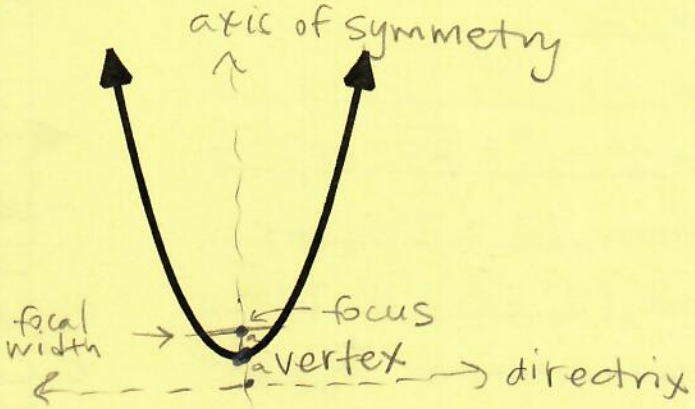
SM2H

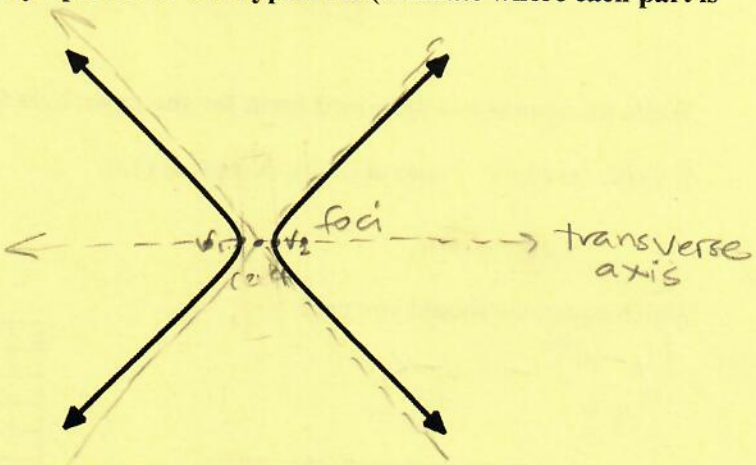
Name:_____ Period:_____ Date:_____

5.3 Graphing and Finding the Equation of Hyperbola 6.3.3 (H.5.1)

1. Draw and label the vertex, focus, both a values, axis of symmetry, directrix, and the latus rectum (focal width) for the parabola (estimate where each part is located).



2. Label the center, vertices, foci, transverse axis, and asymptotes for the hyperbola (estimate where each part is located).



Locate the center, vertices, foci and asymptotes of the hyperbola, then graph.

3. $\frac{x^2}{25}-\frac{y^2}{9}=1$

Center: (0,0)

