Hyperbolas
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Section: 10.4

Notes Reset

Label the center, vertices, foci, and transverse axis on the graph.

Vertical Hyperbolas

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

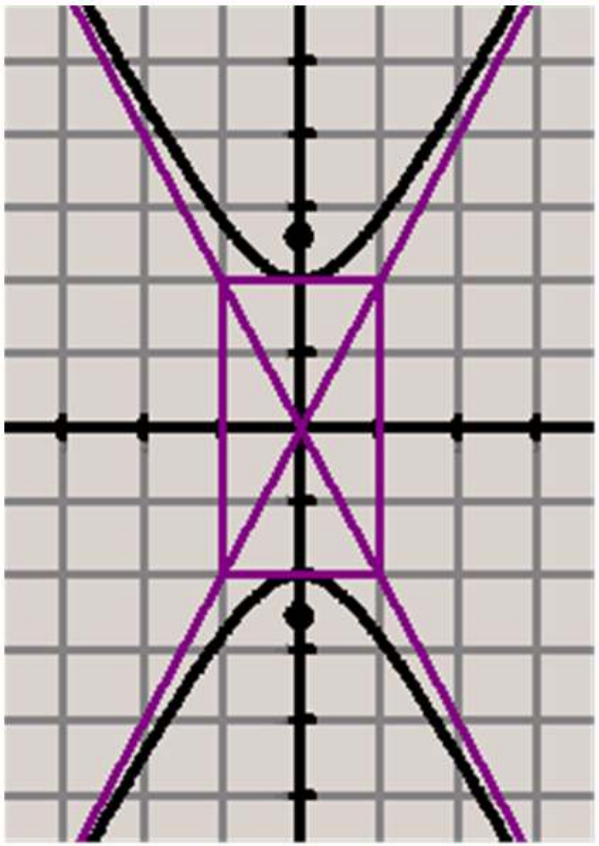
Transverse Axis is Vertical

Equation of the asymptotes:

$$y - k = \pm\frac{a}{b}(x-h)$$

How to find the foci:

$$c^2 = a^2 + b^2$$



Notes Reset

Label the center, vertices, foci, and transverse axis on the graph.

Horizontal Hyperbolas

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

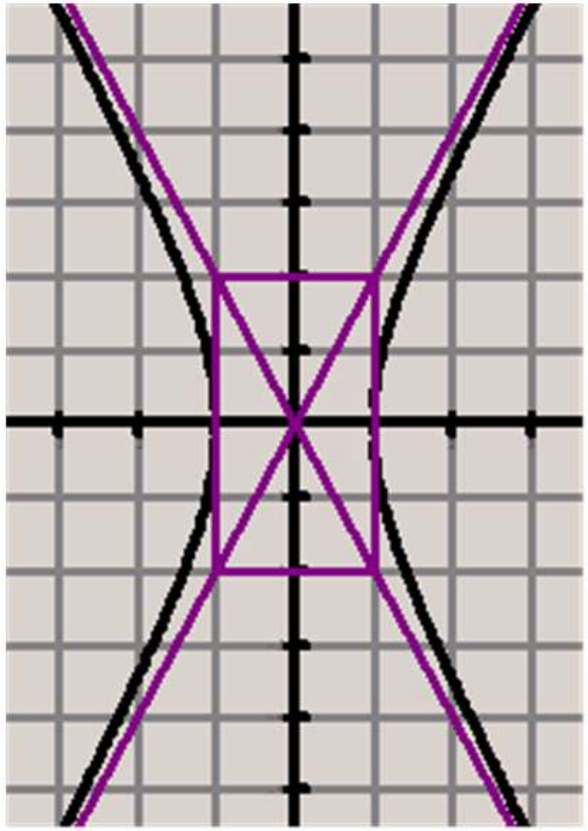
Transverse Axis is Horizontal

Equation of the asymptotes:

$$y - k = \pm \frac{b}{a}(x - h)$$

How to find the foci:

$$c^2 = a^2 + b^2$$



Notes Reset

Example 1 - a

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

Transverse Axis is Horizontal

Find the center, vertices, foci and equations of the asymptotes of the hyperbola and sketch its graph.

