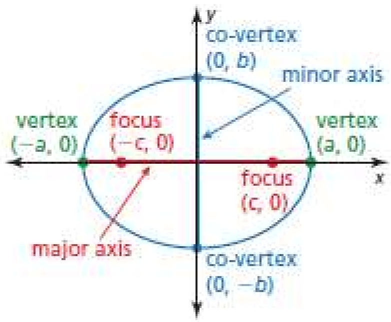
Ellipses

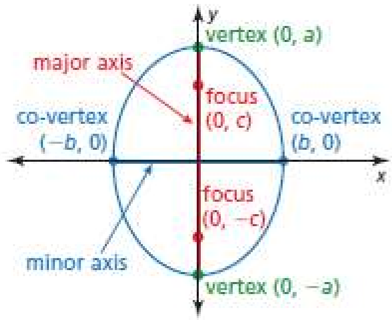
Thursday, April 8, 2021   9:13 PM

I. Ellipse:

a.



Ellipse with horizontal major axis
$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$



Ellipse with vertical major axis
$\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$

b. Standard Equation of Ellipse with Center at the Origin

Equation	**Major Axis**	**Vertices**	**Co-Vertices**
$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$	Horizontal	$(\pm a, 0)$	$(0, \pm b)$
$\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$	Vertical	$(0, \pm a)$	$(\pm b, 0)$

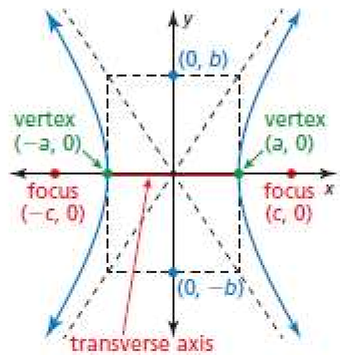
c. Foci: $c^2 = a^2 - b^2$

Hyperbolas

Monday, April 12, 2021 10:36 PM

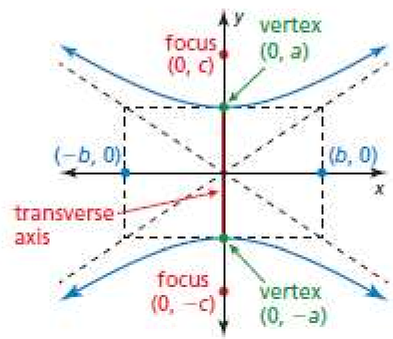
I. Hyperbolas

a.



Hyperbola with horizontal transverse axis

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



Hyperbola with vertical transverse axis

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

b. Standard Equation of a Hyperbola with Center at the Origin

Equation	**Transverse Axis**	**Asymptotes**	**Vertices**
$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$	Horizontal	$y = \pm\frac{b}{a}x$	$(\pm a, 0)$
$\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$	Vertical	$y = \pm\frac{a}{b}x$	$(0, \pm a)$

c. Foci: $c^2 = a^2 + b^2$

Translating and Classifying Conic Sections

Monday, April 12, 2021   10:57 PM

I. Translating and Classifying Conic Sessions
   a. Standard Form of Equations of Translated Conics

Type	**Horizontal Axis**	**Vertical Axis**
Circle	$(x-h)^2+(y-k)^2=r^2$	$(x-h)^2+(y-k)^2=r^2$
Parabola	$(y-k)^2=4p(x-h)$	$(y-k)^2=4p(x-h)$
Ellipse	$\frac{(x-h)^2}{a^2}+\frac{(y-k)^2}{b^2}=1$	$\frac{(x-h)^2}{b^2}+\frac{(y-k)^2}{a^2}=1$
Hyperbola	$\frac{(x-h)^2}{a^2}-\frac{(y-k)^2}{b^2}=1$	$\frac{(x-h)^2}{b^2}-\frac{(y-k)^2}{a^2}=1$

   b. Classifying Conics Using Their Equations

Discriminant	**Type of Conic**
$B^2-4AC<0, B=0, A=C$	Circle
$B^2-4AC<0$ and either $B\neq 0$ or $A\neq C$	Ellipse
$B^2-4AC=0$	Parabola
$B^2-4AC>0$	Hyperbola