a= 5

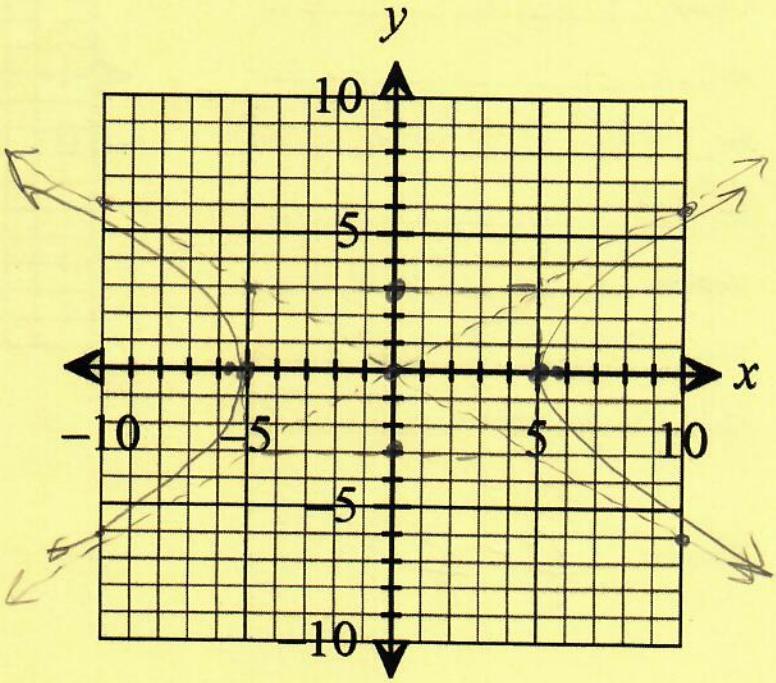
b= 3

c= $c^2=25+9=\sqrt{34}$ $c=\sqrt{34}$

Vertices: (-5,0) (5,0)

Foci: $(-\sqrt{34},0)$ $(\sqrt{34},0)$

Slope of the Asymptotes: $3/5, -3/5$



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

Center: (0,0)

a= 2

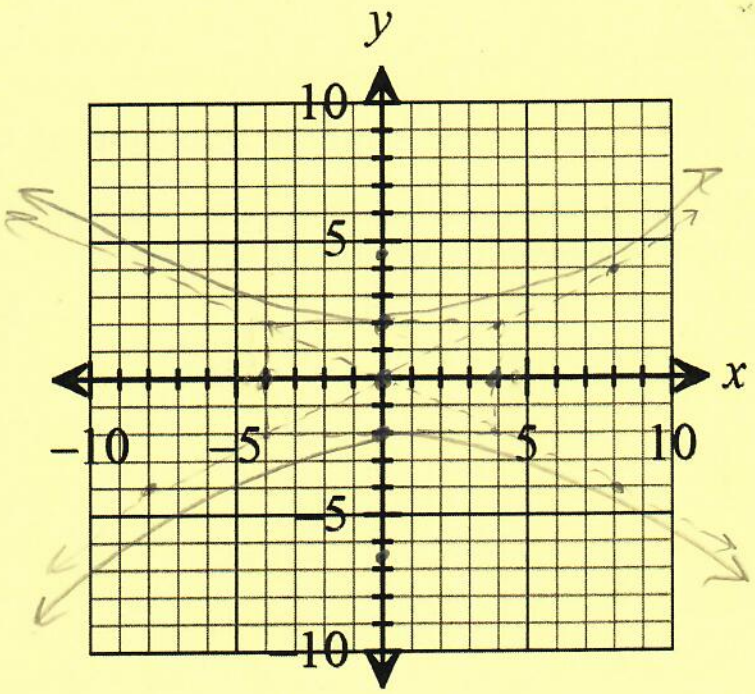
b= 4

c= $2^2+4^2 = \sqrt{20}$ or $2\sqrt{5}$

Vertices: (0,2) (0,-2)

Foci: $(0, 2\sqrt{5})$ $(0, -2\sqrt{5})$

Slope of the Asymptotes: $\frac{1}{2}, -\frac{1}{2}$



Write an equation in standard form for the hyperbola that satisfies the given conditions.

5. Center at (0,0); Focus at (3, 0); Vertex at (1,0)

Which equations should you use?

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

Center: (0,0)

