

Answer on Question #53936– Math – Analytic Geometry

Find an equation in standard form for the hyperbola with vertices at $(0, \pm 6)$ and asymptotes at

$$y = \pm \frac{3}{5}x$$

Solution

An equation in a standard form for the hyperbola is

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

This equation defines a hyperbola centered at the origin with vertices $(\pm a, 0)$.

An equation

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

defines a hyperbola centered at the origin with vertices $(0, \pm a)$.

Given vertices at $(0, \pm 6)$, so an equation in standard form for the hyperbola is

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

and $a = 6$.

The equations of the asymptotes are

$$y = \pm \frac{a}{b}x$$

So

$$\frac{a}{b} = \frac{3}{5}$$

$$b = \frac{5}{3}a = \frac{5}{3} \cdot 6 = 10$$

$$\frac{y^2}{6^2} - \frac{x^2}{10^2} = 1$$

Answer:

$$\frac{y^2}{6^2} - \frac{x^2}{10^2} = 1$$