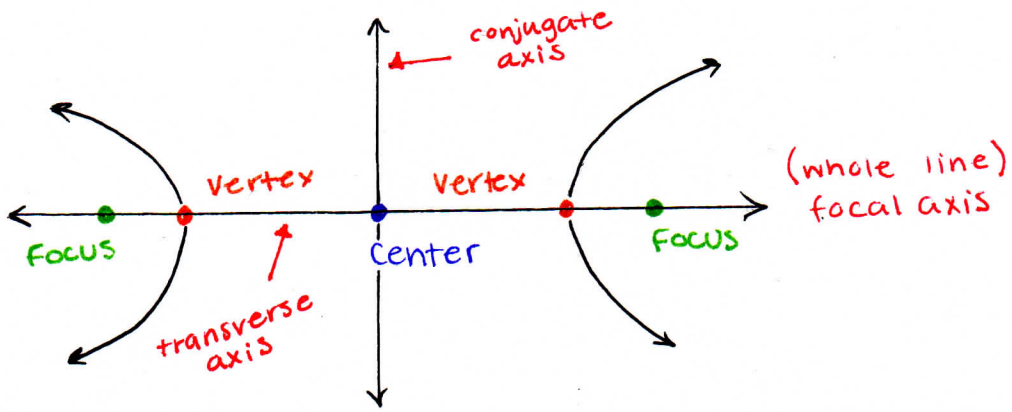
CONICS
Lesson 4 - Hyperbolas

Def: The set of all points in a plane whose dist. from two fixed points (foci) are a constant diff.



- The chord connecting the vertices is called the transverse axis. (focal axis)

- The line perpendicular to the focal axis with the center as its midpoint is called the conjugate axis.

Standard Equation	$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$ open L/R	$\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$ open U/D
Focal Axis	$y = k$	$x = h$
Center	(h, k)	(h, k)
Foci	$(h \pm c, k)$ $* a^2 + b^2 = c^2$	$(h, k \pm c)$ $* a^2 + b^2 = c^2$
Vertices	$(h \pm a, k)$	$(h, k \pm a)$
Transverse Axis	Parallel to x 2a units long	Parallel to y 2a units long
Conjugate Axis	Parallel to y 2b units long	Parallel to x 2b units long
Asymptotes	$y = \pm \frac{b}{a}(x-h) + k$	$y = \pm \frac{a}{b}(x-h) + k$

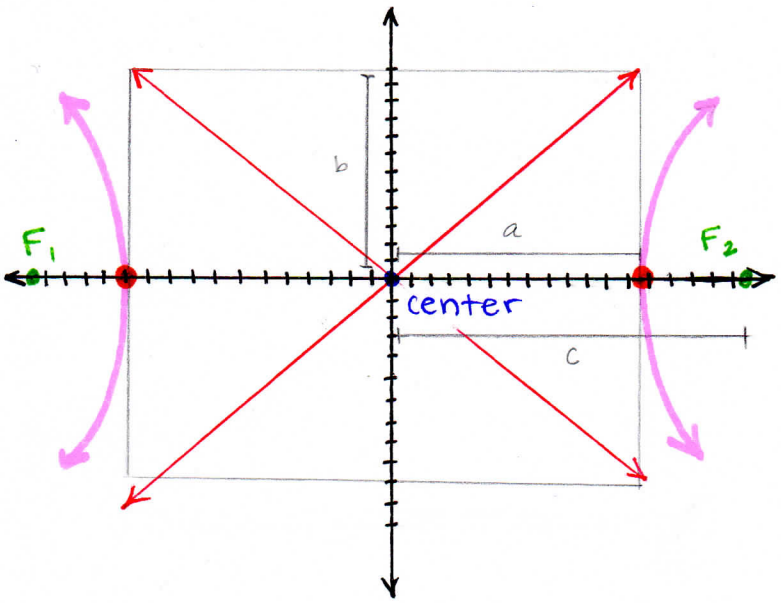
Ex.1] Graph and give critical info

$$\frac{x^2}{169} - \frac{y^2}{144} = 1$$

$a = \sqrt{169} = 13$

$b = \sqrt{144} = 12$

$a^2 + b^2 = c^2, \quad c = \sqrt{313}$



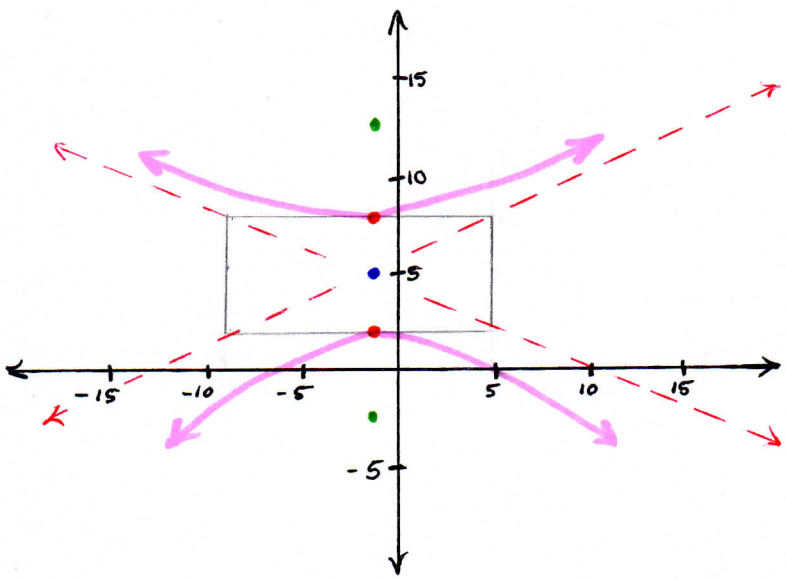
center: $(0,0)$

Vertices: $(\pm 13, 0)$

Foci: $(\pm\sqrt{313}, 0)$

Asymptotes: $y = \pm \frac{12}{13}x$

Ex.2] $\frac{(y-5)^2}{9} - \frac{(x+2)^2}{49} = 1$



center: $(-2,5)$

Vertices: $(-2,8)(-2,2)$

Foci: $(-2, 5 \pm \sqrt{58})$

Asym: $y = \frac{3}{7}x - \frac{41}{7}$

$y = \frac{-3}{7}x + \frac{29}{7}$