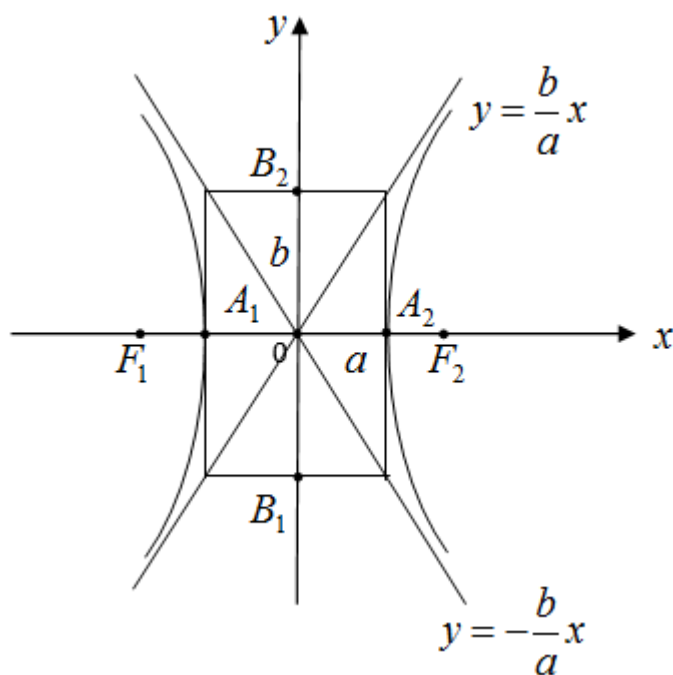Find an equation in standard form for the hyperbola with vertices at (0, ±6) and asymptotes at:

$$y = \pm \frac{3}{4} x$$

Solution

Equation in standard form for the hyperbola:

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

In our equation $B_1 = (0; -6)$, $B_2 = (0; 6)$, $y = \pm \frac{3}{4} x = \pm \frac{6}{8} x$, $b = 6$, $\frac{b}{a} = \frac{3}{4}$, then

$a = \frac{4b}{3} = \frac{4*6}{3} = 8$ and equation for the hyperbola is

$$\frac{x^2}{64} - \frac{y^2}{36} = 1$$

Answer:

$$\frac{x^2}{64} - \frac{y^2}{36} = 1$$