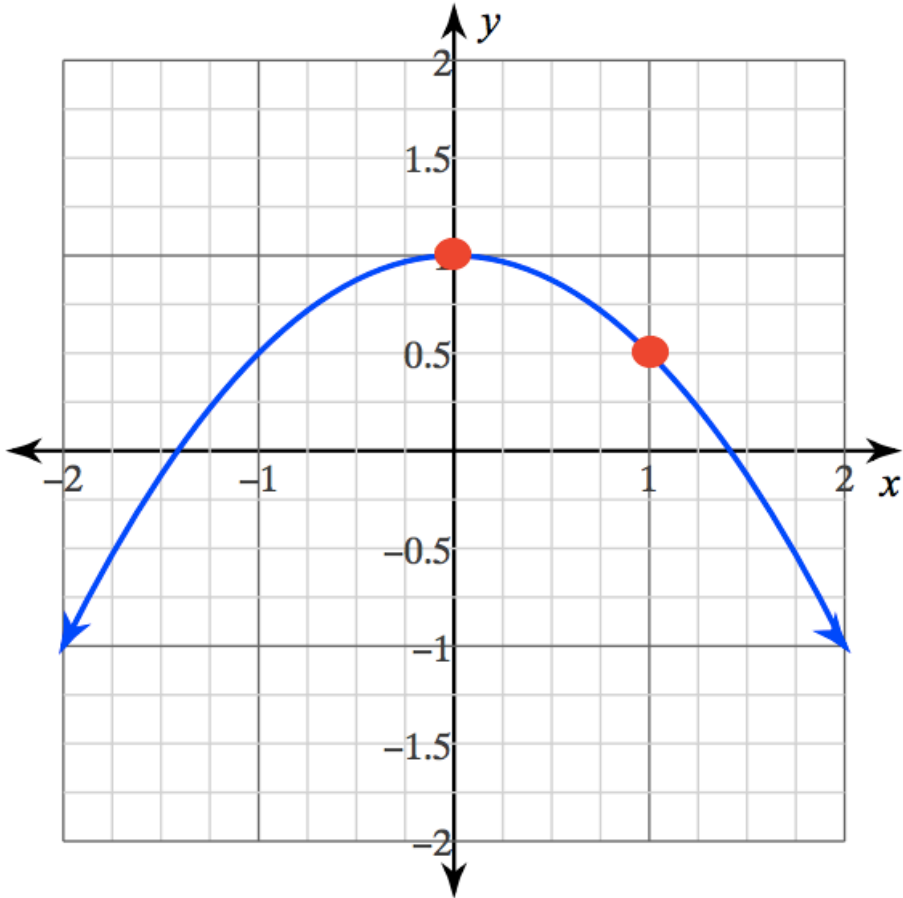
$$y = a(x - 0)^2 + 1$$

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

Use the graph to find the value of a .



Writing in Vertex Form



Write the equation of the graph in vertex form.

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

To find the value of a , start at the vertex.

Count how many vertical units you need to move to go one full unit to the right.

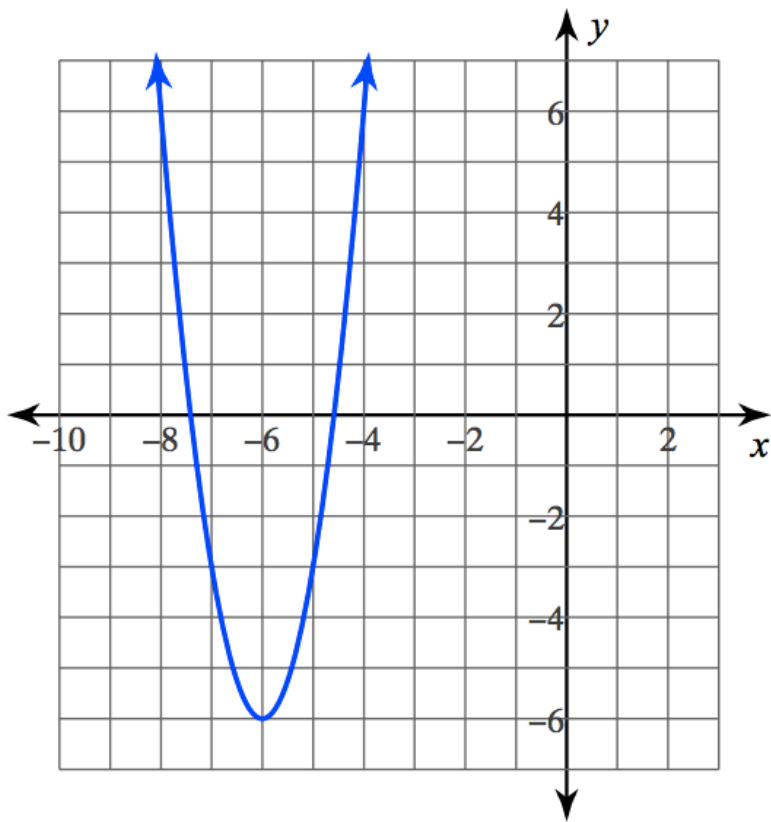
Here, to go right 1, you need to go **down .5**

