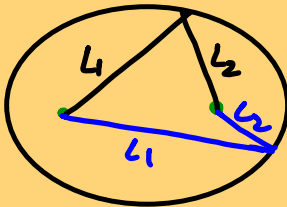
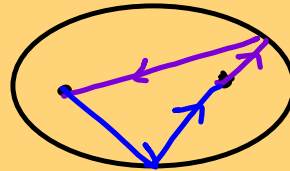


ELLIPSES

- the set of points in which the sum of the distances from two given points is constant.
foci

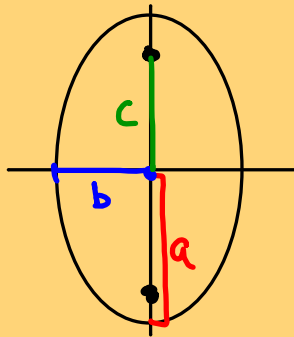
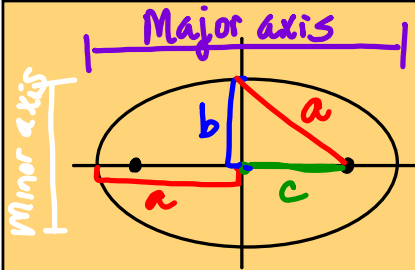


Reflective Property



Whispering gallery
Telescope / Microscope mirrors
Orbits of planets
Shape of earth = ellipsoid
Lithotripsy





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

$$\text{Foci: } (h \pm c, k)$$

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

Major axis = $2a$

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

Minor axis = $2b$

a is the larger # center (h, k) $\left\{ e = \frac{c}{a} \right.$

$$\frac{(x-h)^2}{b^2} + \frac{(y-k)^2}{a^2} = 1 \quad \text{Foci: } (h, k \pm c)$$

$$25x^2 + 4y^2 - 150x - 40y + 225 = 0$$

$$25x^2 - 150x \quad + 4y^2 - 40y = -225$$

$$25(x^2 - 6x + 9) + 4(y^2 - 10y + 25) = -225$$

-3 -5 +225
+225 +100

$$\frac{25(x-3)^2}{100} + \frac{4(y-5)^2}{100} = \frac{100}{100}$$

$$\frac{(x-3)^2}{4} + \frac{(y-5)^2}{25} = 1$$

Center: (3, 5)

$$a = \sqrt{25} = 5$$

$$b = \sqrt{4} = 2$$

Vertical (big # under y)

$$\text{Major axis} = 2a = 2(5) = 10$$

$$\text{Minor axis} = 2b = 2(2) = 4$$

Coordinates of foci: $(h, k \pm c)$

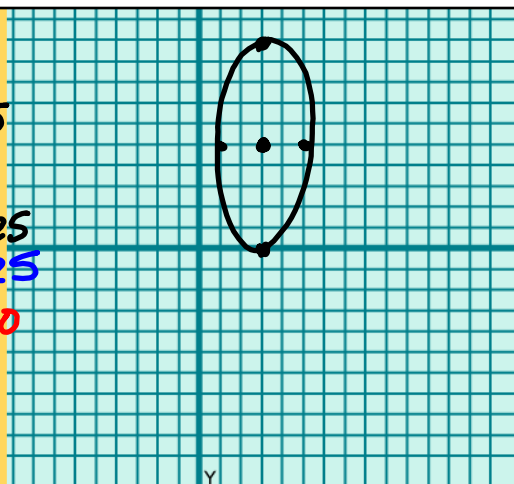
$$c^2 = a^2 - b^2$$

$$c^2 = 25 - 4$$

$$\sqrt{c^2} = \sqrt{21}$$

$$c = \sqrt{21}$$

$$(3, 5 \pm \sqrt{21})$$



To plot graph:

Plot center, a & b

Eccentricity = how round or flat the ellipse is

Circle

$$e = 0$$

Ellipse

$$0 < e < 1$$

round flat

Parabola

$$e = 1$$

Hyperbola

$$e > 1$$