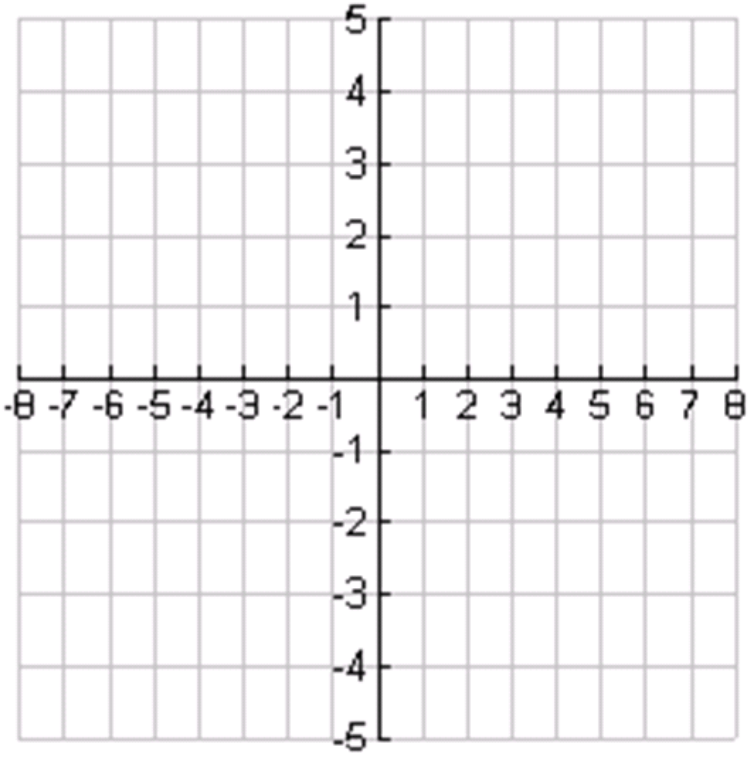
a. $\frac{x^2}{25}-\frac{y^2}{9}=1$

center: _____

vertices: _____ _____

foci: _____ _____

asymptotes: _____



Notes Reset

Example 1 - b

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

Transverse Axis is Vertical

Find the center, vertices, foci and equations of the asymptotes of the hyperbola and sketch its graph.

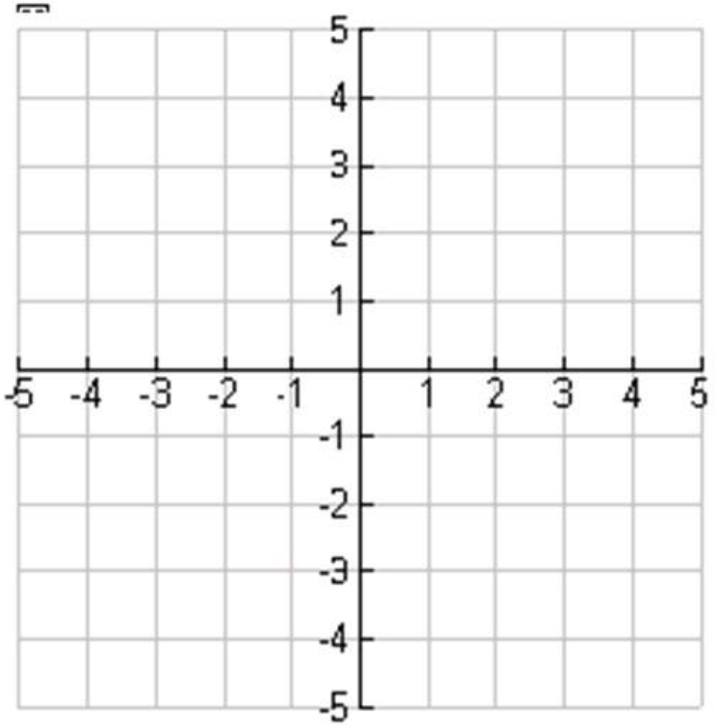
b. $\frac{(y-1)^2}{4} - \frac{(x+2)^2}{9} = 1$

