

Example 1 Sketch the graph $9y^2 - 16x^2 = 144$

Since the coefficients of the quadratic terms are opposite in sign, this is a hyperbola. Dividing both sides by 144.

$$\frac{9y^2}{144} - \frac{16x^2}{144} = \frac{144}{144}$$

Therefore, $a = 4$ and $b = 3$.

$$\frac{y^2}{16} - \frac{x^2}{9} = 1$$

By inspection, the y-intercepts are 4 and -4. There are no x-intercepts. The asymptotes are graphs $y = 4x/3$ and $y = -4x/3$. These graphs go through the origin and the slope of the diagonals is $4/3$ and $-4/3$.