a= 1

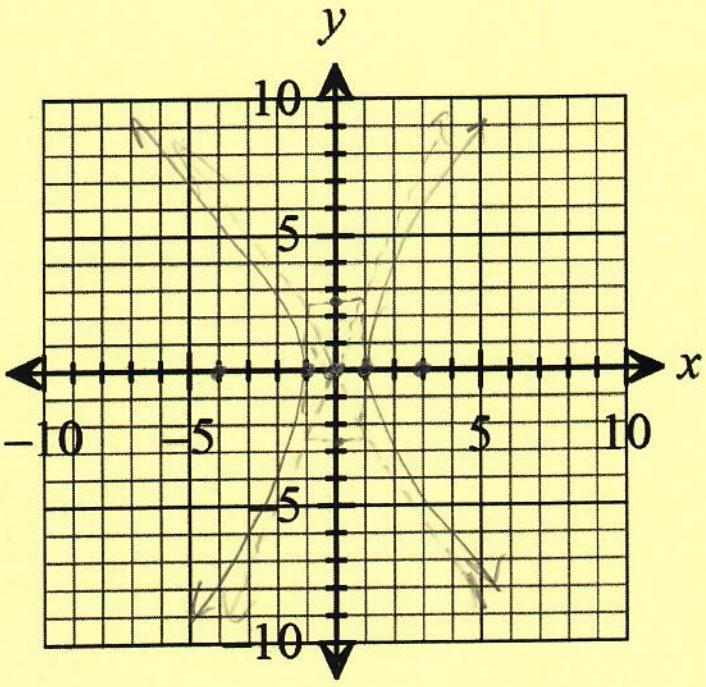
b= $1^2+b^2=3^2$ $\quad b^2=8$ $\quad b=\sqrt{8}$

c= 3

Vertices: (1,0) (-1,0)

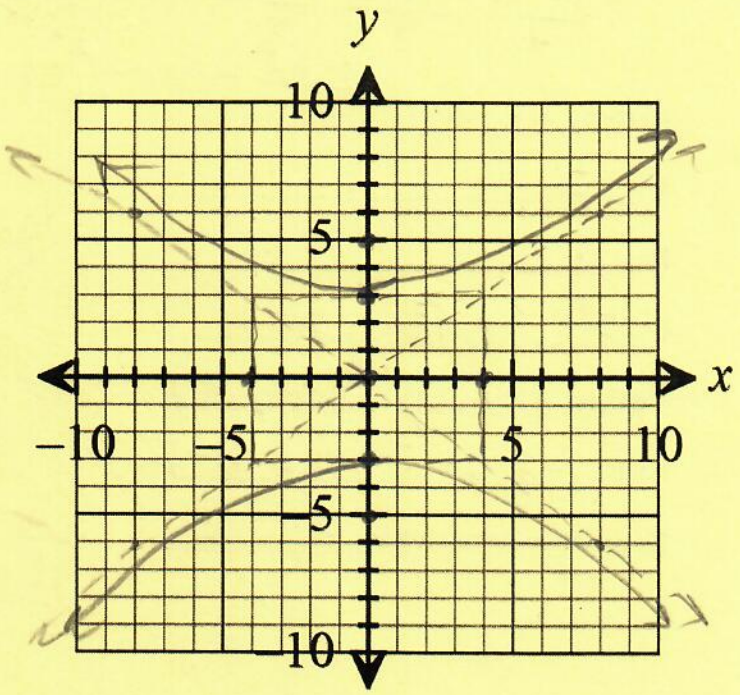
Foci: (3,0) (-3,0)

Slope of the Asymptotes: $\sqrt{8}, -\sqrt{8}$



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

6. Foci at (0,-5) and (0, 5); Vertex at (0,3)



Which equations should you use?

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

Center: (0,0)

a= 3

b= $3^2+b^2=5^2$ $b^2=16$ $b=4$

c= 5

Vertices: (0,3) (0,-3)