So, $a = -.5$ \longrightarrow $y = -\frac{1}{2}(x)^2 - 5$

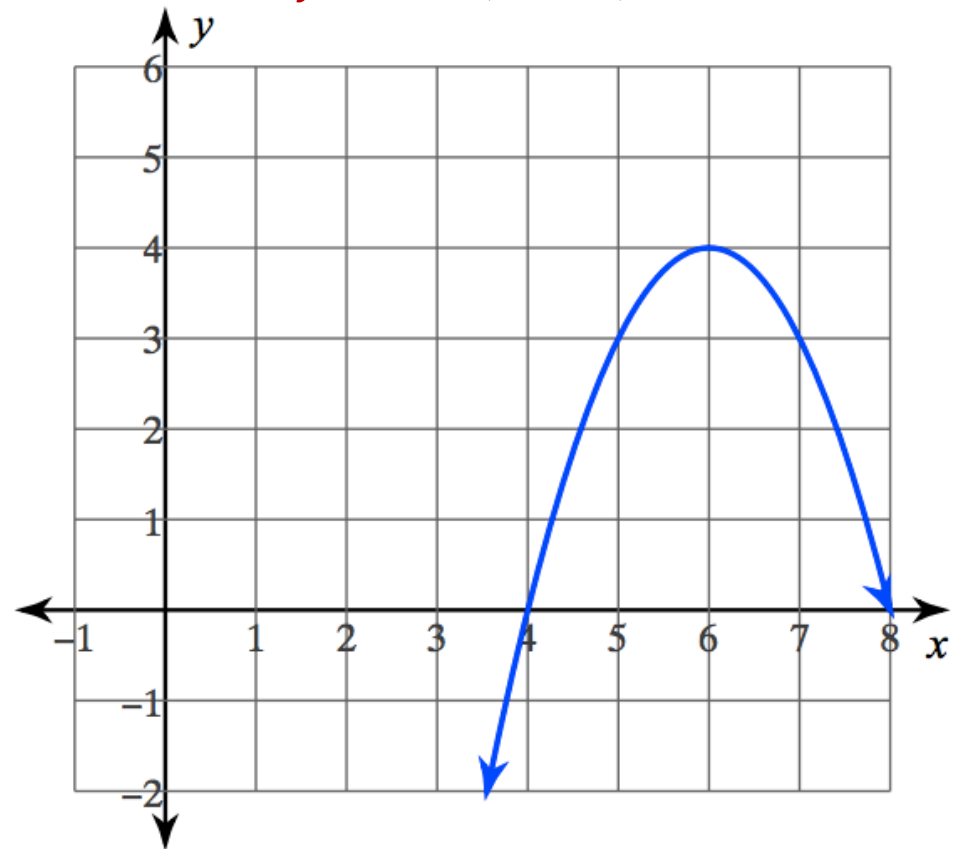


You try:

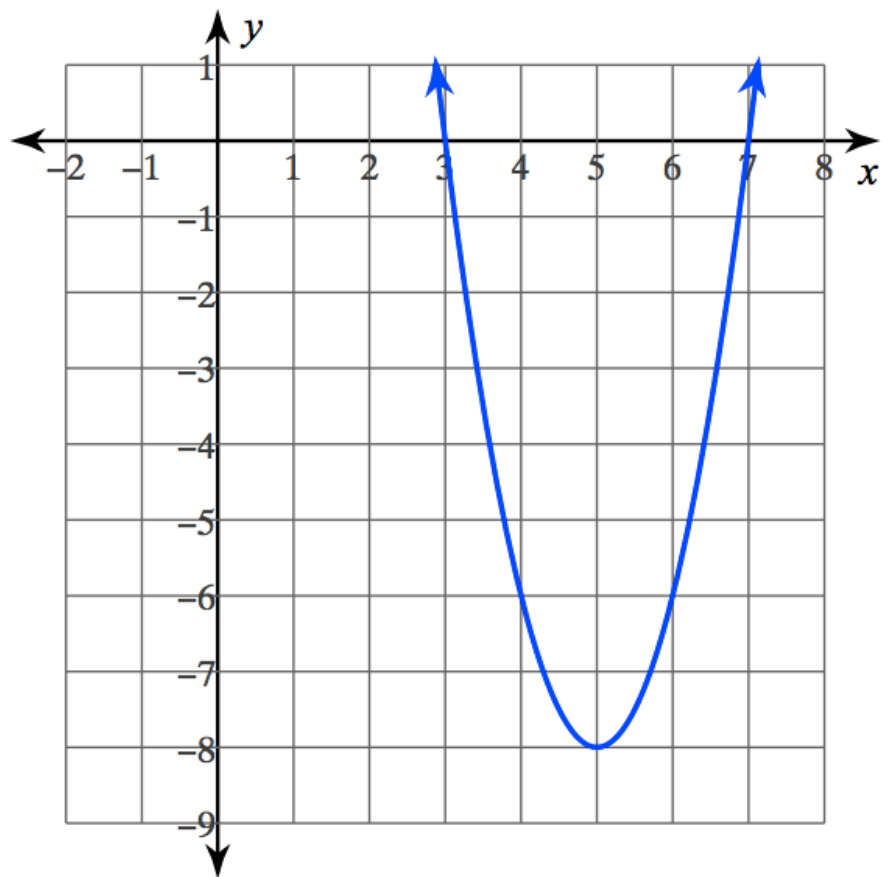
$$y = 3(x + 6)^2 - 6$$



$$y = -1(x - 6)^2 + 4$$



Writing in Intercept Form



Write the equation of the graph in intercept form.

First find the x -intercepts of the graph.

x -intercepts: 3 & 7



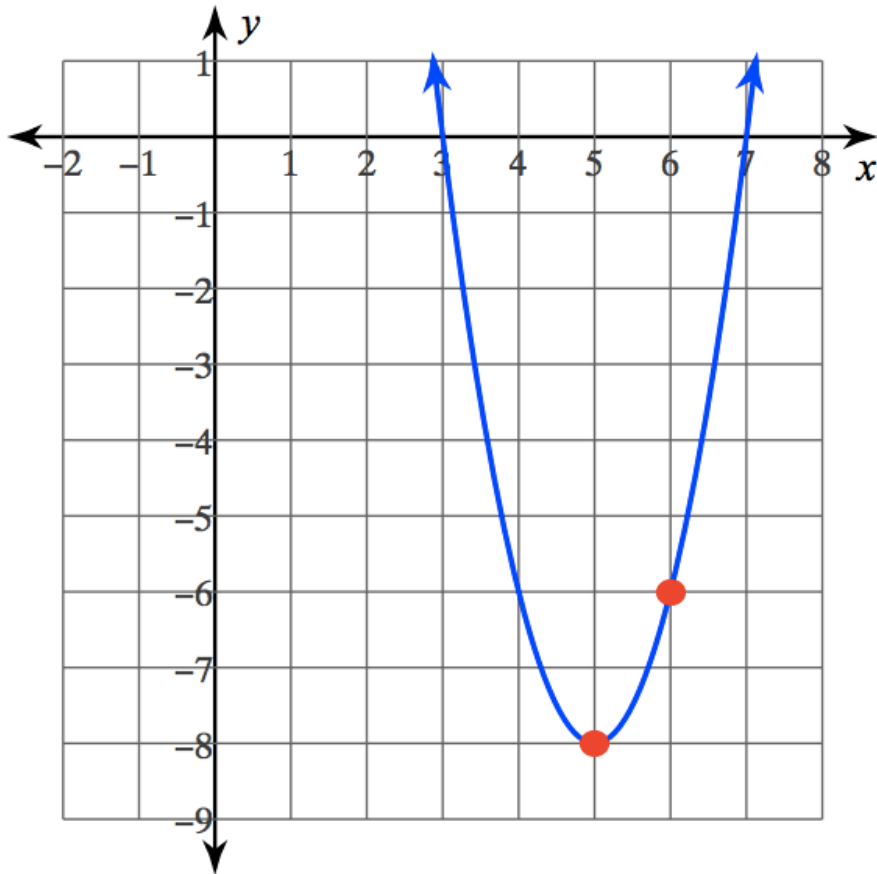
So,

$$y = a(x - 3)(x - 7)$$

Like before, use the graph to find the value of a .



