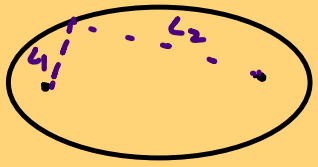
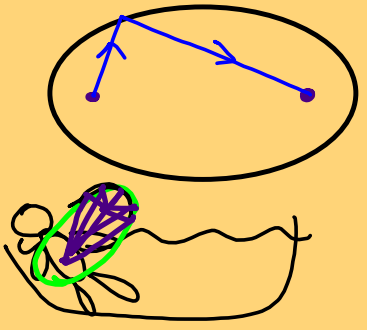
ELLIPSES – the set of points in which the sum of the distances from two given points is constant.



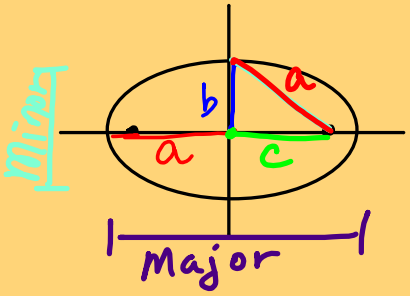
$L_1 + L_2 = \#$



* Whispering gallery
* Lithotripsy
* telescope/microscope mirrors
* planet orbits comet
* ellipsoid – earth

Eccentricity: describes how flat or round the ellipse is. $e = \frac{c}{a}$

Circle $e = 0$ — ellipse $0 < e < 1$ (round … flat) — parabola $e = 1$ — hyperbola $e > 1$



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

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

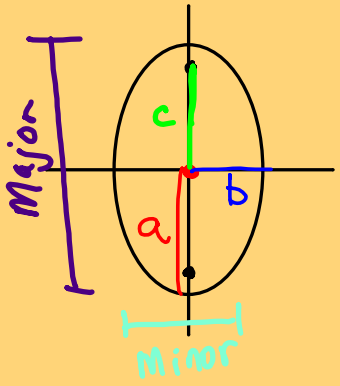
$c^2=a^2-b^2$

Major = $2a$

Minor = $2b$

Eccentricity = $\frac{c}{a}$

a is the largest #



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

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

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

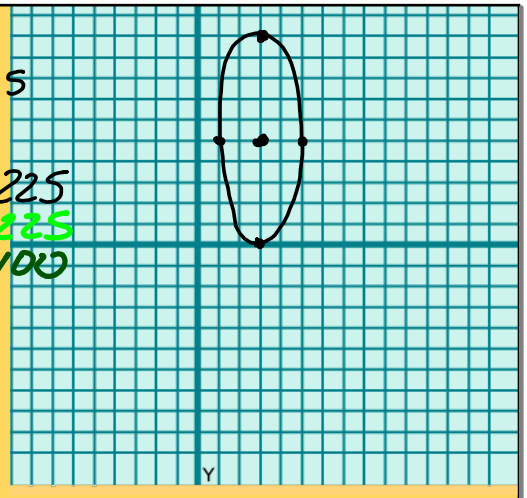
$25(x^2 - 6x + 9) + 4(y^2 - 10y + 25) = -225 + 225 + 100$

-3 225 $\quad -5$ $+100$

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

4 $\quad 25$

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



Center: $(3, 5)$

$a = \sqrt{25} = 5$

$b = \sqrt{4} = 2$

Vertical (big # under y)

Coordinates of foci:

$(h, K \pm c)$

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

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

$c^2 = 25 - 4$

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

$c = \sqrt{21}$