

Conic Sections- Hyperbolas Notes Day 2

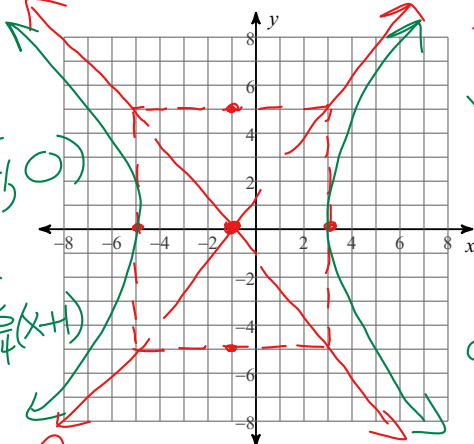
Identify the vertices, foci, and asymptotes of each. Then sketch the graph.

1)  $25x^2 - 16y^2 + 50x - 375 = 0$

"center" = (-1, 0)

Foci  $(-1 \pm \sqrt{41}, 0)$

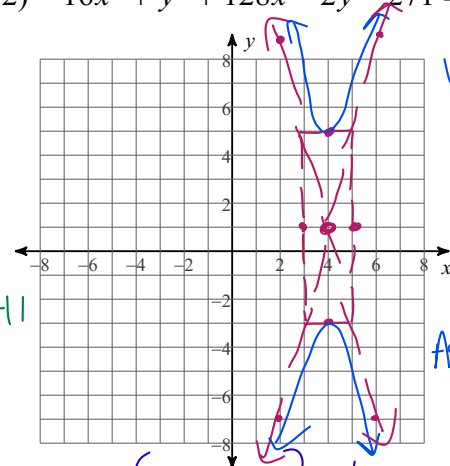
Asym  $y - 0 = \pm \frac{5}{4}(x + 1)$



vertices (-5, 0) (3, 0)

$c^2 = a^2 + b^2$   
 $c^2 = 16 + 25 = 41$   
 $c = \sqrt{41}$

2)  $-16x^2 + y^2 + 128x - 2y - 271 = 0$  center (4, 1)



vertices (4, 5) (4, -3)

$c^2 = 1 + 16 = 17, c = \sqrt{17}$   
 Foci  $(4, 1 \pm \sqrt{17})$   
 Asym  $y - 1 = \pm 4(x - 4)$

$25x^2 + 50x + 25 - 16y^2 = 375$

$25(x^2 + 2x + 1)$

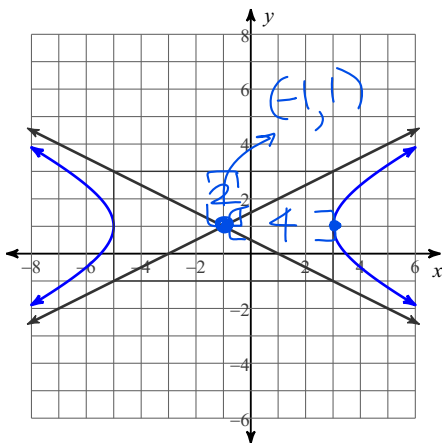
$\frac{25(x+1)^2}{400} - \frac{16y^2}{400} = \frac{400}{400}$

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

$-16x^2 + 128x - 256 + y^2 - 2y + 1 = 271$   
 $-16(x^2 - 8x + 16) + (y-1)^2 = 276$   
 $-16(x-4)^2 + (y-1)^2 = 16$   
 $\frac{-16(x-4)^2}{16} + \frac{(y-1)^2}{16} = \frac{16}{16}$   
 $-(x-4)^2 + \frac{(y-1)^2}{16} = 1$

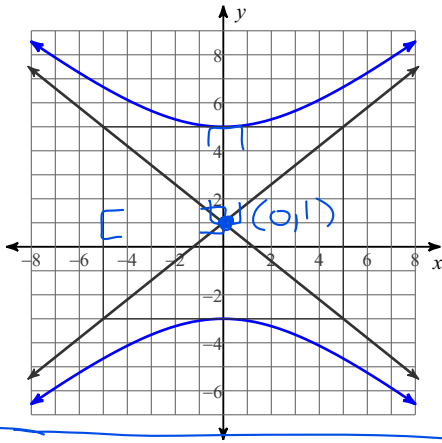
Use the information provided to write the standard form equation of each hyperbola.

