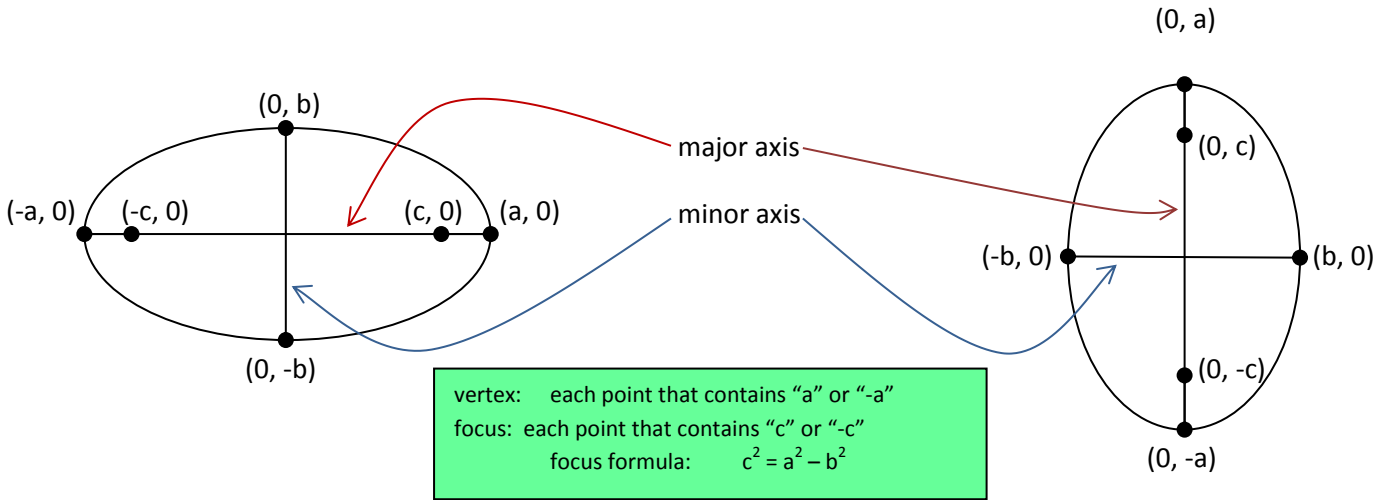


ELLIPSES

Generic form for ellipses (centered at the origin):

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 \quad \text{or} \quad \frac{y^2}{a^2} + \frac{x^2}{b^2} = 1 \quad \text{where } a > b$$


Example # 1:

Sketch the ellipse. Identify the vertices and foci. $\frac{x^2}{25} + \frac{y^2}{4} = 1$

$a = 5$
 $b = 2$
 $c = \sqrt{21}$

$c^2 = a^2 - b^2$
 $c^2 = 25 - 4$
 $c = \sqrt{21}$

Example # 2:

Sketch the ellipse. Identify the vertices and foci. $49x^2 + 10y^2 = 490$

$\frac{49x^2}{490} + \frac{10y^2}{490} = 1$
 $\frac{x^2}{10} + \frac{y^2}{49} = 1$

$a = 7$
 $b = \sqrt{10}$
 $c = \sqrt{39}$

$c^2 = 49 - 10$
 $c = \sqrt{39}$

Sketch for Ex. #1 (Ex. #2 is not shown)

The sketch for Example #2 would be the shape of a football, only upright.

To write the equation for an ellipse, the key is to find both a & b.

Example #1:

Vertex = (0, -3); minor axis = 4

$\frac{y^2}{9} + \frac{x^2}{4} = 1$

Example #2:

Vertex = (8, 0); focus = (6, 0)

$c^2 = a^2 - b^2$
 $6^2 = 8^2 - b^2$
 $36 = 64 - b^2$
 $b^2 = 28$

$\frac{x^2}{64} + \frac{y^2}{28} = 1$

Example #3:

Focus = (0, 12)
major axis = 30

$c^2 = a^2 - b^2$
 $12^2 = 15^2 - b^2$
 $144 = 225 - b^2$
 $b^2 = 81$

$\frac{y^2}{225} + \frac{x^2}{81} = 1$