

### Warm up

1. Find the vertex, directrix and focal chord endpoints for

$$y^2 - 2y - 8x + 1 = 0$$

$$y^2 - 2y + 1 = 8x - 1 + 1$$

$$(y-1)^2 = 8x$$

$$\frac{1}{8}(y-1)^2 = x$$

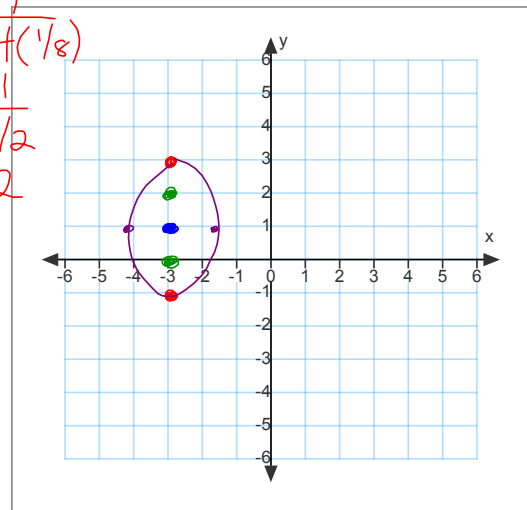
$x = -2$

$V(0, 1)$

focus (2, 1)

$P = \frac{1}{4}(\frac{1}{8})$

$P = \frac{1}{1/2} = 2$



2. Find the equation of the ellipse with

M(-3, 1)   V(-3, 3)   F(-3, 0)

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

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

$$a^2 = 4$$

$$c^2 = 1$$

$$4 - b^2 = 1$$

$$-b^2 = -3$$

$$b^2 = 3$$

$$b = \sqrt{3}$$

GO COUGARS!



## Homework Questions

$$16x^2 - 32x + 25y^2 + 50y = -16$$

$$16(x^2 - 2x + 1) + 25(y^2 + 2y + 1) = -16 + 16 + 25$$

$$\frac{16(x-1)^2}{25} + 25(y+1)^2 = 25$$

$$\frac{\frac{16}{25}(x-1)^2}{\frac{25}{16}} + \frac{(y+1)^2}{1} = 1$$

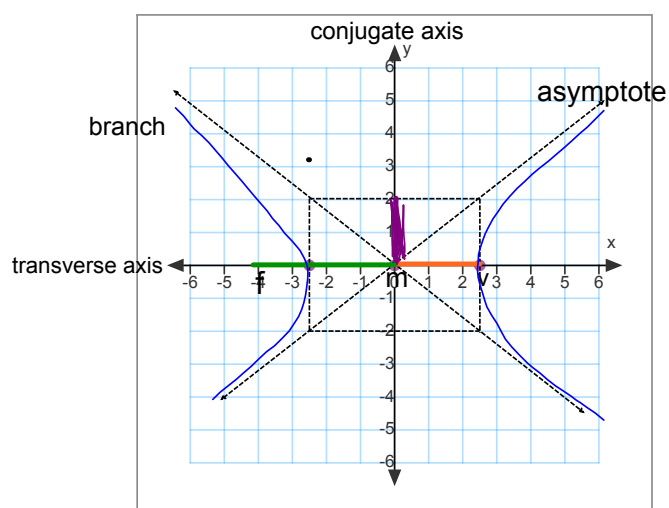
## 9.3 The Hyperbola

hyperbola - the set of all points, where the difference from two fixed points, called foci, is a constant

middle to vertices =  $a$

middle to box side =  $b$

middle to focus =  $c$



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

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

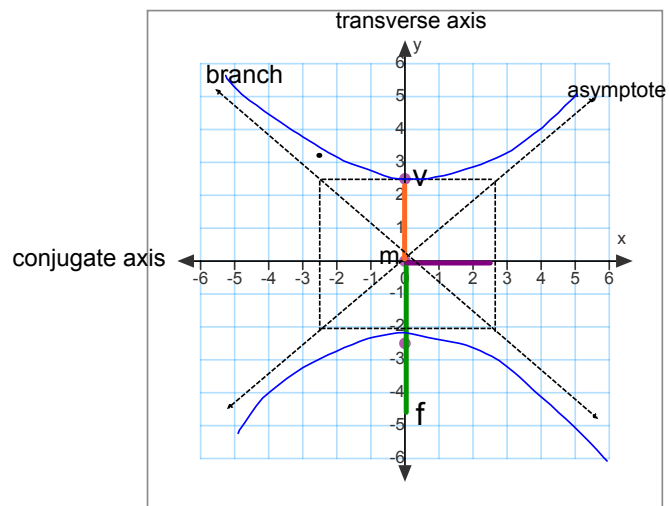
asymptotes:

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

$$y - y_1 = m(x - x_1)$$

↑  
rise  
run

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



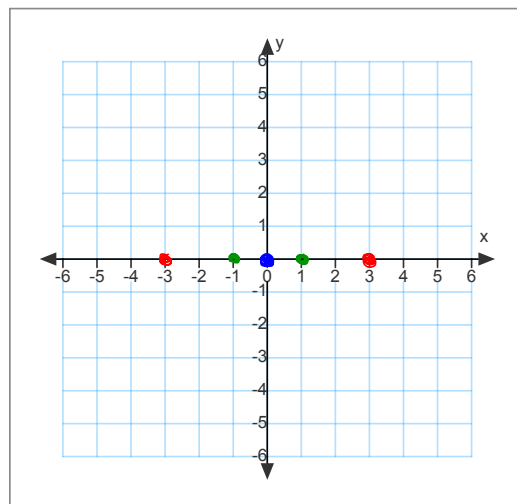
asymptotes:  $y - k = \pm \frac{a}{b}(x - h)$

Find the equation of the hyperbola with

M (0, 0)   F (3, 0)   V (1, 0)

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

$$\frac{x^2}{1} - \frac{y^2}{8} = 1$$



$$a^2 = 1$$

$$c^2 = 9$$

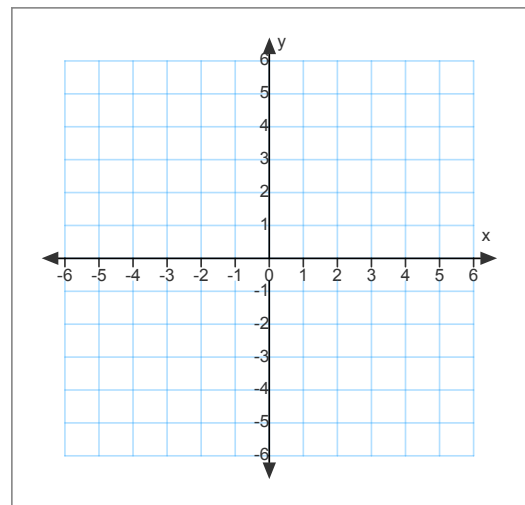
$$c^2 = a^2 + b^2$$

$$9 = 1 + b^2$$

$$b^2 = 8$$

Discuss  $y^2 - 4x^2 = 4$

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

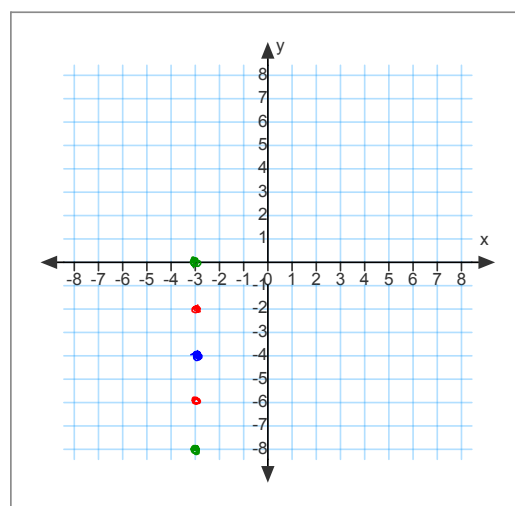


Find the equation of the hyperbola if

$$M (-3, -4) \quad F (-3, -8) \quad V (-3, -2)$$

$$\frac{(y+4)^2}{4} - \frac{(x+3)^2}{12} = 1$$

$$16 = 4 + b^2$$





Find the middle, vertices, foci and asymptotes

$$(x+4)^2 - 9(y-3)^2 = 9$$

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

$$M(-4, 3)$$

$$V(-7, 3) \text{ \& } (-1, 3)$$

$$F(-4 \pm \sqrt{10}, 3)$$

Asymptotes

$$y - y_1 = m(x - x_1)$$

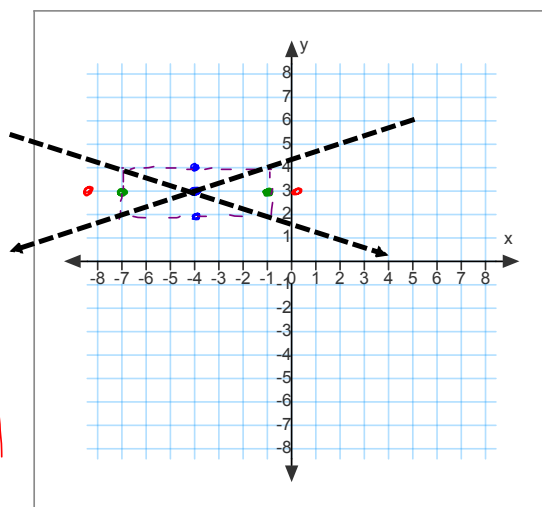
$$(-4, 3) \quad y - 3 = \pm \frac{1}{3}(x + 4)$$

$$b = 1$$

$$c^2 = 9 + 1$$

$$c^2 = 10$$

$$c = \sqrt{10}$$



Find the middle, vertices, foci and asymptotes

$$y^2 - 4x^2 - 4y - 8x - 4 = 0$$

# HOMework



p 687 1-4 all, 6-42 by 3's  
(omit #21)