BE – Alg. 2 | MONDAY 3-22-10

① FIND THE equATION of the line THAT passes THrough the points (3,4), (-2,-6). PUT THIS EQUATION is THE 3 basic forms of A linear equation: Ⓐ SLOPE-INTERCEPT
Ⓑ Standard
Ⓒ POINT-SLOPE

ANS) $(3,4), (-2,-6) \Rightarrow \frac{-6-4}{-2-3} = \frac{-10}{-5} = 2 = m$

x, y

$y = mx + b$

$4 = 2\cdot 3 + b$

$-6 \quad -6$

$-2 = b \Longrightarrow \boxed{y = 2x - 2}$ SI, UNIQUE

$\therefore \boxed{2x - y = 2}$ SF, UNIQUE

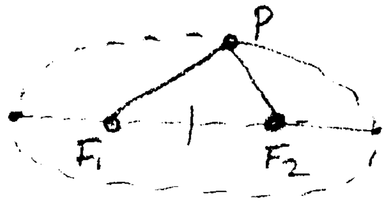
$\boxed{y - 4 = 2(x - 3)}$ PS, NOT UNIQUE, 1 per (x, y) pair

or $\boxed{y + 6 = 2(x + 2)}$

CK
$$\left.\begin{aligned} y-4 &= 2(x-3) \\ y-4 &= 2x-6 \\ y &= 2x-2 \checkmark \end{aligned}\right\} \quad \begin{aligned} y+6 &= 2(x+2) \\ y+6 &= 2x+4 \\ y &= 2x-2 \checkmark \end{aligned}$$

Recall the definition of an ellipse:

"the set of points in a plane, the **sum** of whose distances from 2 fixed points (Foci) is constant"



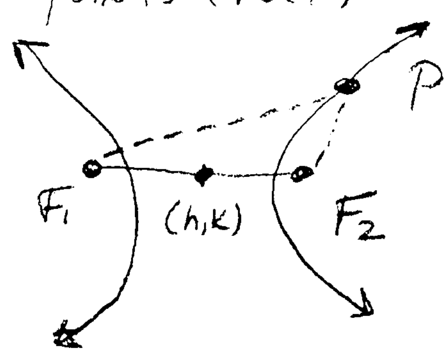
$\overline{F_1P} + \overline{F_2P} = \underbrace{\text{CONSTANT}}_{2a}$

Key Property
Rays bounce from each focal point to the other

$$\boxed{\frac{(X-h)^2}{a^2} + \frac{(Y-K)^2}{b^2} = 1}$$

New definition: A <u>hyperbola</u>

"the set of points in a plane, the <u>difference</u> of the distances from 2 fixed points (foci) is constant.



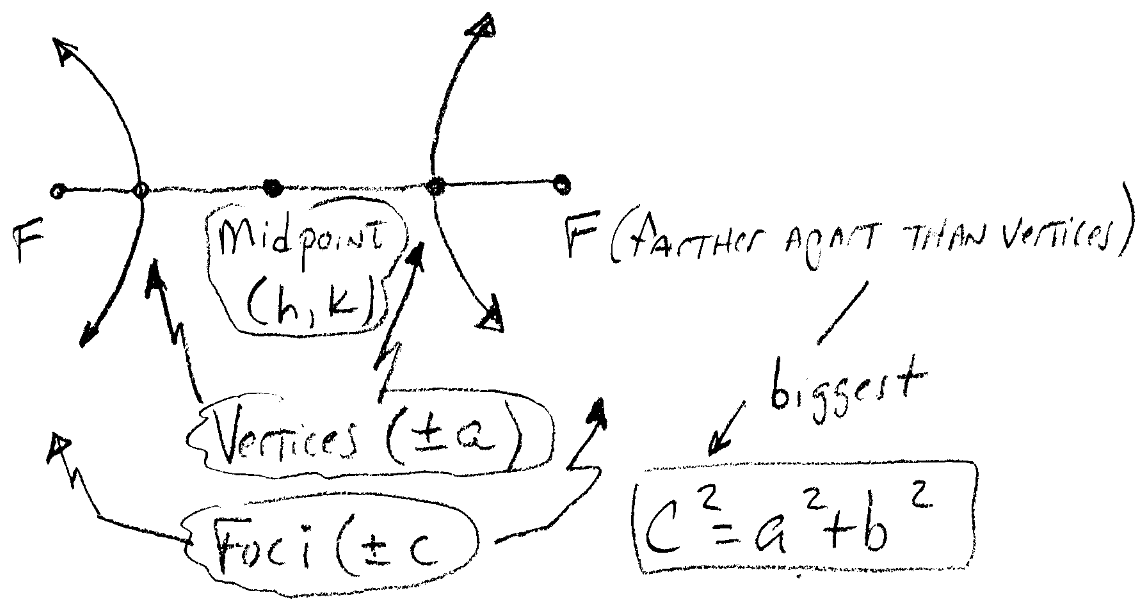
$\overline{F_1P} - \overline{F_2P} = \text{CONSTANT}$

