

MATH 1650: SECTION 7.5: HYPERBOLAS

THE STANDARD EQUATION OF HYPERBOLAS:

For positive numbers a and b , the equation of a hyperbola with center (h, k) which opens to the left and right is:

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

For positive numbers a and b , the equation of a vertical hyperbola with center (h, k) which opens up and down:

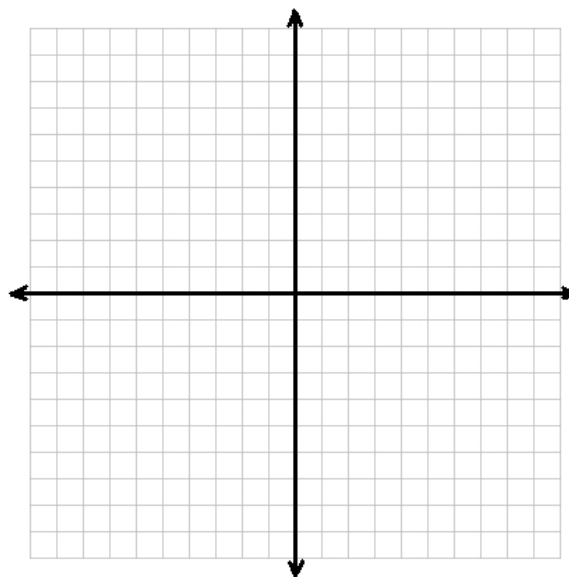
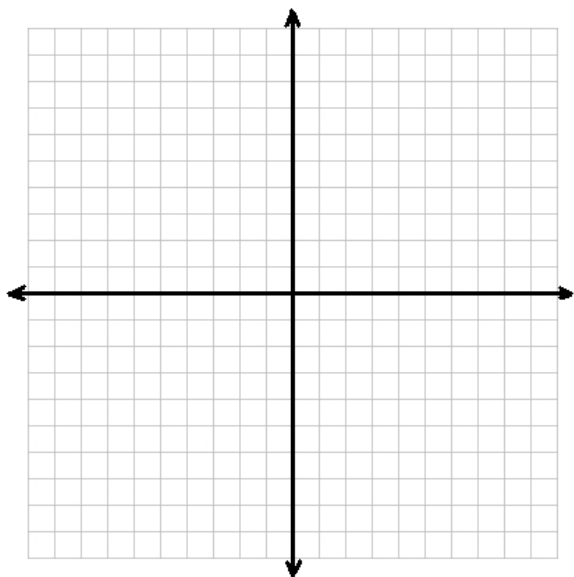
$$\frac{(y - k)^2}{b^2} - \frac{(x - h)^2}{a^2} = 1$$

EXAMPLE:

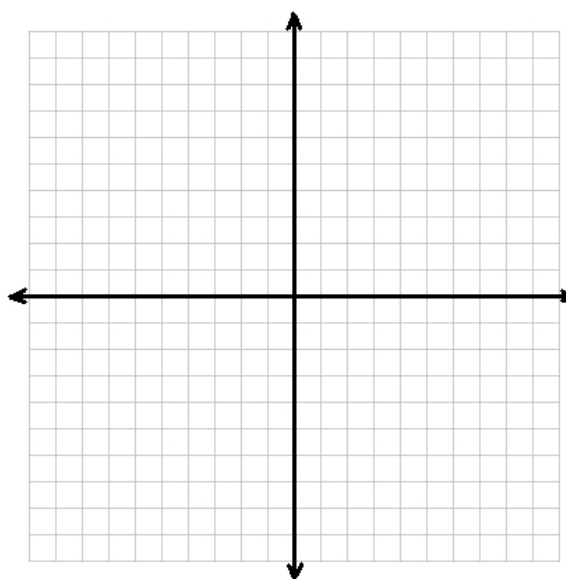
- Graph each of the following equations below in the xy -plane. Find the center, the lines which contain the transverse and conjugate axes, the vertices, the foci and the equations of the asymptotes.

(a) $25(x - 2)^2 - 4y^2 = 100$.

(b) $9y^2 - x^2 - 6x = 10$.



2. Graph $f(x) = \sqrt{x^2 - 2x - 3}$.



3. Find the standard form of the equation of a hyperbola which satisfies the following characteristics:

(a) the asymptotes are $y = \pm 2x$ and the vertices are $(\pm 5, 0)$.

(b) the hyperbola graphed below:

