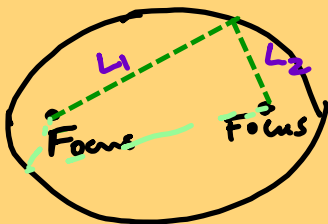


ELLIPSES

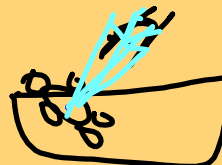
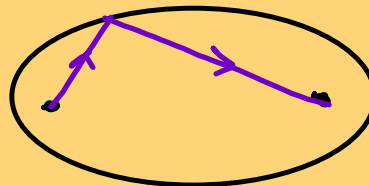
- the set of points in which the sum of the distances from two given points is constant.

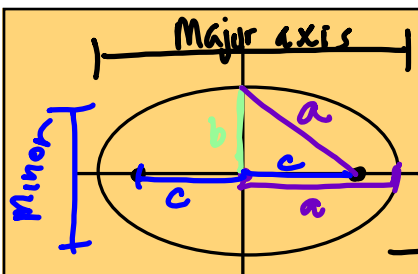


Whispering gallery
Lithotripsy

Telescopes/Microscopes
Elliptical orbits

Shape of earth -
ellipsoid





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

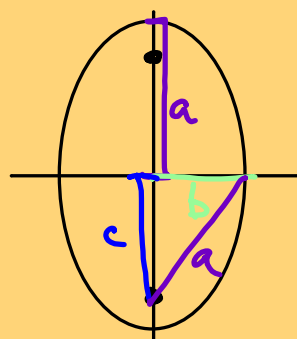
Foci: $(h \pm c, k)$

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

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

Major = $2a$
Minor = $2b$

a is the larger #



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

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

card
↓
Eccentricity = $\frac{c}{a}$

Not on card:

Circles Ellipses

$e = 0$ $0 < e < 1$

Parabolas

$e = 1$

Hyperbola

$e > 1$

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

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

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

-3
 -5

$+225$
 $+100$

$+225$
 $+100$

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

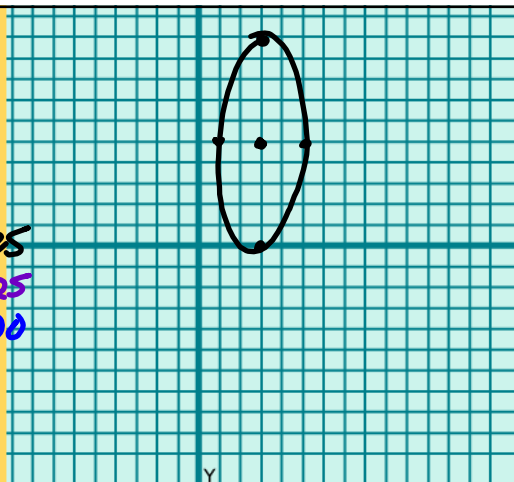
$$\frac{(x-3)^2}{4} + \frac{(y-5)^2}{25} = 1$$

Center: $(3, 5)$

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

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

Vertical = a is under y .



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

$$c^2 = (5)^2 - (2)^2$$

$$= 25 - 4$$

$$c = \pm 21$$

$$c = \pm \sqrt{21}$$

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

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

Plot
center
Plot a
+ b