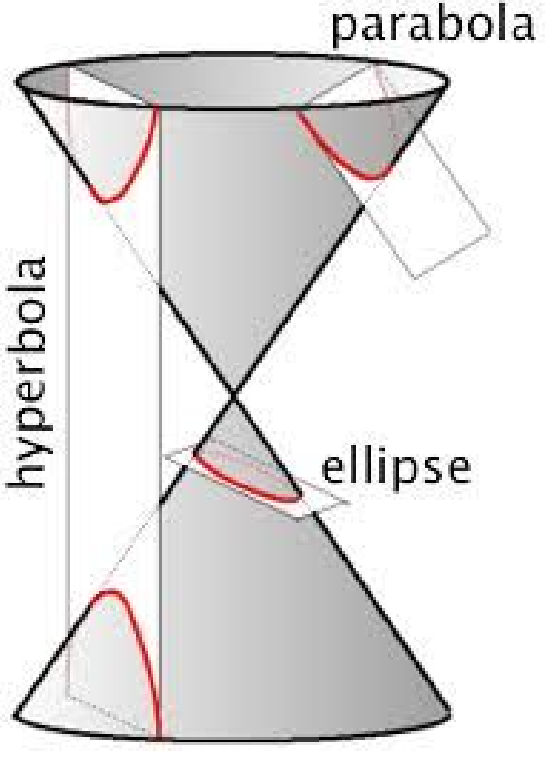
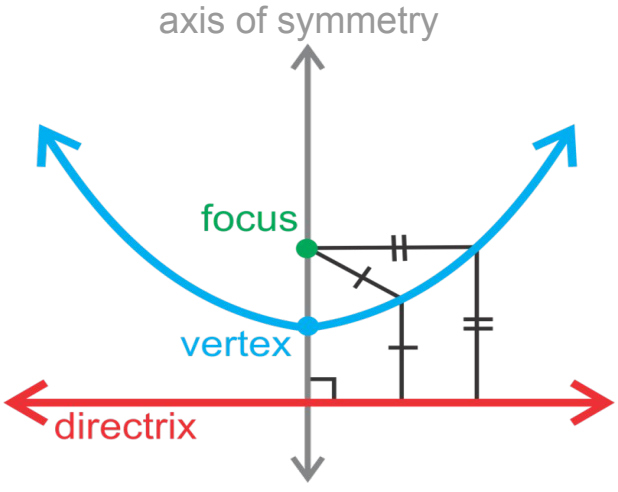
Pre Calculus 12
Conics - Parabolas

Introduction to Conics

In this section we will be looking at three conic sections. The parabola, the ellipse and the hyperbola.



Let's draw a parabola



Lets draw this by defining the focus and directrix. Other notable terms drawn on diagram.

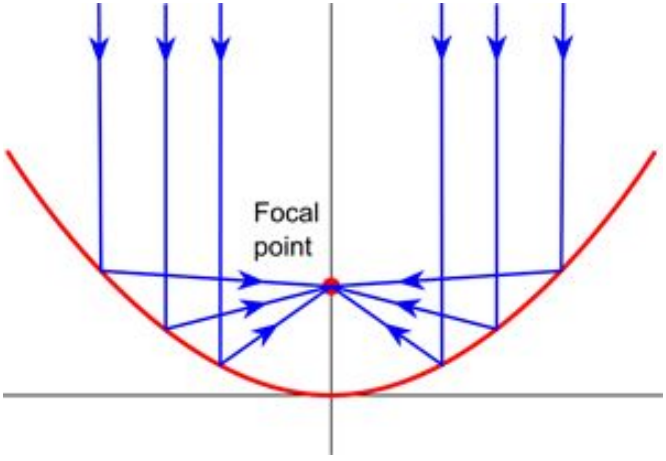
Using a string to find the points along the parabola. This leads us to the definition:

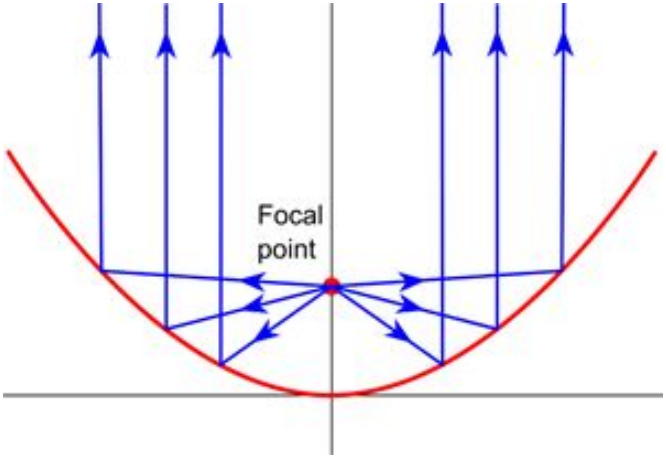
Definition:
A parabola is a curve where any point is at an equal distance from:

1. a fixed point (the focus), and
2. a fixed straight line (the directrix)

What's special about parabolas?

Parabolas have the property that any ray parallel to the axis of symmetry will reflect through the focus and vice versa.





The equations of parabolas

There are many ways to represent a parabola. We are going to use the standard form:

If the parabola is concave up or down:

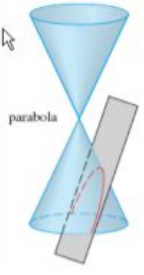
$$(x-h)^2 = 4p(y-k)$$

If the parabola is concave right or left:

$$(y-k)^2 = 4p(x-h)$$

Looking at your formula sheet:

Parabola		
	Vertical Axis	Horizontal axis
equation	$(x-h)^2=4p(y-k)$	$(y-k)^2=4p(x-h)$
Axis of symmetry	x=h	y=k
Vertex	(h,k)	(h,k)
Focus	(h,k+p)	(h+p,k)
Directrix	y=k-p	x=h-p
Direction of opening	p>0 then up; p<0 then down	p>0 then rignt; p<0 then left



Use this information to find the vertex, focus, axis of symmetry, and directrix of the following parabolas. Use this information to graph them.

$$x = 2y^2$$

$$y + 12x - 2x^2 = 16$$