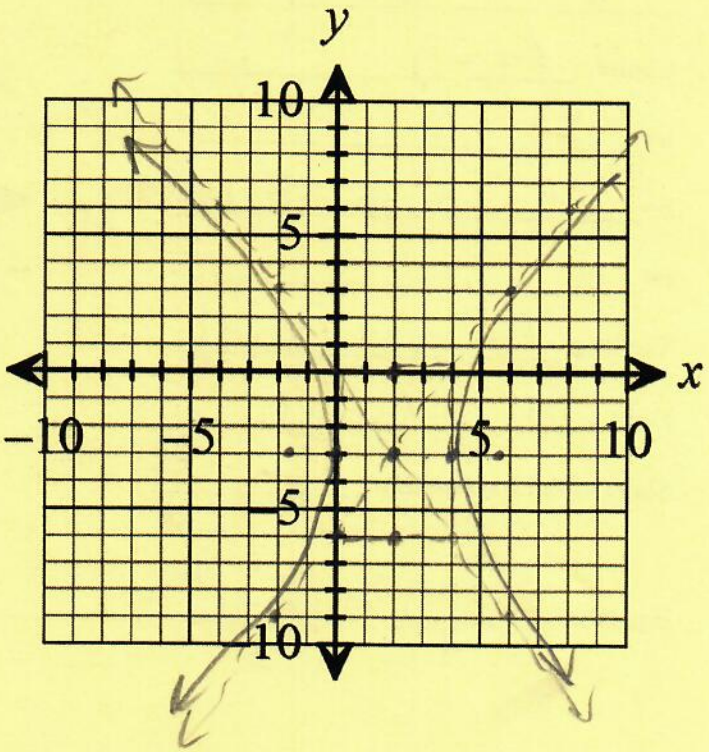
Foci: (0,-5) (0,5)

Slope of the Asymptotes: 3/4, -3/4

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

Locate the center, vertices, foci and asymptotes of the hyperbola, then graph.

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



Center: (2,-3)

a= 2

b= 3

c= $c^2=2^2+3^2=\sqrt{13}$

Vertices: (0,-3); (4,-3)

Foci: $(2+\sqrt{13}, -3)$; $(2-\sqrt{13}, -3)$

Slope of the Asymptotes: 3/2, -3/2

8. $\frac{(y-2)^2}{4} - \frac{4(x+2)^2}{4} = \frac{4}{4}$ (check to make sure the form is correct)

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

Center: $(-2, 2)$

a= 2

b= 1

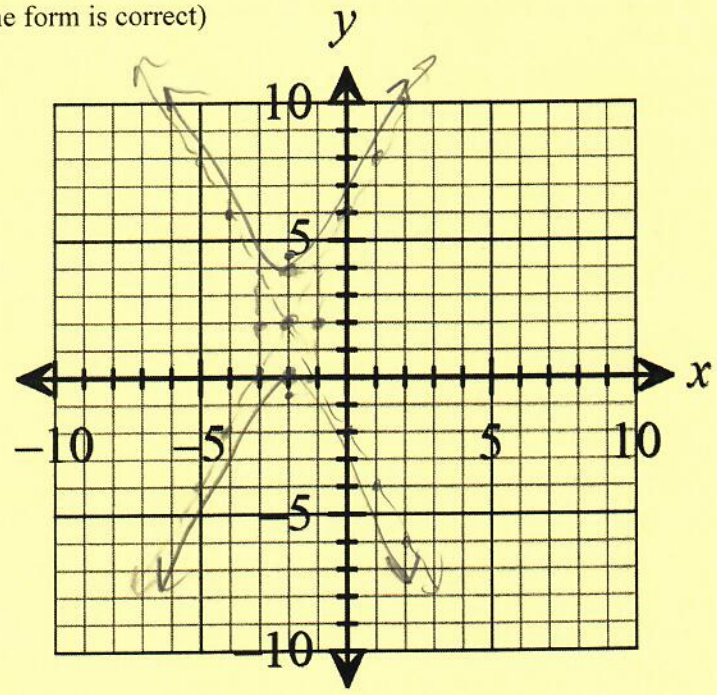
c= $2^2+1^2=\sqrt{5}$ 2.24

Vertices: $(-2, 0)$ $(-2, 4)$

Foci: $(-2, 2+\sqrt{5})$ $(-2, 2-\sqrt{5})$

Slope of the Asymptotes: $2, -2$

up & down



Write an equation in standard form for the hyperbola that satisfies the given conditions.

9. Center at (4, -1); Focus at (7, -1); Vertex at (6,-1)

Which equations should you use?