center: _____

vertices: _____ _____

foci: _____ _____

asymptotes: _____



Notes Reset

Example 1 - c

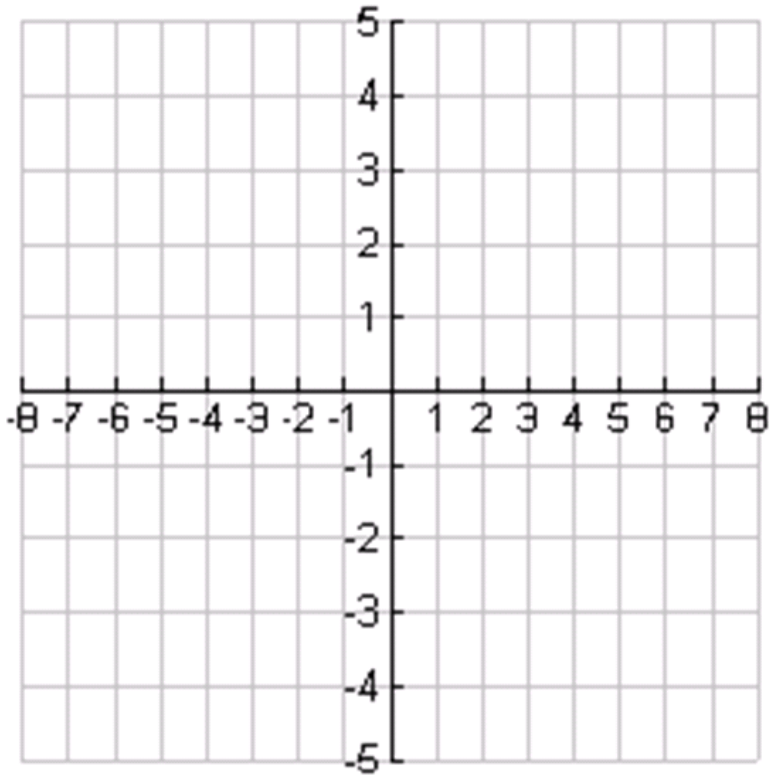
First, let's complete the square:

c. $x^2 - 9y^2 + 36y - 72 = 0$

Notes Reset

Example 1 - c

c. $x^2 - 9y^2 + 36y - 72 = 0$



center: _____

vertices: _____ _____

foci: _____ _____

asymptotes: _____

Notes Reset

Example 1 - d

First, let's complete the square:

d. $16y^2 - x^2 + 2x + 64y + 47 = 0$

Notes Reset

Example 1
Problem d

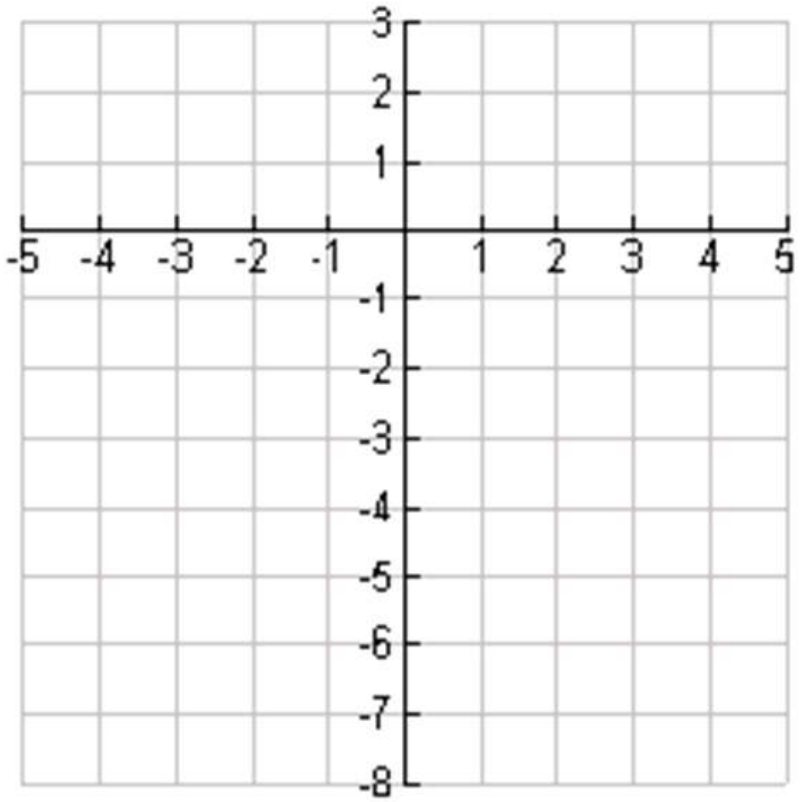
d. $16y^2 - x^2 + 2x + 64y + 47 = 0$

center: _____

vertices: _____ _____

foci: _____ _____

asymptotes: _____



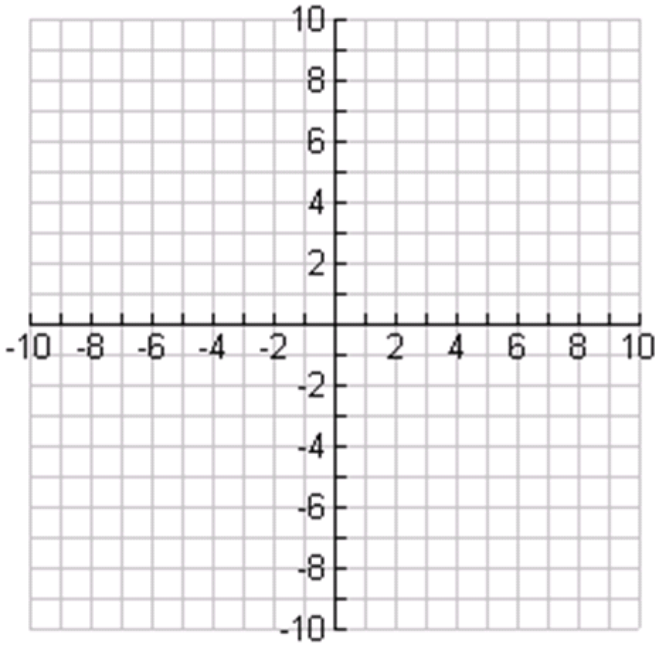
Notes Reset

Example 2

Find the standard form of the equation of the hyperbola with the given characteristics and center at the origin. Sketch a graph to help.

a. **Vertices:** $(\pm 4, 0)$

foci: $(\pm 6, 0)$



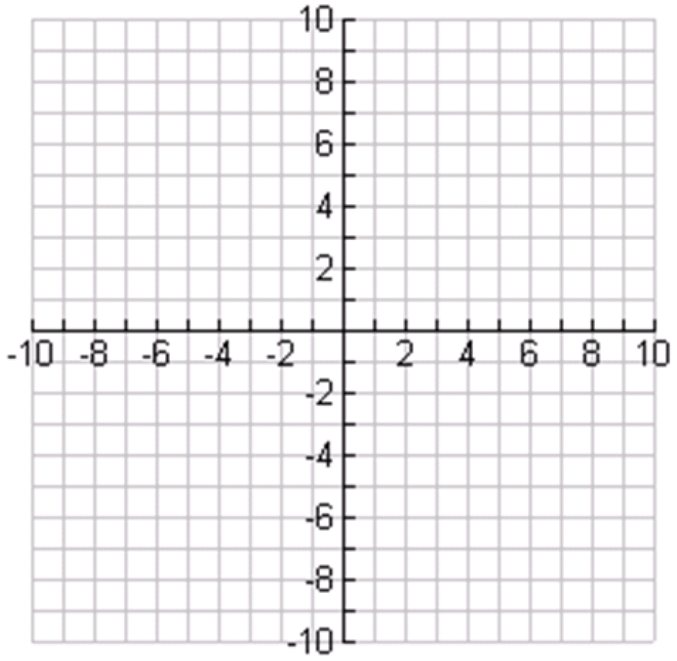
Notes Reset

Example 2
Problem b

Find the standard form of the equation of the hyperbola with the given characteristics and center at the origin. Sketch a graph to help.

b. vertices: $(0, \pm 3)$

asymptotes: $y = \pm 3x$



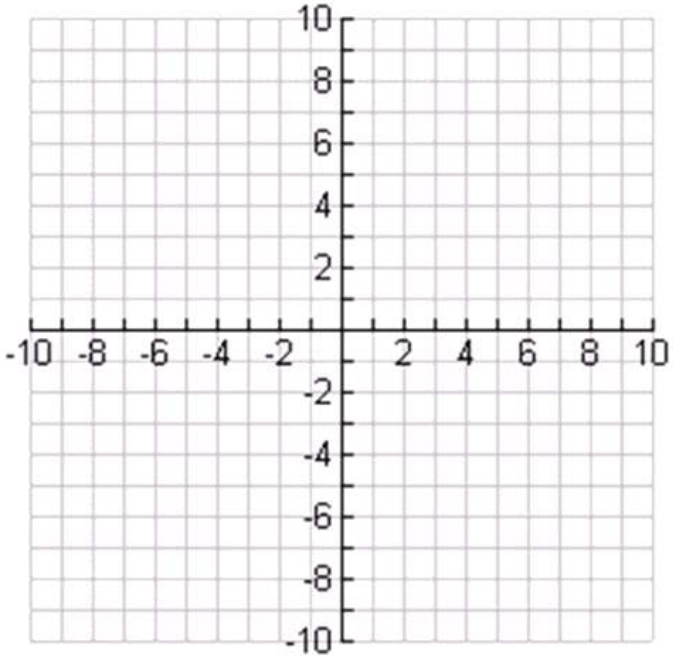
Notes Reset

Example 2 - c

Find the standard form of the equation of the hyperbola with the given characteristics and center at the origin. Sketch a graph to help.

c. foci: $(\pm 10, 0)$

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



Notes Reset