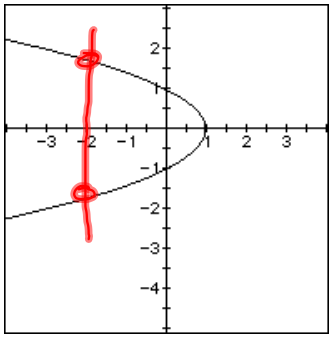
Parabola's that open sideways



Horizontal Parabolas are not functions. They don't pass the vertical line test. We cannot express them as y=something, but we can express them in parabolic form

This is very similar to our standard parabolic form, but the x-h has switched places with the y-k.

$x-h=a(y-k)^2$ ← horizontal

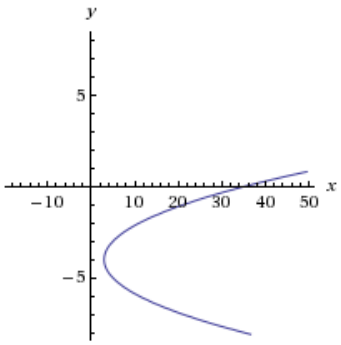
$y-k=a(x-h)^2$ ← vertical

Let's investigate these parabolas

most graphing tools won't graph these equations because they are not functions. We will use www.wolframalpha.com, a great math resource.

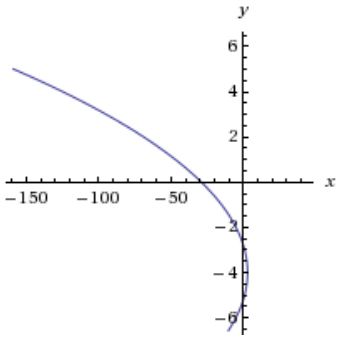
$x-3=2(y+4)^2$

V:(3,-4)



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

what happens when I make a negative?
Predictions: it opens to the left, it would flip our parabola

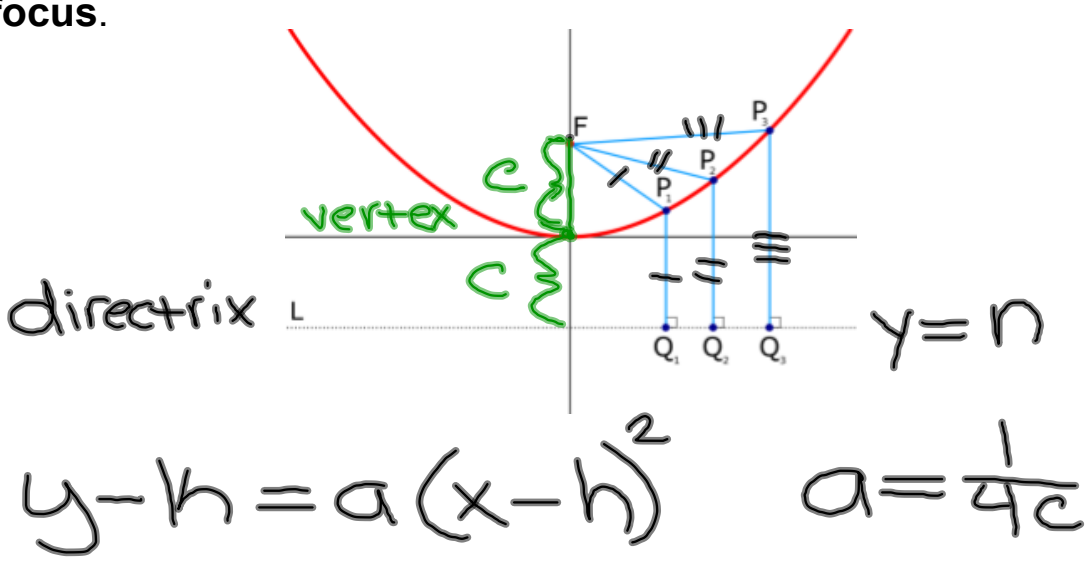


this graph doesn't look exactly like it was flipped around, but that is because our axis are on different scales. But the prediction is correct, a negative a makes the parabola open to the left.

