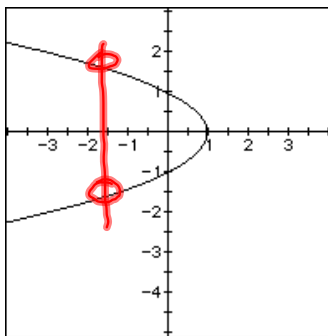


## Horizontal Parabolas



Horizontal parabolas are not function. They don't pass the vertical like test. We cannot express them as  $y=\text{something}$ , but we can express them in parabolic form.

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

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

$$x = y^2$$

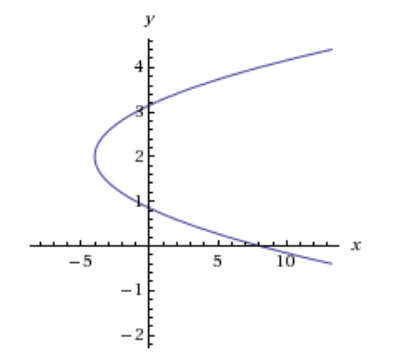
$$y = x^2$$

We can easily find the vertex, but what does a do?

Because horizontal parabolas are not functions most graphing tools can't graph them. I will use [www.wolframalpha.com](http://www.wolframalpha.com).

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

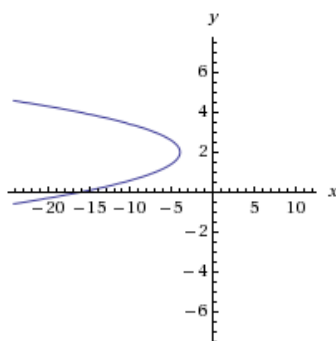
$$(4,-2)$$



What do you think would happen if I make the a negative?

Prediction: it opens to the left

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

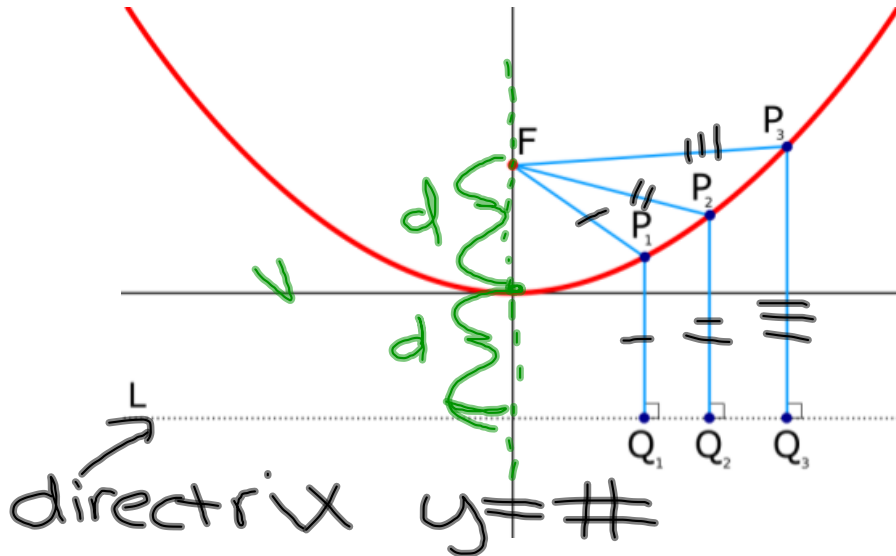


$a > 0$ : Parabola opens to the right

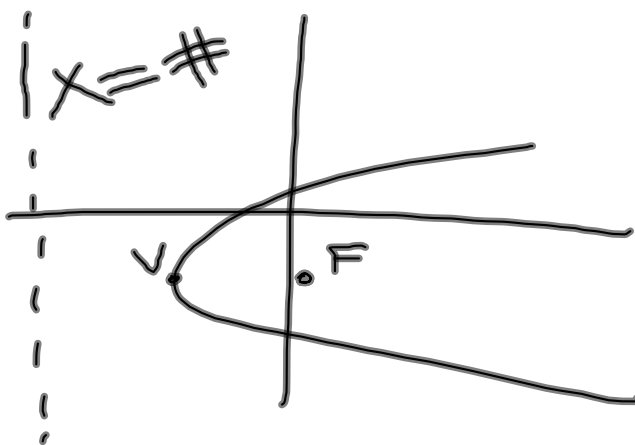
$a < 0$ : Parabola opens to the left

# Geometry of Parabolas

a **parabola** is the set of all points equidistant from a fixed line (the **directrix**) and a fixed point (the **focus**).



vertex halfway  
between focus +  
directrix.



Finding Focus, Vertex and Directrix when given two out of the three.