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

Center: $(4, -1)$

a= 2

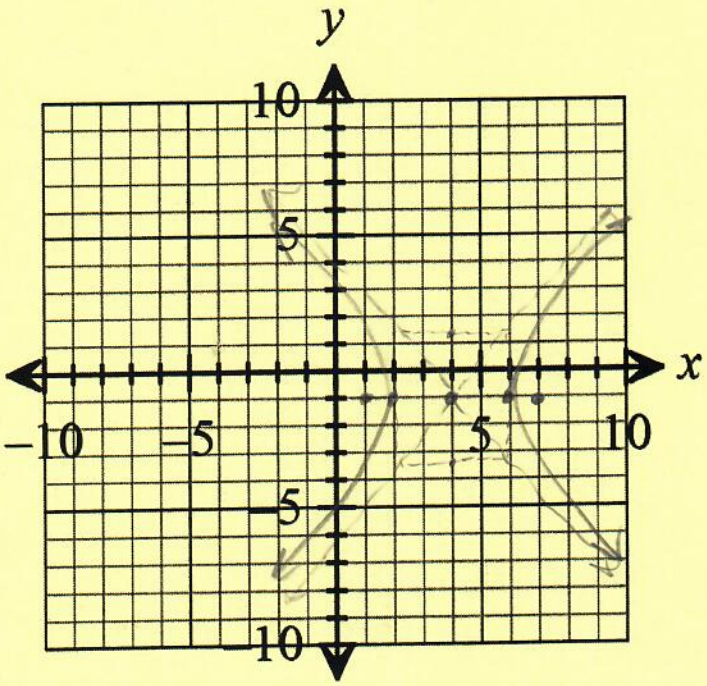
b= $2^2+b^2=3^2$ $b^2=5$ $b=\sqrt{5}$ 2.24

c= 3

Vertices: $(6, -1)$ $(2, -1)$

Foci: $(7, -1)$ $(1, -1)$

Slope of the Asymptotes: $\frac{\sqrt{5}}{2}, -\frac{\sqrt{5}}{2}$



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

10. Foci at (7, 3) and (7,7); Vertex at (7, 6)

Which equations should you use?

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

up & down

Center: (7,5)

a= 1

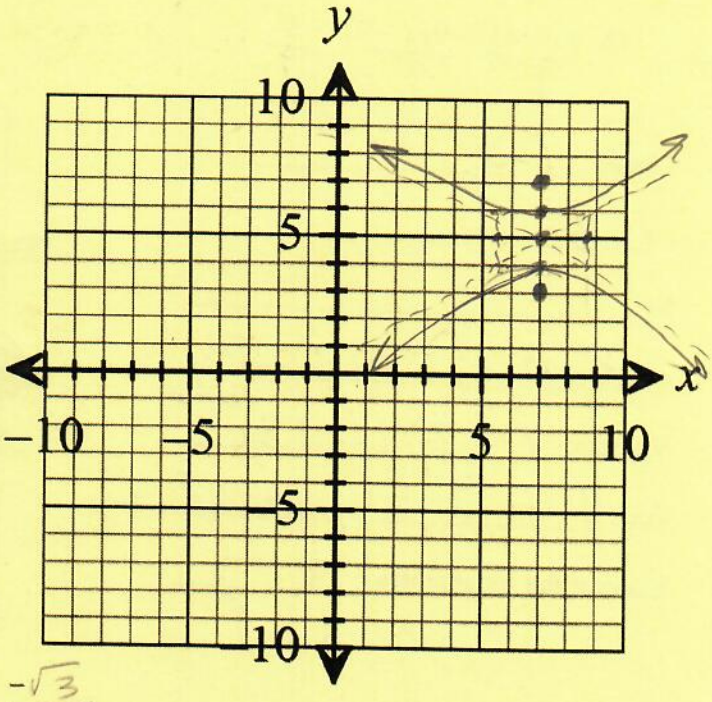
b= $1^2+b^2=2^2$ $b^2=3$ $b=\sqrt{3}$ 1.73

c= 2

Vertices: (7,6); (7,4)

Foci: (7,3); (7,7)

Slope of the Asymptotes: $\frac{1}{\sqrt{3}}, \frac{-1}{\sqrt{3}} = \frac{\sqrt{3}}{3}, -\frac{\sqrt{3}}{3}$



Equation: $\frac{(y-5)^2}{1} - \frac{(x-7)^2}{3} = 1$

Locate the center, a,b,c, vertices, foci and asymptotes of the hyperbola, then graph.

