Hyperbola

- A Hyperbola is made up of 2 parabolas that are _____.
- The denominators of the equation determine how _____ and _____ the box is.
- The Vertices of a Hyperbola always lie on the _____ which always go in the direction of the positive variable.
- The Foci points always lie on the _____ of the parabolas.

With Hyperbolas, a^2 is always the first denominator!

Standard Form of an Ellipse

Center is _____.

a is the distance from the center to each vertex on the major axis

b is the distance from the center to each of the covertex

c is the distance from the center to each foci on the major axis

The rectangle with _____ help you find the width of your graph.

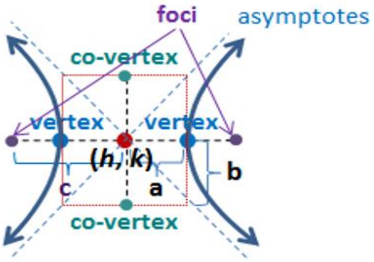
**Use the values of a and b to draw the central "invisible" Rectangles. Then draw lines through the diagonals.

Transverse axis: The axis that contains the _____.

Conjugate axis: The axis that contains the _____.

If "x" is first:

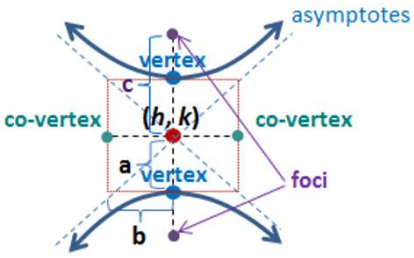
$$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$$



Vertices	
Covertices	
Asymptotes:	
Transverse axis	
Conjugate Axis	

If "y" is first

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



Vertices	
Covertices	
Asymptotes:	
Transverse axis	
Conjugate Axis	

Graph the following:

$$\frac{(x-4)^2}{25} - \frac{(y+2)^2}{4} = 1$$

Center: _____

a^2 = _____ a = _____

b^2 = _____ b = _____

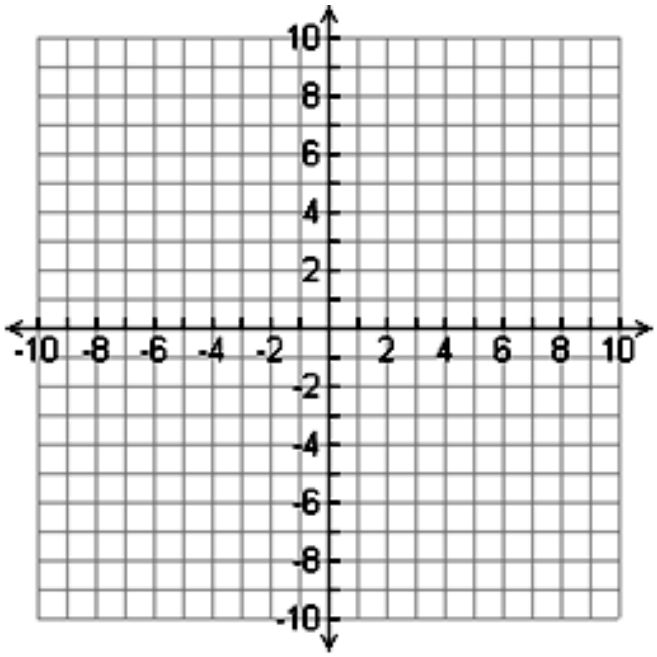
Transverse axis: _____

Vertices:

Co-Vertices:

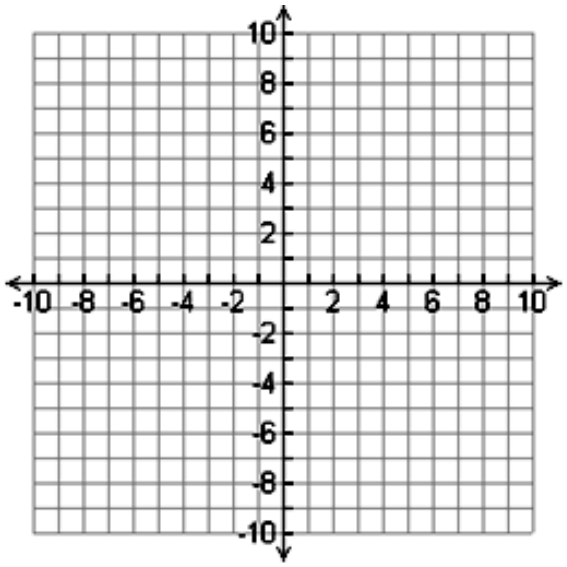
Foci Distance: $c^2 = a^2 + b^2$

Foci Points:



Graph the following:

$$\frac{(y+2)^2}{25} - \frac{(x-3)^2}{16} = 1$$



Center: _____

a^2 = _____ a = _____

b^2 = _____ b = _____

Transverse axis: _____

Vertices:

Co-Vertices:

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

Foci Points:

Writing Equations of a Hyperbola Given

1. Look to see what coordinates change.
   - ✓ If the x-coordinates change, the transverse axis will be horizontal (x is first and a^2 will be under x)
   - ✓ If the y-coordinates change, the transverse axis will be vertical (y is first and a^2 will be under y)

2. Find the center.

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

3. Find the length of a.
   a= center to vertex
   Determine a^2

4. Find the length of c.
   c= center to foci
   Determine c^2

5. Use the formula $c^2 = a^2 + b^2$ to find the value of b^2 by substituting the values of a^2 and c^2 into the formula. Solve for b^2.

6. Substitute the values of a^2, b^2, and (h,k) into the formula.

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

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

Find the equation of a hyperbola whose vertices are at (-5 , 1) and (1 , 1) and whose foci are at (-6, 1) and (2, 1)

Find the equation of a hyperbola whose vertices are at (-1, -1) and (-1, 7) and whose foci are at (-1, 8) and (-1, -2).