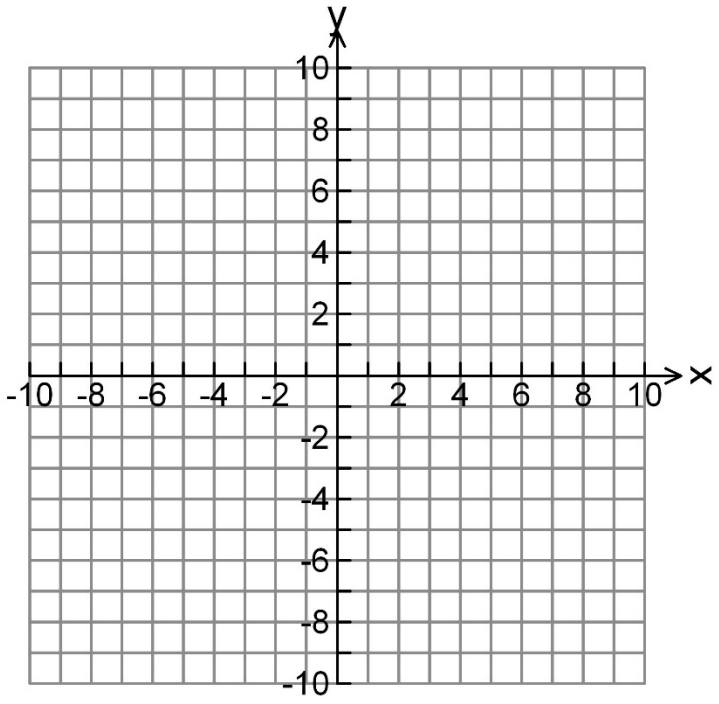
Section 10.3: Hyperbolas

Video 1: Hyperbolas Centered at the Origin, Horizontal Transverse Axis

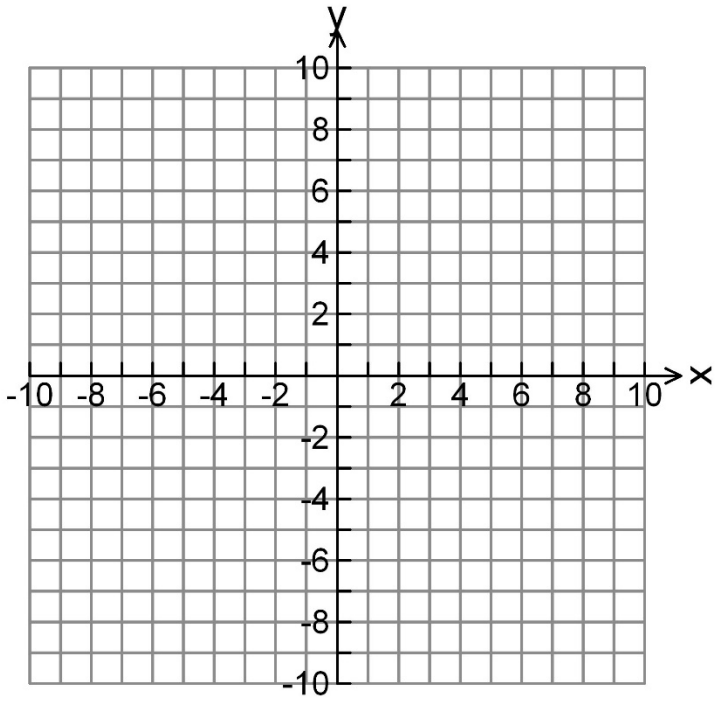
1) Graph the hyperbola. Sketch the asymptotes. Find the coordinates of the vertices and foci. State the domain and range.

$9x^2 - 4y^2 = 36$



2) Graph the hyperbola. Sketch the asymptotes. Find the coordinates of the vertices and foci. State the domain and range.