If a>0, parabola opens to the right.
If a<0, parabola opens to the left.

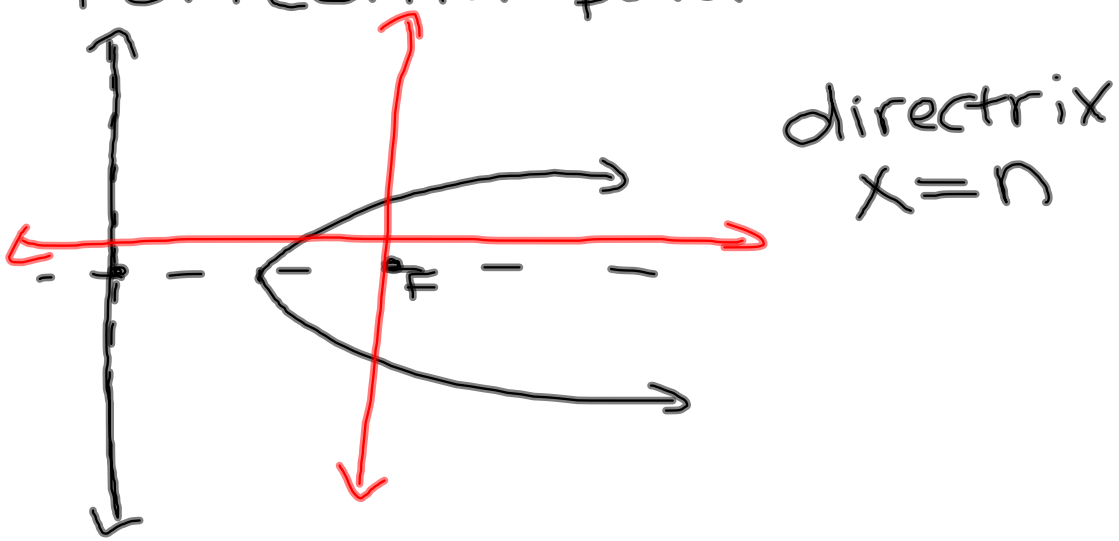
The geometry of parabolas

a **parabola** is the set of all points equidistant from a fixed line, called the **directrix**, and a fixed point not on the line, called the **focus**.



$$y-h=a(x-h)^2 \qquad a=\frac{1}{4c}$$

Horizontal parabola



$$x - 2 = \frac{1}{12}(y-1)^2$$

because $x = y^2$ this is horizontal

$V: (2, 1)$

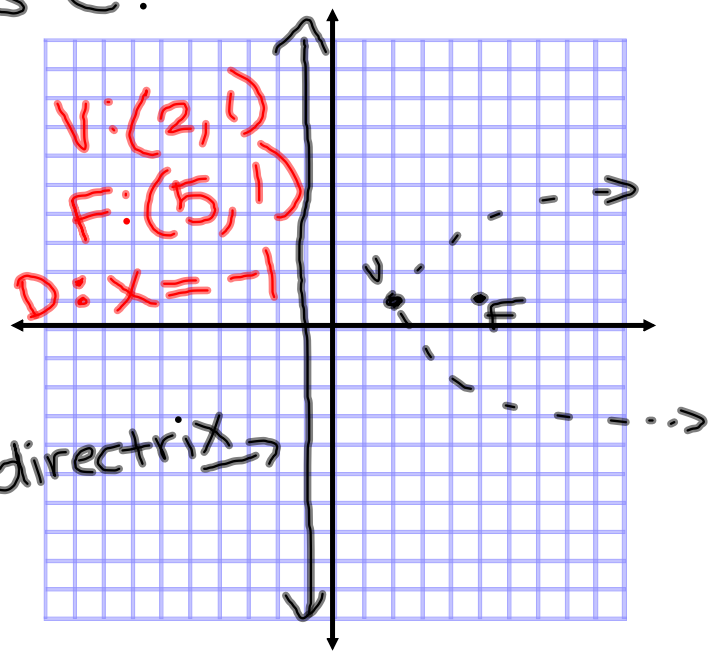
distance between Focus & vertex is c.