3)



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

4)



$$\frac{-(x-0)^2}{25} + \frac{(y-1)^2}{16} = 1$$

5) Center at  $(-1, -9)$

direction of opening  $\rightarrow$  Transverse axis is vertical and 20 units long  
 Conjugate axis is 8 units long  
 $\hookrightarrow$  not the direction of opening

$$\frac{-(x+1)^2}{16} + \frac{(y+9)^2}{100} = 1$$

6) Foci:  $(11, -4), (-15, -4)$

Endpoints of Conjugate Axis:  $(-2, 8), (-2, -16)$   
 "center"  $(-2, -4)$

$$\frac{(x+2)^2}{25} - \frac{(y+4)^2}{144} = 1$$

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

$$169 = a^2 + 144$$

$$a^2 = 25$$

7) Vertices:  $(7, 5), (7, -19)$

Foci:  $(7, 6), (7, -20)$

$$\frac{-19+5}{2} = \frac{-14}{2} = -7 \quad \frac{6-20}{2} = \frac{-14}{2} = -7$$

$$\frac{-(x-7)^2}{25} + \frac{(y+7)^2}{144} = 1$$

$$c^2 = 144 + b^2$$

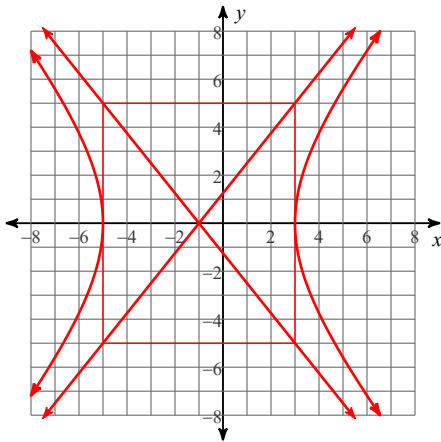
$$169 = 144 + b^2$$

$$b^2 = 25$$

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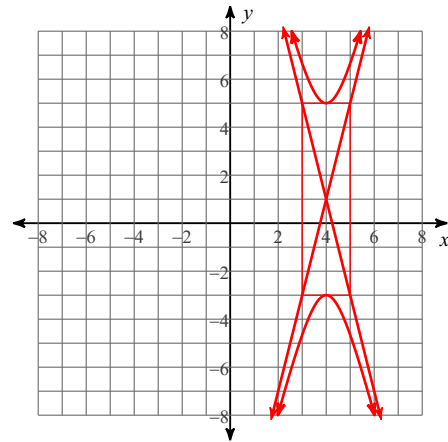
Identify the vertices, foci, and asymptotes of each. Then sketch the graph.

1)  $25x^2 - 16y^2 + 50x - 375 = 0$



Vertices:  $(3, 0)$   
 $(-9, 0)$   
 Foci:  $(-1 + \sqrt{41}, 0)$   
 $(-1 - \sqrt{41}, 0)$   
 Asym.:  $y = \frac{5}{4}x + \frac{5}{4}$   
 $y = -\frac{5}{4}x - \frac{5}{4}$

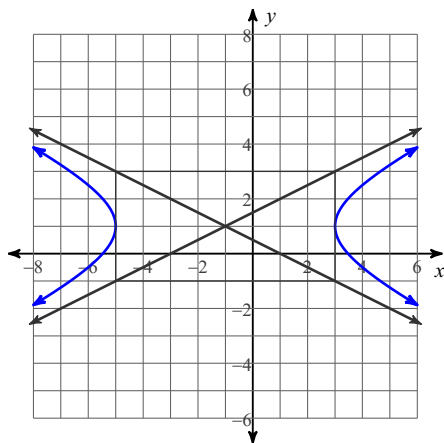
2)  $-16x^2 + y^2 + 128x - 2y - 271 = 0$



Vertices:  $(4, 5)$   
 $(4, -7)$   
 Foci:  $(4, 1 + \sqrt{17})$   
 $(4, 1 - \sqrt{17})$   
 Asym.:  $y = 4x - 15$   
 $y = -4x + 17$

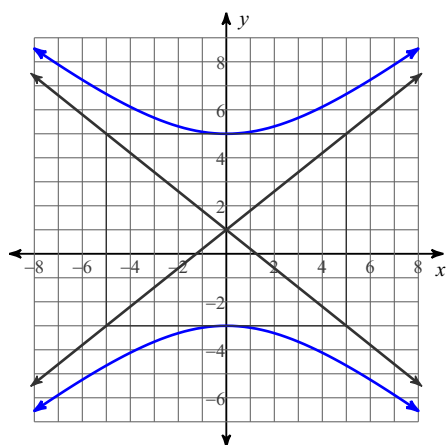
Use the information provided to write the standard form equation of each hyperbola.

3)



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

4)



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

5) Center at  $(-1, -9)$ 

Transverse axis is vertical and 20 units long

Conjugate axis is 8 units long

$$\frac{(y+9)^2}{100} - \frac{(x+1)^2}{16} = 1$$

6) Foci:  $(11, -4)$ ,  $(-15, -4)$ Endpoints of Conjugate Axis:  $(-2, 8)$   
 $(-2, -16)$ 

$$\frac{(x+2)^2}{25} - \frac{(y+4)^2}{144} = 1$$

7) Vertices:  $(7, 5)$ ,  $(7, -19)$ Foci:  $(7, 6)$ ,  $(7, -20)$ 

$$\frac{(y+7)^2}{144} - \frac{(x-7)^2}{25} = 1$$