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

opens up/down

Center: (0,0)

a= 4

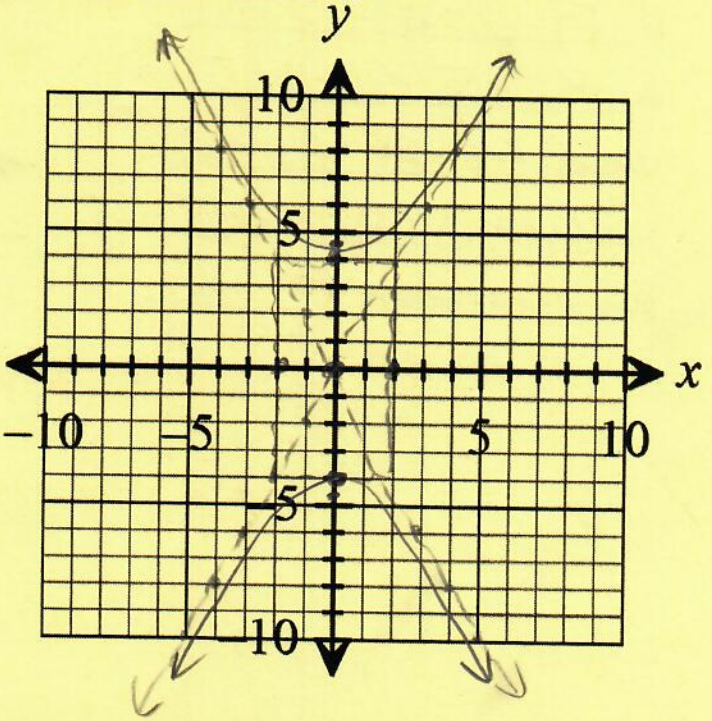
b= 2

c= $4^2+2^2=c^2 = 16+4=0 = \sqrt{20} = 2\sqrt{5}$

Vertices: (0,4); (0,-4)

