

## Determining the Equation of a Hyperbola

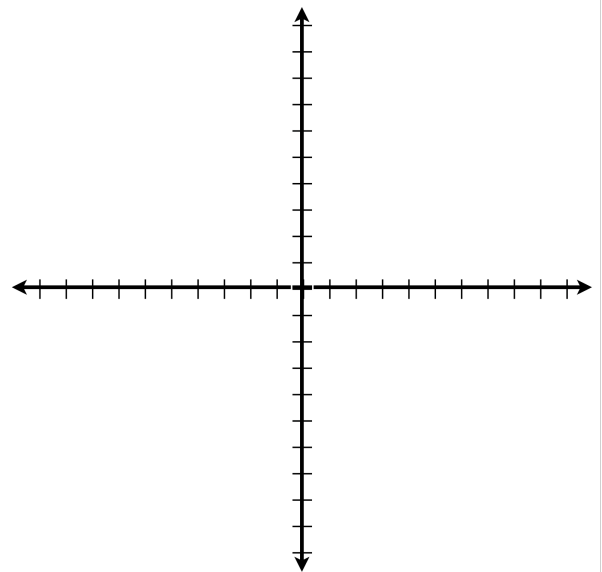
Equation of a **Hyperbola**  
with center  $(h,k)$ 

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

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

Write the equation of a **hyperbola** with the following characteristics

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

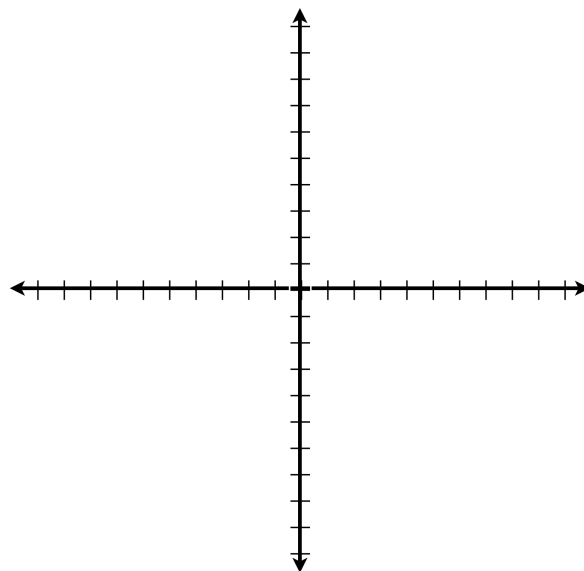
**Center:**  $(0,0)$ **Vertex:**  $(0,4)$ **Focus:**  $(0,-5)$ 

Write the equation of a **hyperbola** with the following characteristics

$$\frac{(x-h)^2}{\underset{\text{horizontal}}{a^2}} - \frac{(y-k)^2}{b^2} = 1 \quad \frac{(y-k)^2}{\underset{\text{vertical}}{a^2}} - \frac{(x-h)^2}{b^2} = 1$$

**Vertices:** (-4,0) and (4,0)

**Asymptote:**  $y = x$



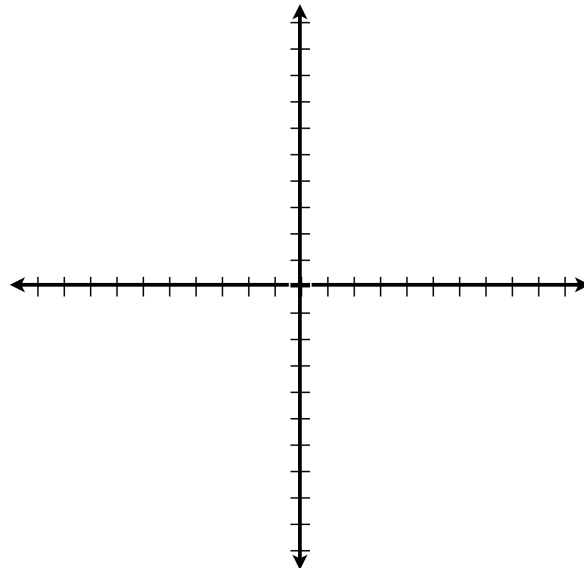
Write the equation of a **hyperbola** with the following characteristics

$$\frac{(x-h)^2}{\underset{\text{horizontal}}{a^2}} - \frac{(y-k)^2}{b^2} = 1 \quad \frac{(y-k)^2}{\underset{\text{vertical}}{a^2}} - \frac{(x-h)^2}{b^2} = 1$$

**Center:** (-3,-4)

**Vertex:** (-3,-2)

**Focus:** (-3,-8)



Write the equation of a **hyperbola** with the following characteristics

$$\frac{(x-h)^2}{\underset{\text{horizontal}}{a^2}} - \frac{(y-k)^2}{b^2} = 1 \quad \frac{(y-k)^2}{\underset{\text{vertical}}{a^2}} - \frac{(x-h)^2}{b^2} = 1$$

**Vertices:** (-1,2) and (7,2)

**Asymptote:**  $y = 2x - 4$