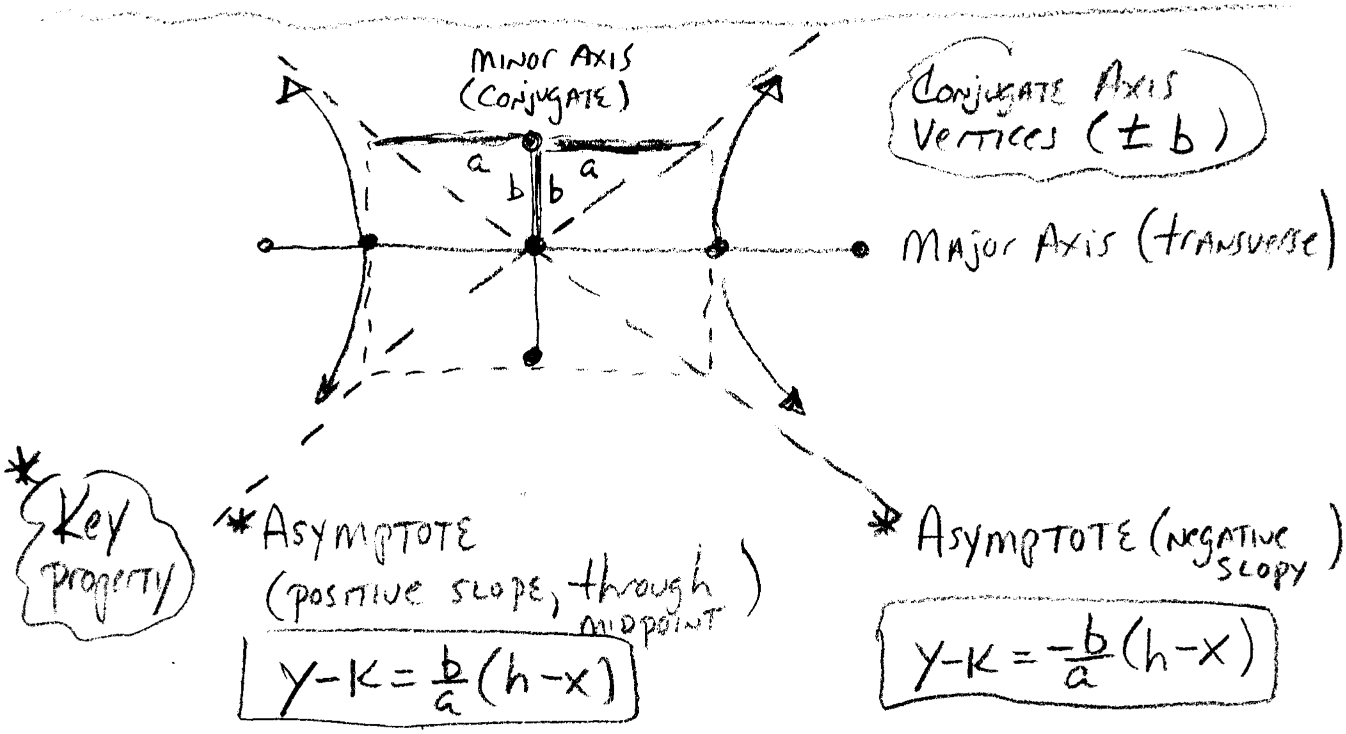
$$\boxed{\frac{(X-h)^2}{a^2} - \frac{(Y-K)^2}{b^2} = 1}$$

Key Property
Rays headed to one focus reflect to the other.

* Position of 1^{st} term, if $X \Rightarrow$, if Y

The a, b, & c terms will be used in a very similar fashion to an ellipse. The terms and properties are fitted to a hyperbola:





Conic - paper hyperbolas

Left-Right Ellipse

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

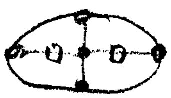
$a>b \quad c^2=a^2-b^2$

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

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

$V\leftrightarrow (h\pm a,\ k)$

$V\updownarrow (h,\ k\pm b)$



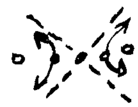
Left-Right Hyperbola

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

$\uparrow$ x term first $\quad c^2=a^2+b^2$ (c $\uparrow$ biggest)

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

$V\leftrightarrow (h\pm a,\ k)$



Asymptotes: $y-k=\pm\frac{b}{a}(x-h)$

Conjugate Axis $(h,\ k\pm b)$

Up-Down Ellipse

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

$a>b \quad c^2=a^2-b^2$

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

$V\updownarrow (h,\ k\pm a)$

$V\leftrightarrow (h\pm b,\ k)$

NOTE: if $a^2=b^2 \Rightarrow$ multiply through by a^2 or b^2

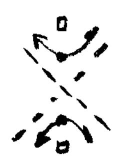
$\Rightarrow (x-h)^2+(y-k)^2=r^2$

A circle

Up-Down Hyperbola

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

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



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

$V\updownarrow (h,\ k\pm a)$

Asymptotes: $y-k=\pm\frac{a}{b}(x-h)$

reciprocals of a left-right

Conjugate axis (minor) $(h\pm b,\ k)$

NOTE: if $a^2=b^2 \Rightarrow$ slopes of asymptotes are ± 1 and it is called an "equilateral hyperbola"

Homework: Memorize Equations & Vocab. of Hyperbolas