Writing in Vertex Form



Write the equation of the graph in vertex form.

$$y = a(x - 3)(x - 7)$$

To find the value of a , start at the vertex.

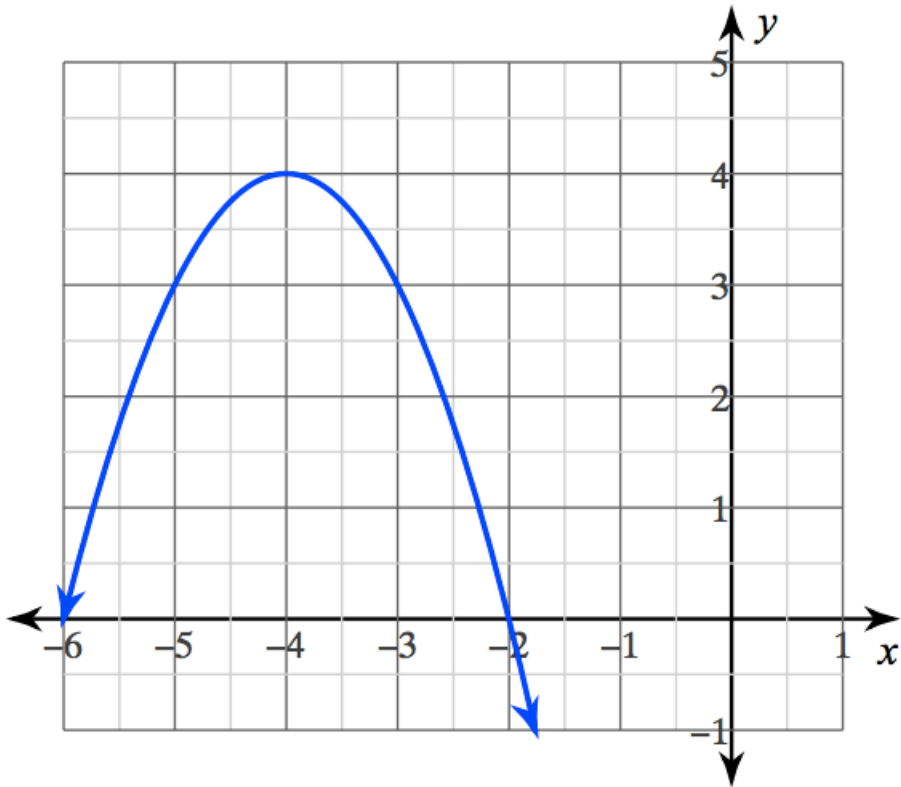
Count how many vertical units you need to move to go one full unit to the right.

Here, to go right 1, you need to go **up 2**

So, $a = 2$ \longrightarrow $y = 2(x - 3)(x - 7)$



Writing in Intercept Form



Write the equation of the graph in intercept form.

First find the x -intercepts of the graph.