$$a = \frac{1}{4c}$$

$$\frac{1}{12} = \frac{1}{4c}$$

$$\frac{12 = 4c}{4}$$

$$c = 3$$

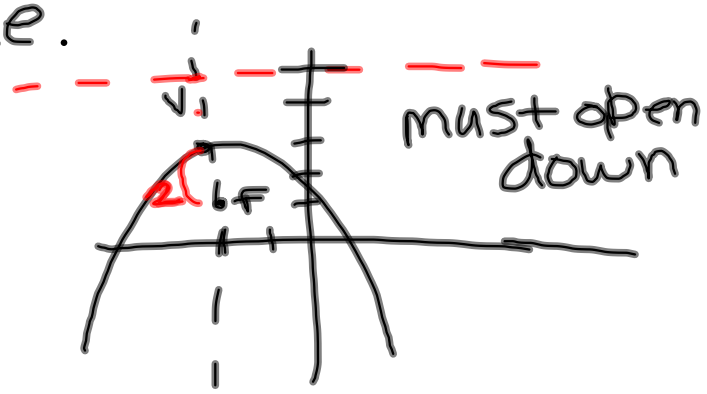


HOW do we find F, V & D when we are given 2 of the three.

V: (−2, 3)

F: (−2, 1)

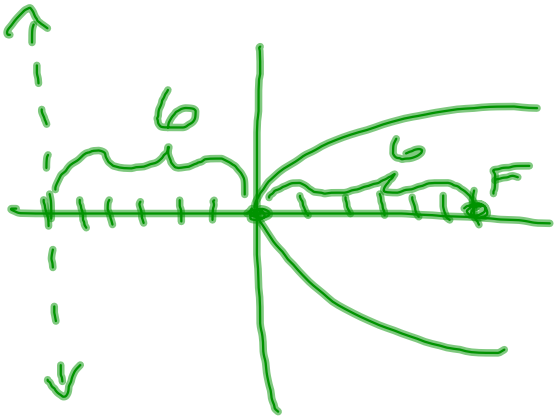
D: y = 5



V: (0, 0)

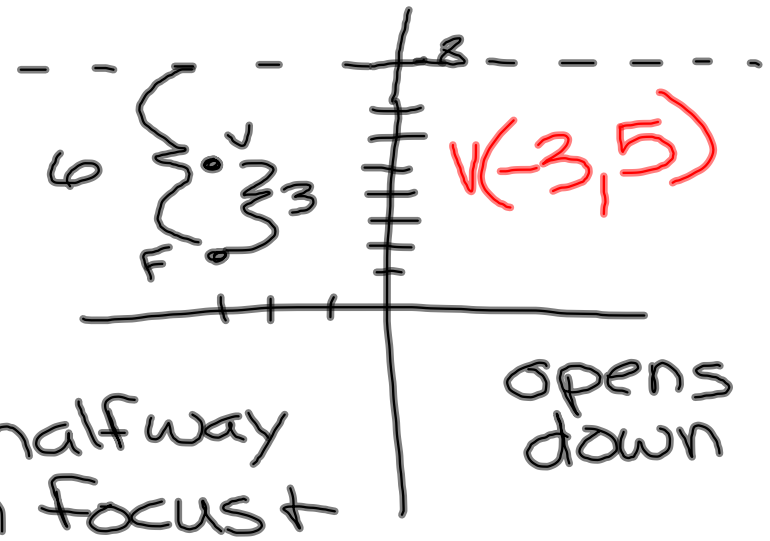
D: x = −6

F: (6, 0)



F(-3,2)

D: y=8



opens down

Vertex is halfway between focus + directrix

V(-1,1)

D: y=-5

F:(-1,7)