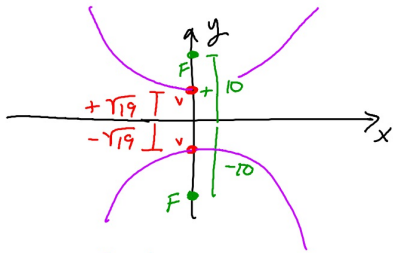
$$\frac{y^2}{19} - \frac{x^2}{81} = 1$$

Vertices: $(0, \pm\sqrt{19})$ Foci: $(0, \pm 10)$




Length of Transverse Axis =

$2a = 2\cdot\sqrt{19}$

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

$m = \pm\frac{\sqrt{19}}{9}$

$a^2 = 19 \quad a = \sqrt{19}$

$b^2 = 81 \quad b = 9$

$c^2 = a^2 + b^2 = 19 + 81$

$c^2 = 100$

$c = 10$

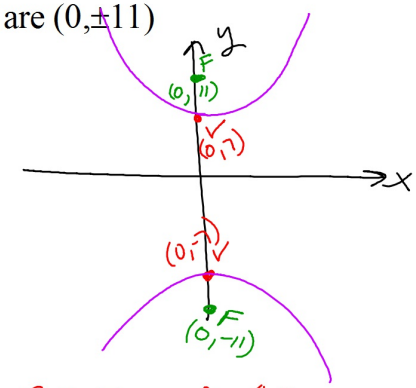
Write the equation of each hyperbola.

The Vertices are $(0,\pm 7)$ and the Foci are $(0,\pm 11)$

The center is at the origin.

$$\frac{y^2}{49} - \frac{x^2}{72} = 1$$

$a^2 \quad b^2$




$a = 7 \rightarrow a^2 = 49$

$c = 11 \rightarrow c^2 = 121$

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

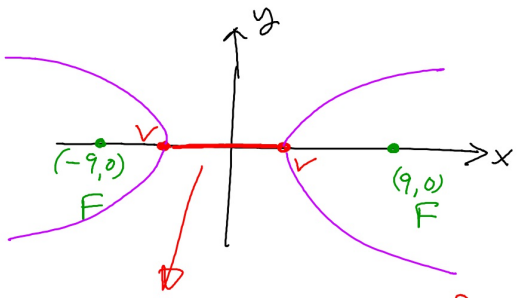
$121 = 49 + b^2$ $\quad b^2 = 72$

The Foci are $(\pm 9, 0)$ and the transverse axis is 8 units long.

The center is at the origin.

$$\frac{x^2}{16} - \frac{y^2}{65} = 1$$

$a^2 \quad b^2$




Transverse axis $= 8$

$2a = 8$

$a = 4$

$a^2 = 16$

$c = 9 \rightarrow c^2 = 81$

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

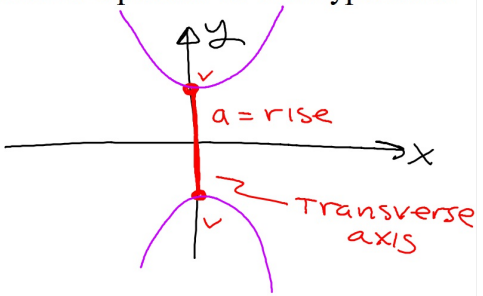
$81 = 16 + b^2 \rightarrow b^2 = 65$

The asymptotes are $y = \pm\frac{3}{7}x$ and the transverse axis is vertical

The center is at the origin. Write the equation of this hyperbola.

$$\frac{y^2}{9} - \frac{x^2}{49} = 1$$

$a^2 \quad b^2$

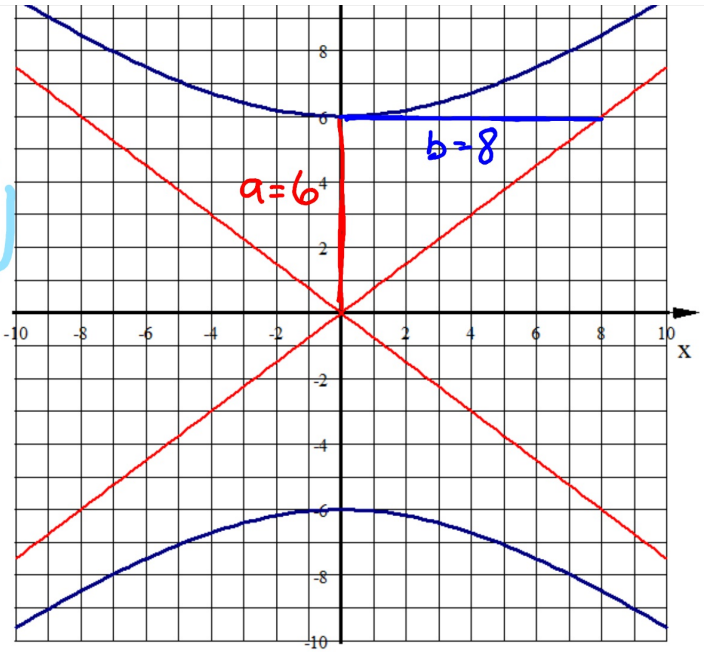



$m = \frac{3}{7} = \frac{\text{rise}}{\text{run}} = \frac{a}{b}$

$a = 3 \rightarrow a^2 = 9$

$b = 7 \rightarrow b^2 = 49$

Write the equation of this Hyperbola. The asymptotes are shown in red.