Foci: $(0, 2\sqrt{5})$; $(0, -2\sqrt{5})$

Slope of the Asymptotes: 2, -2



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

left/right

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

Center: $(-4, 3)$

a= 3

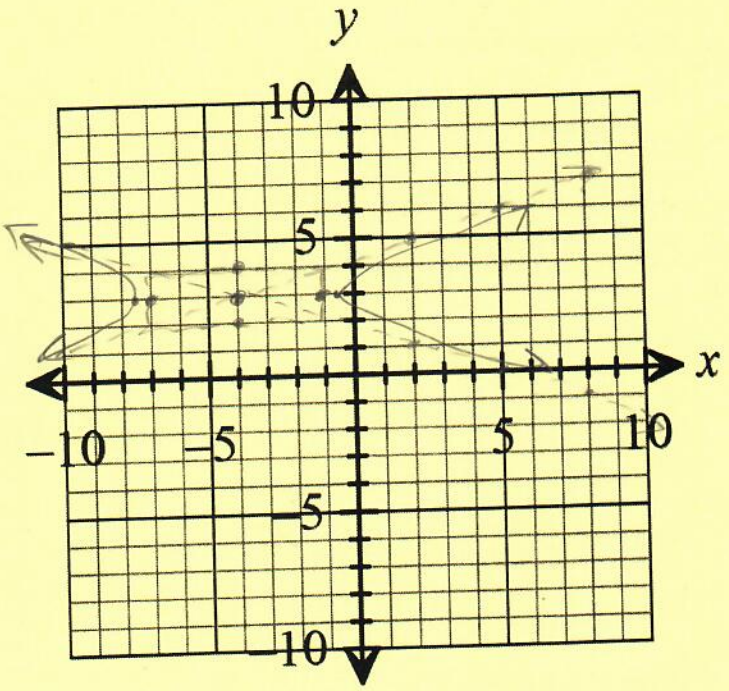
b= 1

c= $3^2+1^2=c^2=10 \quad c=\sqrt{10} \approx 3.16$

Vertices: $(-1, 3)$; $(-7, 3)$

Foci: $(-4+\sqrt{10}, 3)$; $(-4-\sqrt{10}, 3)$

Slope of the Asymptotes: $\frac{1}{3}, \frac{-1}{3}$



$\frac{(x+4)^2}{4} - \frac{(y+2)^2}{7} = 1$

left/right

13. $\frac{7(x+4)^2}{28} - \frac{4(y+2)^2}{28} = \frac{28}{28}$

Center: $(-4, -2)$

a= 2

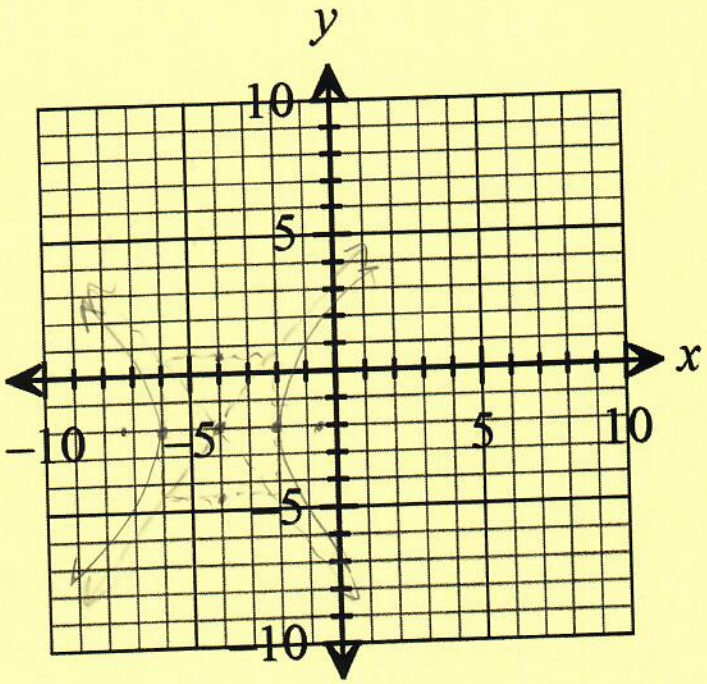
b= $\sqrt{7} \approx 2.65$

c= $c^2=2^2+\sqrt{7}^2=4+7=\sqrt{11} \approx 3.32$

Vertices: $(-2, -2)$; $(-6, -2)$

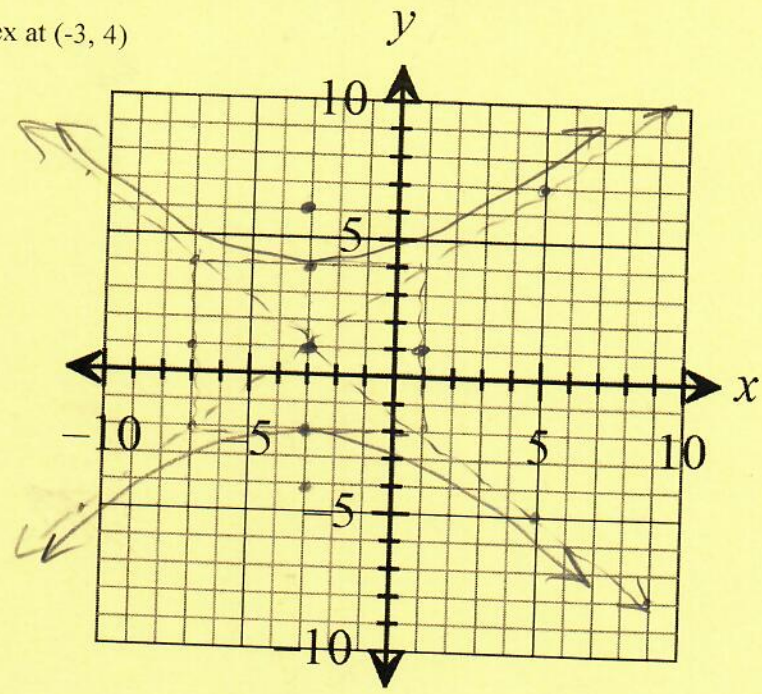
Foci: $(-4+\sqrt{11}, -2)$; $(-4-\sqrt{11}, -2)$

