

The Hyperbola

Standard Form of a Hyperbola

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

$$b^2 = c^2 - a^2$$

Center : (h, k)

Transverse Axis :

Parallel to x - axis

Foci : $(h+c, k)$, $(h-c, k)$

Vertices : $(h+a, k)$, $(h-a, k)$

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

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

$$b^2 = c^2 - a^2$$

Center : (h, k)

Transverse Axis :

Parallel to y - axis

Foci : $(h, k+c)$, $(h, k-c)$

Vertices : $(h, k+a)$, $(h, k-a)$

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

1. Graph
(Similar to p.408 #15-18)

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

2. Find an equation for each hyperbola. Graph the equation
(Similar to p.408 #19-28)

Center : $(0,0)$

Focus : $(-5,0)$

Vertex : $(4,0)$

3. Find an equation for the hyperbola.
Graph the equation
(Similar to p.408 #19-28)

Vertices : $(\pm 6, 0)$

asymptote the line $y = 3x$

4. Find the center, transverse axis, vertices, foci, and asymptotes. Graph each equation
(Similar to p.409 #29-36)

$$\frac{y^2}{9} - \frac{x^2}{4} = 1$$

5. Find the center, transverse axis, vertices, foci, and asymptotes. Graph each equation

(Similar to p.409 #29-36)

$$3x^2 - y^2 = 9$$

6. Find an equation for the hyperbola described. Graph the equation
(Similar to p.409 #41-48)

$$\text{Vertices : } (-3,6), (-3,-2)$$

$$\text{Asymptote : } y - 2 = \frac{4}{5}(x + 3)$$

7. Find the center, transverse axis, vertices, foci, and asymptotes. Graph each equation

(Similar to p.409 #49-62)

$$9y^2 - 4x^2 + 18y + 40x - 127 = 0$$

8. Find the center, transverse axis, vertices, foci, and asymptotes. Graph each equation

(Similar to p.409 #49-62)

$$9x^2 - y^2 - 72x - 4y + 131 = 0$$