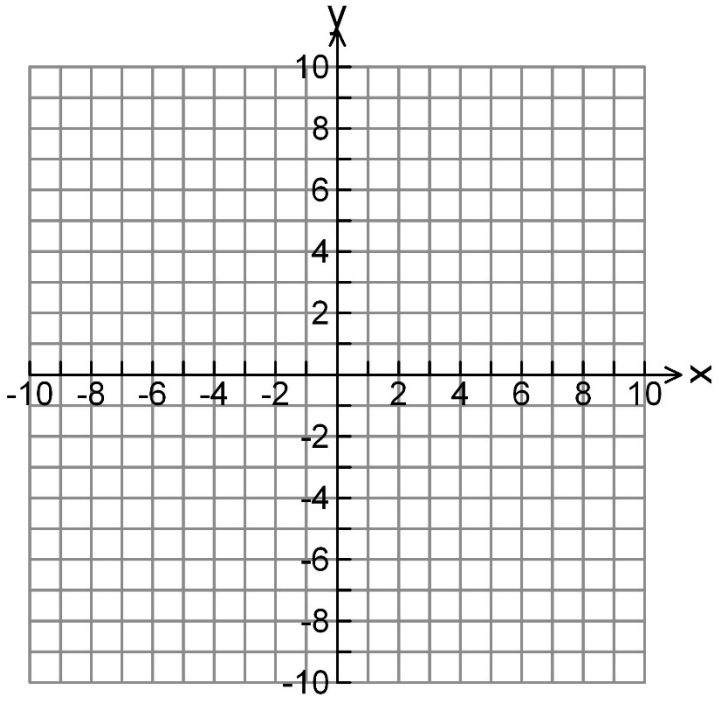
$$\frac{x^2}{25} - y^2 = 1$$



Video 3: Hyperbolas Centered at the Origin, Vertical Transverse Axis

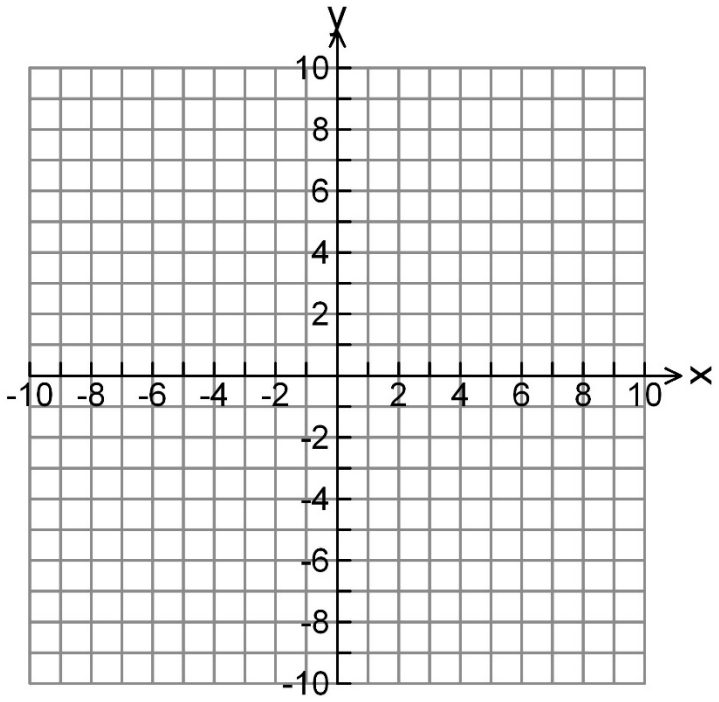
3) Graph the hyperbola. Sketch the asymptotes. Find the coordinates of the vertices and foci. State the domain and range.

$50y^2 - 72x^2 = 1800$



4) Graph the hyperbola. Sketch the asymptotes. Find the coordinates of the vertices and foci. State the domain and range.