x -intercepts: -6 & -2



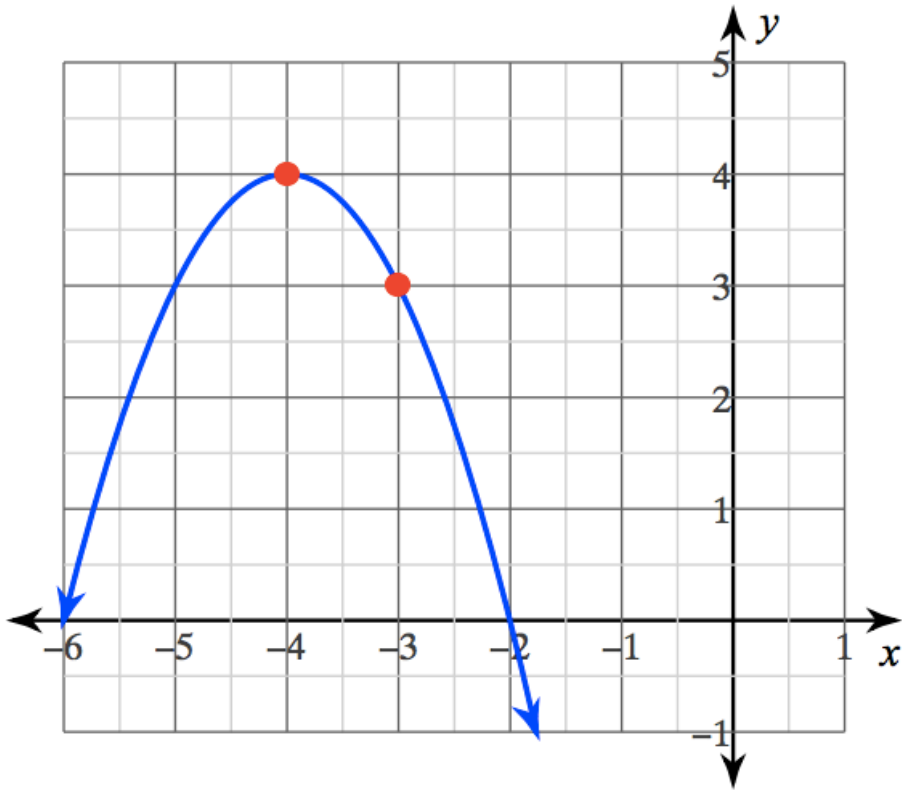
So,

$$y = a(x + 6)(x + 2)$$

Use the graph to find the value of a .



Writing in Vertex Form



Write the equation of the graph in vertex form.

$$y = a(x + 6)(x + 2)$$

To find the value of a , start at the vertex.

Count how many vertical units you need to move to go one full unit to the right.

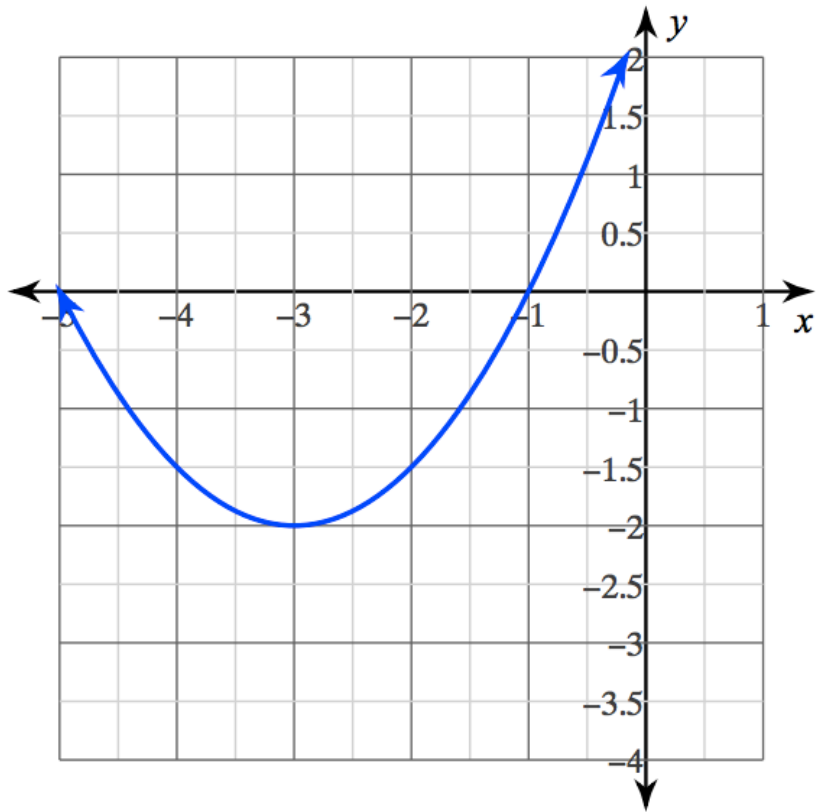
Here, to go right 1, you need to go **down 1**

So, $a = -1$ \longrightarrow $y = -1(x + 6)(x + 2)$



You try:

$$y = .5(x + 5)(x + 1)$$



$$y = 1(x - 3)(x - 7)$$

