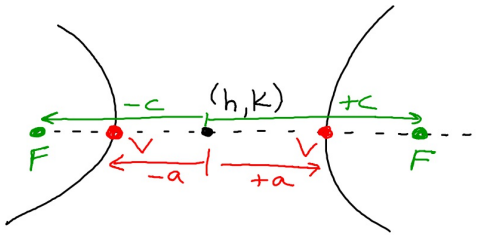
Standard Form of the Equation for Hyperbolas with center at (h,k):

Horizontal Transverse Axis:

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



Vertices: (h±a, k)

Foci: (h±c, k)

Asymptotes: $m = \pm \frac{b}{a}$

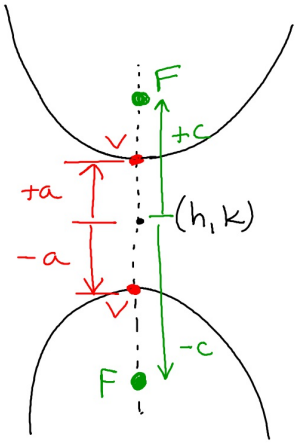
Vertical Transverse Axis:

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

Vertices: (h, k±a)

Foci: (h, k±c)

Asymptotes: $m = \pm \frac{a}{b}$



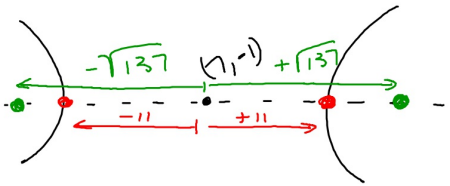
$$\frac{(x-7)^2}{121} - \frac{(y+1)^2}{16} = 1$$

$a^2 = 121$ $a = 11$

$b^2 = 16$ $b = 4$

Find each of the following:

1. Center $(7, -1)$
2. Vertices $(-4,-1)$ $(18,-1)$
3. Foci $(7 \pm \sqrt{137}, -1)$
4. Transverse Axis length $2a = 2(11) = 22$
5. Slope of Asymptotes $m = \pm \frac{b}{a} = \pm \frac{4}{11}$



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

$c^2 = 121 + 16$

$c^2 = 137$

$c = \sqrt{137}$

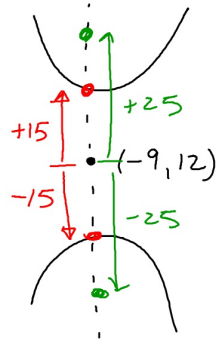
$$\frac{(y-12)^2}{225} - \frac{(x+9)^2}{400} = 1$$

$a^2 = 225$ $a = 15$

$b^2 = 400$ $b = 20$

Find each of the following:

1. Center $(-9, 12)$
2. Vertices $(-9, 27)$ $(-9, -3)$
3. Foci $(-9, 37)$ $(-9, -13)$
4. Transverse Axis length $2(15) = 30$
5. Slope of Asymptotes $m = \pm \frac{a}{b} = \pm \frac{15}{20}$



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

$= 225 + 400$

$c^2 = 625$

$c = 25$

Graph this Hyperbola showing the Vertices and Asymptotes.

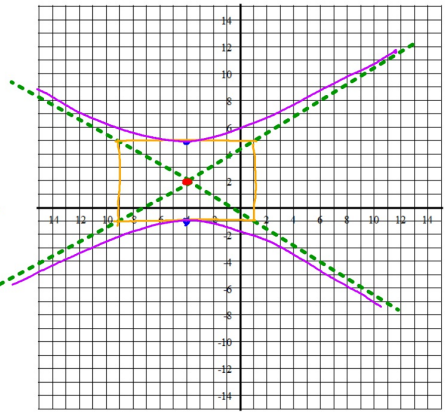
$$\frac{(y-2)^2}{9} - \frac{(x+4)^2}{25} = 1$$

center $(-4, 2)$

$a^2 = 9$

$a = 3$ Vertices are 3 above & below the center

$m = \pm \frac{3}{5}$



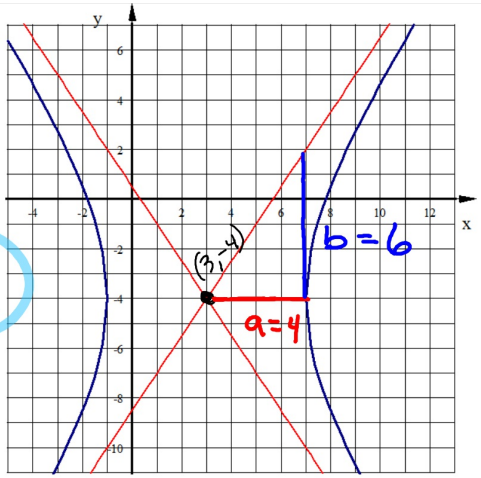
Write the equation of this Hyperbola:

center $= (3, -4)$

branches open in x-direction

$$\frac{(x-3)^2}{16} - \frac{(y+4)^2}{36} = 1$$

a^2 b^2

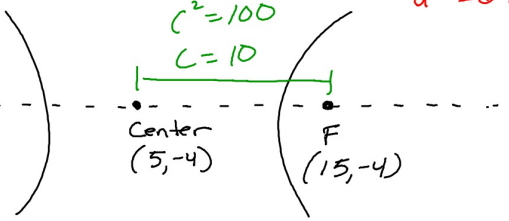


The center is (5,- 4), the Transverse Axis has a length of 16. → $2a = 16$, $a = 8$, $a^2 = 64$

One Focus is (15, - 4). Write the equation of this Hyperbola.

$$\frac{(x-5)^2}{64} - \frac{(y+4)^2}{36} = 1$$

a^2 b^2



$c^2 = 100$

$c = 10$

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

$100 = 64 + b^2$

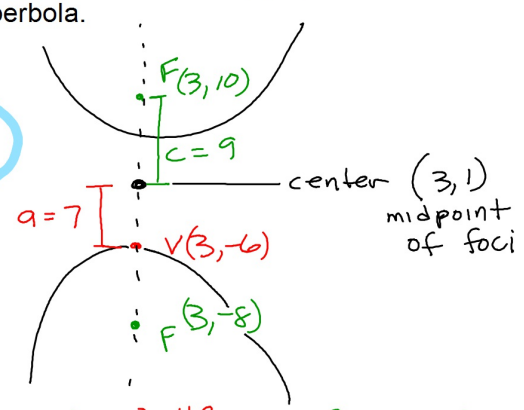
$36 = b^2$

The Foci are (3, 10) and (3, -8) and one Vertex is (3,-6).

Write the equation of this Hyperbola.

$$\frac{(y-1)^2}{49} - \frac{(x-3)^2}{32} = 1$$

a^2 b^2



$a = 7$ $a^2 = 49$ $c = 9$ $c^2 = 81$

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

$81 = 49 + b^2$

$b^2 = 32$