Slope of the Asymptotes: $\frac{\sqrt{7}}{2}, \frac{-\sqrt{7}}{2}$



Write an equation in standard form for the hyperbola that satisfies the given condition.

14. Center at (-3, 1); Focus at (-3, 6); Vertex at (-3, 4)



up/down

Which equations should you use? $\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$

Center: $(-3, 1)$

a= 3

b= $3^2+b^2=5^2 \quad b^2=16 \quad b=4$

c= 5

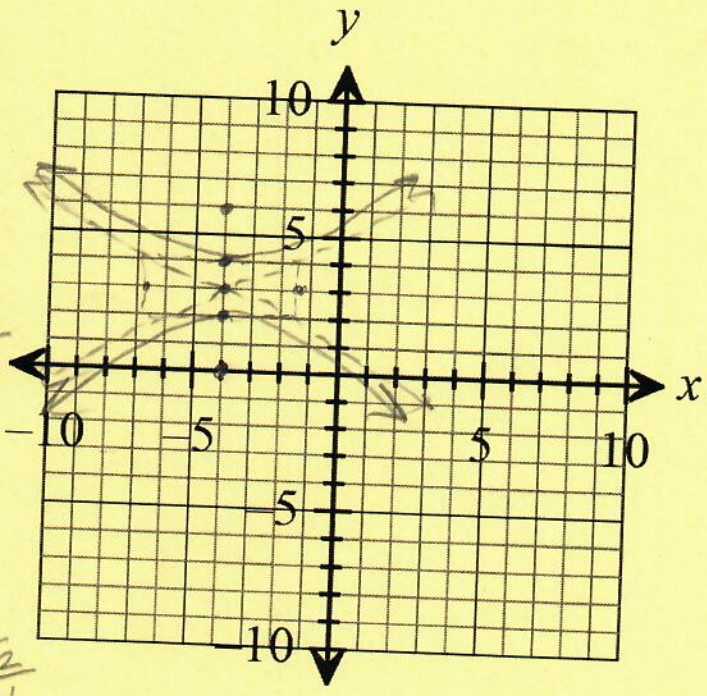
Vertices: $(-3, 4)$; $(-3, -2)$

Foci: $(-3, 6)$; $(-3, -4)$

Slope of the Asymptotes: $\frac{3}{4}, \frac{-3}{4}$

Equation: $\frac{(y-1)^2}{9} - \frac{(x+3)^2}{16} = 1$

15. Focus at (-4, 0); Vertices at (-4, 4) and (-4, 2)



up/down

Which equations should you use? $\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$

Center: $(-4, 3)$

a= $a^2+1^2=3^2 \quad a^2=8 \quad a=\sqrt{8} \text{ or } 2\sqrt{2}$ 2.83

b= 1

c= 3

Vertices: $(-4, 2)$; $(-4, 4)$

Foci: $(-4, 0)$; $(-4, 6)$

Slope of the Asymptotes: $\frac{1}{2\sqrt{2}}, \frac{-1}{2\sqrt{2}}$ or $\frac{\sqrt{2}}{4}, \frac{-\sqrt{2}}{4}$

Equation: $\frac{(y-3)^2}{1} - \frac{(x+4)^2}{8} = 1$