

Equations of Hyperbolas - Step-by-Step Lesson

Find an equation for the hyperbola with the center at $(2, 6)$, vertex at $(0, 6)$, and focus at $(6, 6)$.

Explanation:

The point that the hyperbola is focused (pointed, if you will;) on is referred to as the center. When we use a coordinate system, the recognizable point that is on the branch closest to the center of the hyperbola is called the vertex. The foci reside inside each branch of the hyperbola.

Hyperbolas have an equation that fits the model:

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

(h, k) = center a = semi-transverse axis b = semi-conjugate axis

We can see in this problem that all three measures are on the horizontal line $y = 6$.

The vertex is 2 units from the center, so that $a = 2$

The focus is 4 units from the center, so that $c = 4$.

This means that $a^2 + b^2 = c^2$ gives us $b^2 = 16 - 4 = 12$.

Putting it all together, the equation would look like this:

$$\frac{(x-2)^2}{4} - \frac{(y-6)^2}{12}$$

