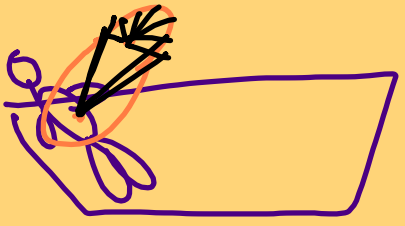
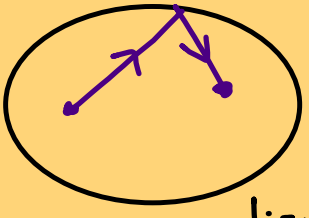
ELLIPSES – the set of points in which the sum of the distances from two given points is constant.

foci

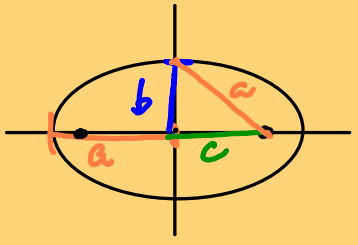


Reflective Property



Lithotripsy – disintegrate Kidney stones

- orbit of planets
- earth – ellipsoid
- whispering gallery
- telescope/microscope mirrors

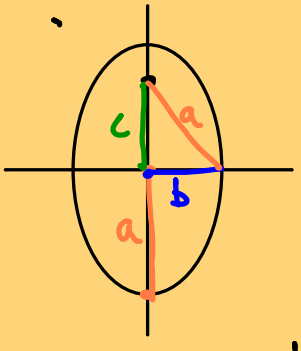


$$\frac{(x-h)^2}{a^2}+\frac{(y-K)^2}{b^2}=1$$

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

a = center to long end
b = center to short side
c = center to focus
a is the larger #!

$b^2+c^2=a^2$
$c^2=a^2-b^2$
Major axis $= 2a$
Minor axis $= 2b$



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

Foci $(h, K \pm c)$

For all conic sections.
eccentricity $= \frac{c}{a}$

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

$$\frac{(x+2)^2}{36} + \frac{(y-3)^2}{9} = 1$$

Center $(-2, 3)$

$a^2 = 36 \Rightarrow a = 6$

$b = \sqrt{9} = 3$

Horiz (big # is under x)

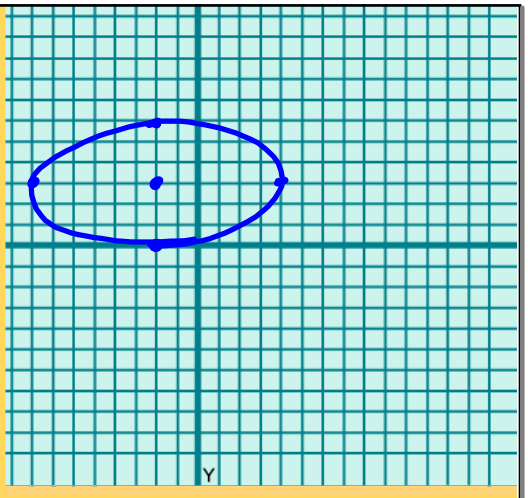
Major axis $= 2a = 2 \cdot 6 = 12$

Minor axis $= 2b = 2 \cdot 3 = 6$

$ecc. = \frac{c}{a} = \frac{3\sqrt{3}}{6} = 0.866$

Foci: $(-2 \pm 3\sqrt{3}, 3)$

To graph:
Plot center, $a, \pm b$.



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

$c^2 = 36 - 9$

$\sqrt{c^2} = \sqrt{27}$ q.3

$c = \pm 3\sqrt{3}$

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

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

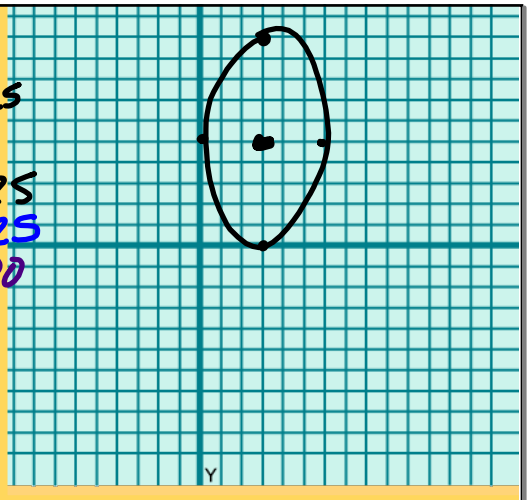
$25(x^2-6x+9)+4(y^2-10y+25)=-225$

$+225$

$+100$

-3 $\quad$ -5

225 $\quad$ 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

$c^2=25-4$

$c^2=21$

$c=\sqrt{21}$

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

Ecc: $\frac{c}{a}=\frac{\sqrt{21}}{5}\approx 0.92$

Major $=2a=10$

Minor $=2b=4$

November 16, 2023

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