Alg 2B Hyperbola Summary Fall 2017

$\boxed{\text{Ellipse}}$ The set of all points P in a plane such that the difference of the distances from P to two fixed points F_1 and F_2 is a given constant.

Transverse Axis: The segment on the line containing the Foci and whose endpoints are on the Hyperbola (connecs the Vertices)

Foci: The two fixed points. Located on the line that contains theTransverse Axis and are equidistant from the center. Use the letter c.

Vertices: Endpoints of the Transverse Axis and are equidistant from the center. Use the letter a.

Asymptotes: Lines that the branches of the Hyperbola approach the farther from the origin you are.

Center: Intersection of the Asymptotes, Midpoint of the Vertices and of the Foci.

Standard Form for the equation of an Hyperbola with center at $(0,0)$:

Horizontal Transverse Axis

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$$

Vertices: $(\pm a, 0)$
Foci: $(\pm c, 0)$
ransverse Axis length $= 2a$
Slope of Asymptotes: $m = \pm\frac{b}{a}$

Vertical Transverse Axis

$$\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$$

Vertices: $(0, \pm a)$
Foci: $(0, \pm c)$
Transverse Axis length $= 2a$
Slope of Asymptotes: $m = \pm\frac{a}{b}$

Standard Form for the equation of an ~~Ellipse~~ HYPERBOLA with center at (h,k):

Horizontal Transverse Axis

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

Vertices: $(h \pm a, k)$
Foci: $(h \pm c, k)$
Transverse Axis length $= 2a$
Slope of Asymptotes: $m = \pm\frac{b}{a}$

Vertical Transverse Axis

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

Vertices: $(h, k \pm a)$
Foci: $(h, k \pm c)$
Transverse Axis length $= 2a$
Slope of Asymptotes: $m = \pm\frac{a}{b}$

$\boxed{c^2 = a^2 + b^2}$

$\boxed{a^2 \text{ is always the denominator of the Positive Ratio}}$

$\boxed{\text{The branches always "open" in the direction of the variable in the numerator of the Positive Ratio}}$