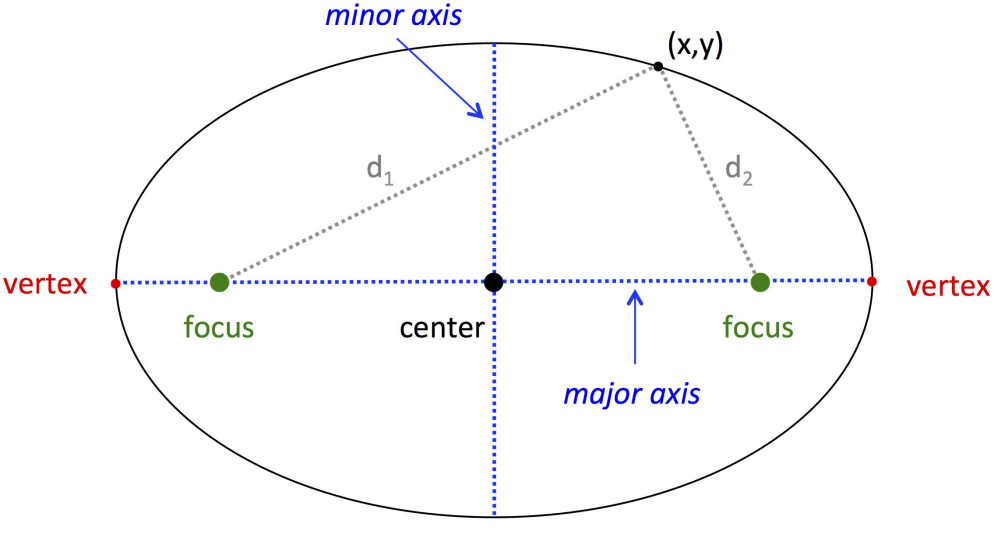
Pre Calculus 12
Conics - Ellipse

Ellipse

Figure 1



Draw this 3 ways with a rope.
Horizontal, vertical and circle

Horizontal Ellipse

Horizontal Ellipse

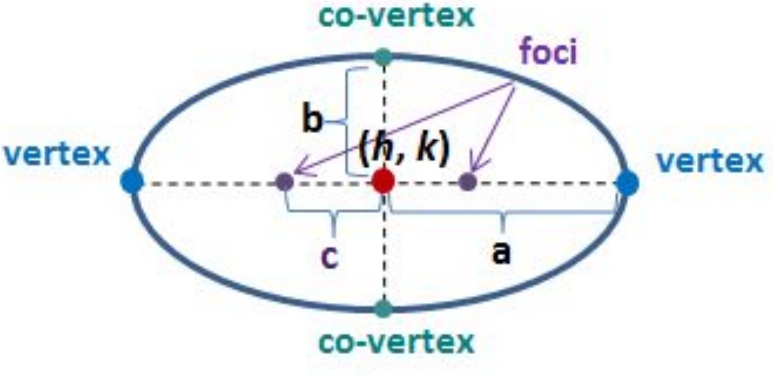
At (0, 0): $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

General: $\frac{(x-h)^2}{a^2}+\frac{(y-k)^2}{b^2}=1$

$a^2-b^2=c^2$

Center: (h,k) **Foci:** $(h\pm c,k)$

Vertices: $(h\pm a,k)$ **Co-Vertices:** $(h,k\pm b)$



Vertical Ellipse

Vertical Ellipse

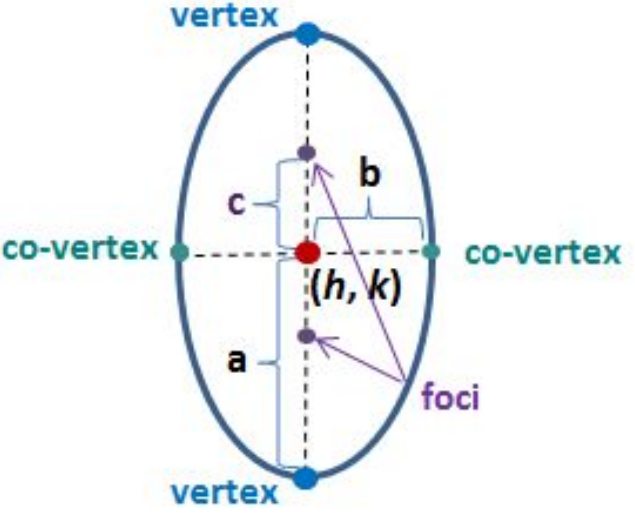
At (0, 0): $\frac{x^2}{b^2}+\frac{y^2}{a^2}=1$

General: $\frac{(x-h)^2}{b^2}+\frac{(y-k)^2}{a^2}=1$

$a^2-b^2=c^2$

Center: (h,k) **Foci:** $(h,k\pm c)$

Vertices: $(h,k\pm a)$ **Co-Vertices:** $(h\pm b,k)$



Sample Question

Find the center, vertices, foci, then draw the following ellipse:

$$\frac{x^2}{5^2} + \frac{y^2}{4^2} = 1$$

First since 6 > 4 we know that the major axis is horizontal.

Now we use the formula sheet to find:
Center: (h,k) = (0,0)
Vertices: (h±a, k) = (±6,0)
Before we find the foci, first we need to find c.

$$a^2 = b^2 + c^2$$
$$5^2 = 4^2 + c^2$$

so c = 3.

Foci: (h±c, k) = (±3, 0)

A couple more

$$\frac{(x-3)^2}{4}+\frac{(y+2)^2}{9}=1$$

$$4x^2+8x+9y^2-54y+49=0$$

Just in case.

$$x^2+y^2=25$$