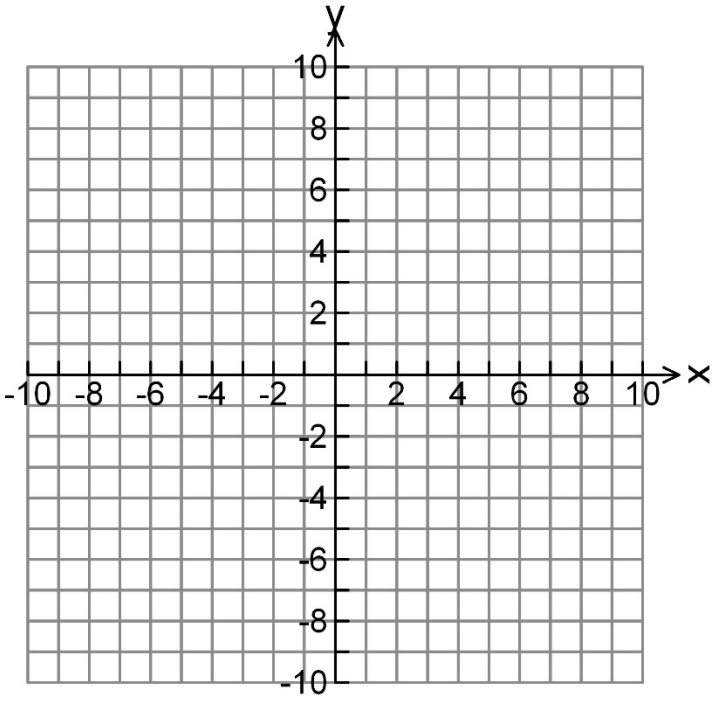
$$\frac{y^2}{16} - \frac{x^2}{4} = 1$$



Video 3: Graph an Hyperbola Translated Away from the Origin

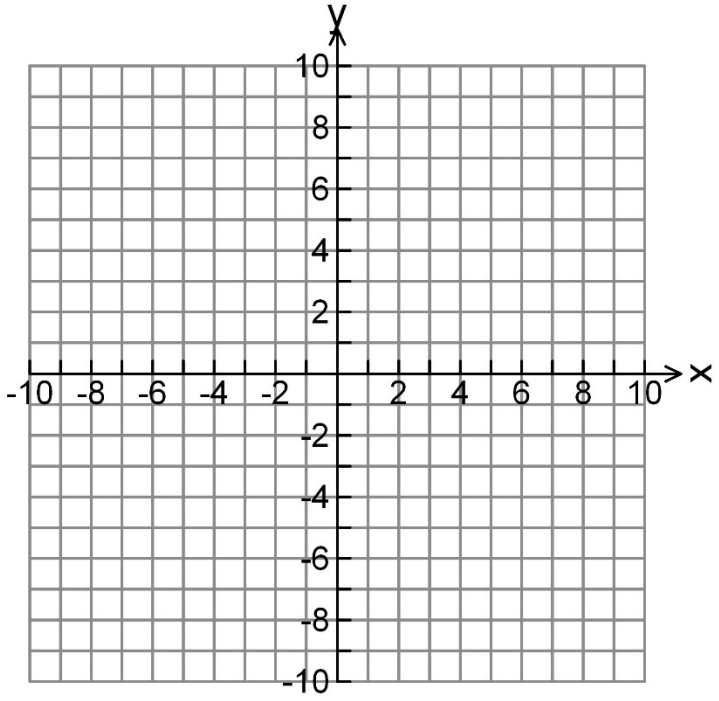
5) Graph the hyperbola. Sketch the asymptotes. Find the coordinates of the vertices and foci. State the domain and range.

$$\frac{(x+3)^2}{4}-\frac{(y+2)^2}{9}=1$$



6) Graph the hyperbola. Sketch the asymptotes. Find the coordinates of the vertices and foci. State the domain and range.

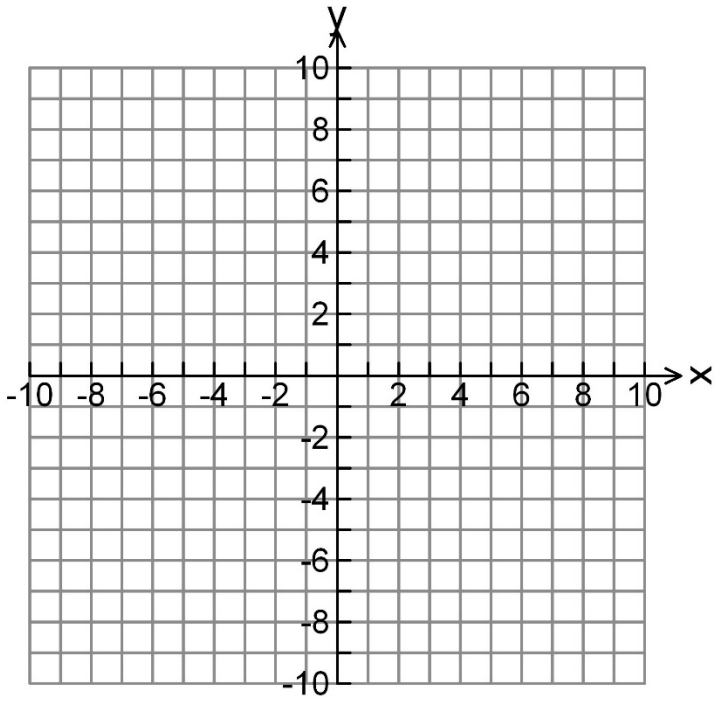
$$(y+4)^2 - \frac{(x-2)^2}{16} = 1$$



Video 4: Rewriting the Equation of a Hyperbola in Standard Form (Completing the Square)

7) Graph the hyperbola. Sketch the asymptotes. Find the coordinates of the vertices and foci. State the domain and range.

$$4x^2 - 16x - 9y^2 - 18y = 29$$



Video 5: Eccentricity

The **eccentricity** of a hyperbola is given by the formula $e = \frac{c}{a} = \frac{\sqrt{a^2 + b^2}}{a}$.

The eccentricity of a hyperbola is always greater than 1. When *e* is close to 1, the hyperbola is "narrow". The larger *e* is, the "wider" the hyperbola is.

8) Find the eccentricity of $\frac{y^2}{49} - \frac{x^2}{64} = 1$.

9) Find the eccentricity of $81(x+3)^2 - 4(y-2)^2 = 324$.