

Pre-Calc  
Worksheet #2 – Hyperbolas

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Write an equation in standard form for each hyperbola. Use the graph to help you!

- 1) Foci at  $(\pm 5, 0)$ ; endpoints of transverse axis  $(\pm 3, 0)$

$$c = 5$$

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

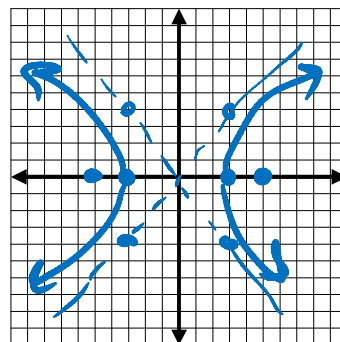
$$25 = 9 + b^2$$

$$b = 4$$

$$a = 3$$

vertices!  
center  $(0, 0)$   
opens hor.

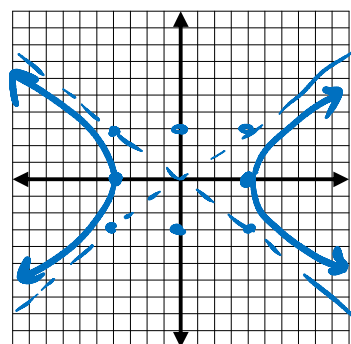
$$\frac{x^2}{9} - \frac{y^2}{16} = 1$$



- 2) Endpoints of transverse axis at  $(\pm 4, 0)$ ; Endpoints of conjugate axis at  $(0, \pm 3)$

vertices!  
 $a = 4$   
opens hor.  
center  $(0, 0)$

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



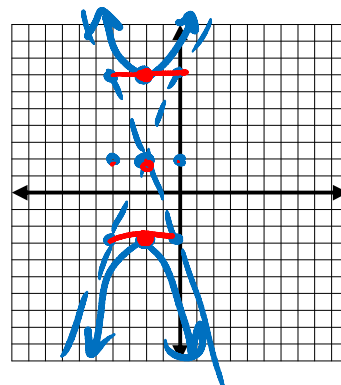
- 3) The endpoints of the transverse axis are  $(-2, -3)$  and  $(-2, 7)$  and of the conjugate axis are  $(-4, 2)$  and  $(0, 2)$

$$2b = 4$$

$$b = 2$$

vertices  
 $2a = 10$   
 $a = 5$   
center  $(-2, 2)$   
opens vert.

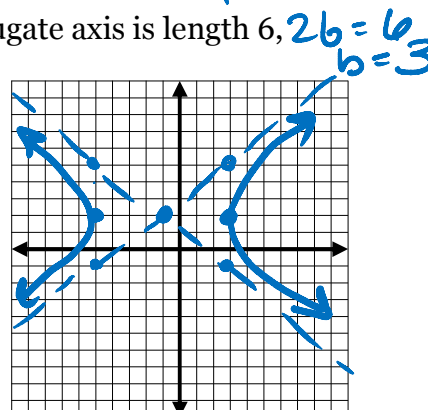
$$\frac{(y-2)^2}{25} - \frac{(x+2)^2}{4} = 1$$



- 4) The transverse axis endpoints are  $(-5, 2)$  and  $(3, 2)$ ; the conjugate axis is length 6,  $2b = 6$

vertices  
 $2a = 8$   
 $a = 4$   
center  $(-1, 2)$   
opens hor.

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



- 5) State the location of the center, the length of the semi-transverse <sup>a</sup> and semi-conjugate <sup>b</sup> axis, and write in parametric form:  $\frac{x^2}{36} - \frac{y^2}{25} = 1$

center (0,0)  
a = 6  
b = 5

$$x = 6 \sec t$$

$$y = 5 \tan t$$

- 6) State the location of the center, the length of the semi-transverse and semi-conjugate axis, and write in parametric form:  $\frac{(x-2)^2}{16} - \frac{(y+1)^2}{12} = 1$ .

center (2, -1)  
a = 4  
b =  $\sqrt{12} = 2\sqrt{3}$

$$x = 2 + 4 \sec t$$

$$y = -1 + 2\sqrt{3} \tan t$$

- 7) Put the equation.  $3x^2 - 5y^2 - 12x + 30y + 42 = 0$  into standard form.

$$3x^2 - 12x - 5y^2 + 30y = -42$$

$$3(x^2 - 4x + 4) - 5(y^2 - 6y + 9) = -42 + 12 - 45$$

$$\frac{3(x-2)^2}{-75} - \frac{5(y-3)^2}{-75} = \frac{-75}{-75}$$

$$\frac{(y-3)^2}{15} - \frac{(x-2)^2}{25} = 1$$

- 8) Put the equation.  $4x^2 - y^2 - 32x + 16y - 128 = 0$  into standard form.

$$4x^2 - 32x - y^2 + 16y = 128$$

$$4(x^2 - 8x + 16) - (y^2 - 16y + 64) = 128 + 64 - 64$$

$$\frac{4(x-4)^2}{128} - \frac{(y-8)^2}{128} = \frac{128}{128}$$

$$\frac{(x-4)^2}{32} - \frac{(y-8)^2}{128} = 1$$