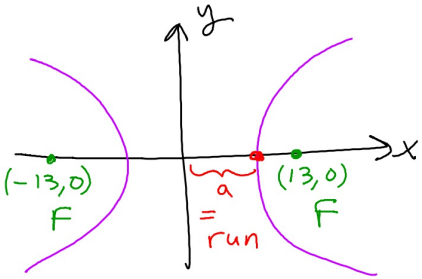

$\frac{y^2}{36} - \frac{x^2}{64} = 1$

$a^2$ $a=6$ $b^2$ $b=8$

---

The Foci are (±13,0). The center is the origin and the slope of one of the Asymptotes is $\frac{12}{5}$. Write the equation of this Hyperbola.

$\frac{x^2}{25} - \frac{y^2}{144} = 1$




$m = \frac{12}{5} = \frac{\text{rise}}{\text{run}} = \frac{b}{a}$

$a=5$ $a^2=25$

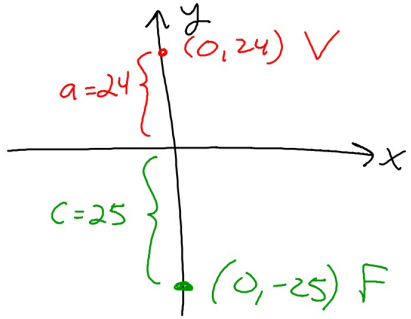
$b=12$ $b^2=144$

---

One Vertex is (0,24) and one Focus is (0,-25). The center is at the origin. Write the equation of this Hyperbola.

$\frac{x^2}{576} - \frac{y^2}{49} = 1$

$a^2$ $a=24$ $b^2$




$a=24$ $a^2=576$

$c=25$ $c^2=625$

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

$625 = 576 + b^2$

$b^2 = 49$

---

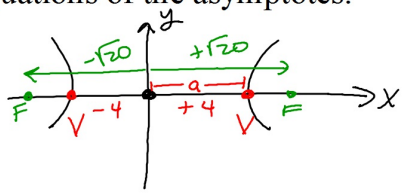
Find the coordinates of the Vertices and Foci then write the equations of the asymptotes:

$\frac{8x^2}{128} - \frac{32y^2}{128} = \frac{128}{128}$

$\frac{x^2}{16} - \frac{y^2}{4} = 1$

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

$a=4$ $b=2$




Vertices $(\pm 4, 0)$

Foci: $(\pm\sqrt{20}, 0)$

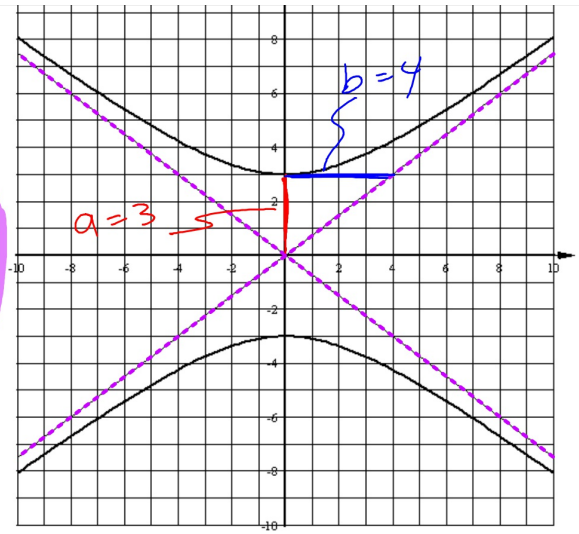
Asymptotes: $m = \pm\frac{b}{a}$

$m = \pm\frac{2}{4} = \pm 1/2$

$c^2 = a^2 + b^2 = 16 + 4 = 20$

$c = \sqrt{20}$

Write the equation of this Hyperbola.




$$\frac{y^2}{9} - \frac{x^2}{16} = 1$$

$a=3$ $\quad a^2=9$ $\qquad b=4$ $\quad b^2=16$

Find the coordinates of the Vertices and Foci then write the equations of the asymptotes:

$$4y^2 - 25x^2 = 1$$

Vertices: $(0, \pm 1/2)$

Foci: $(0, \pm \frac{\sqrt{29}}{10})$

Asymptotes:

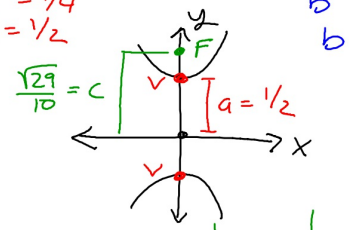
$$m = \pm \frac{a}{b} = \pm \frac{\frac{1}{2}}{\frac{1}{5}}$$

$$= \pm \frac{1}{2} \cdot \frac{5}{1}$$

$$= \pm 5/2$$

$$\frac{y^2}{1/4} - \frac{x^2}{1/25} = 1$$

$a^2 = 1/4$ $\quad a = 1/2$ $\qquad b^2 = 1/25$ $\quad b = 1/5$




$$c^2 = \frac{1}{4} + \frac{1}{25}$$

$$c^2 = \frac{25}{100} + \frac{4}{100} = \frac{29}{100}$$

$$c = \frac{\sqrt{29}}{10}$$

You can now finish Hwk #25.

## Practice Sheet Sec 10-5

Due Tomorrow