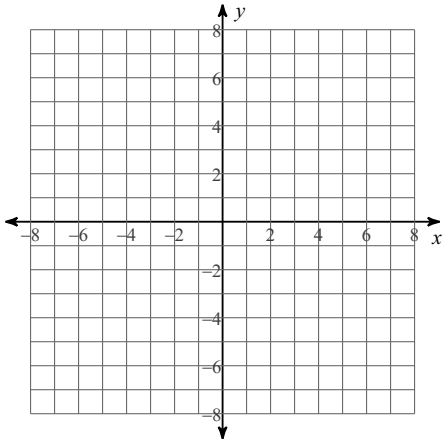
Precalculus Name_____

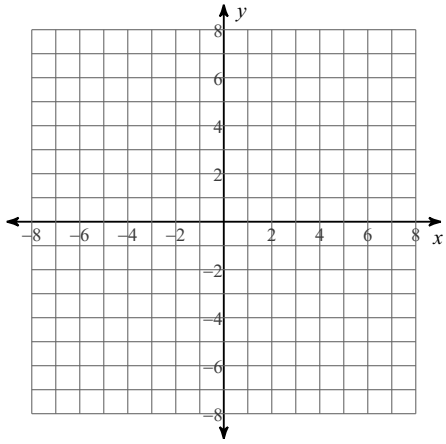
Hyperbolas Graphing and properties

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

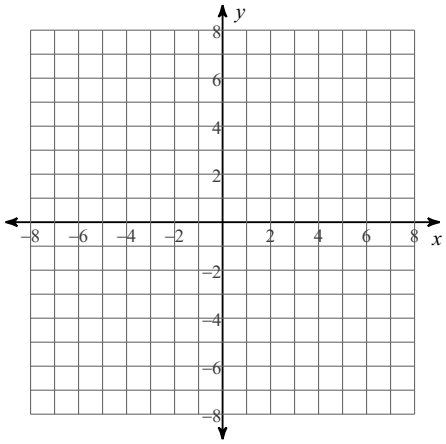
1) $\frac{(y-2)^2}{4} - \frac{x^2}{9} = 1$



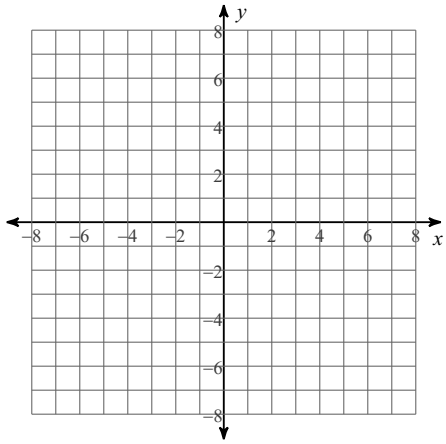
2) $\frac{(y+1)^2}{16} - \frac{x^2}{25} = 1$



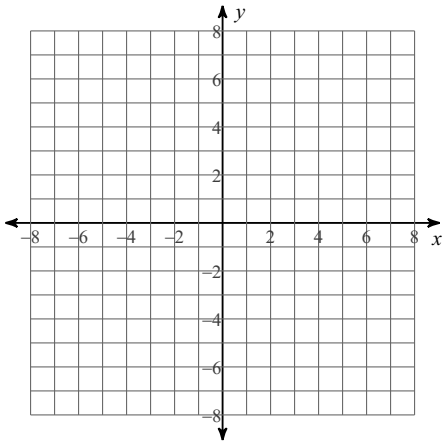
3) $\frac{x^2}{25} - \frac{(y+1)^2}{16} = 1$



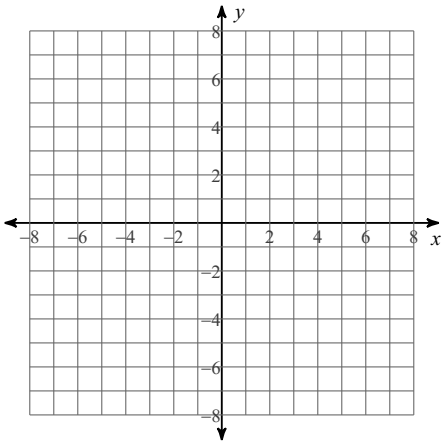
4) $\frac{y^2}{4} - x^2 = 1$



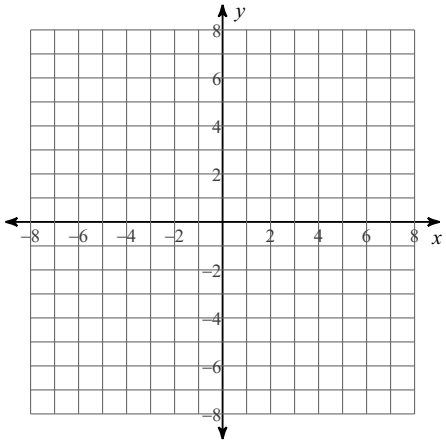
5) $\frac{(x+2)^2}{4} - (y+4)^2 = 1$



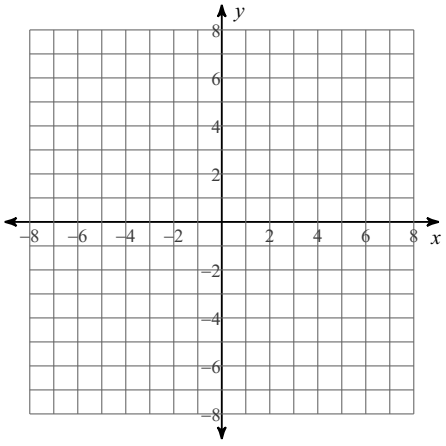
6) $\frac{(y+1)^2}{16} - \frac{(x-2)^2}{9} = 1$



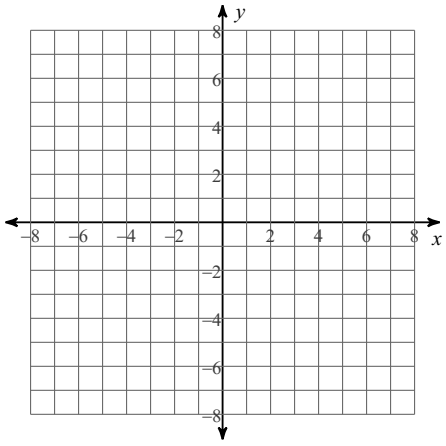
7) $\frac{(y-1)^2}{9} - \frac{(x+1)^2}{9} = 1$



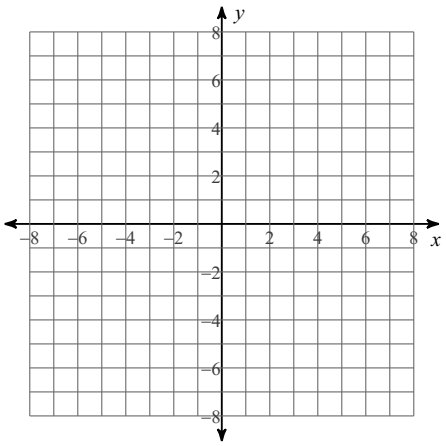
8) $(y-1)^2 - \frac{(x-1)^2}{16} = 1$



9) $y^2 - (x+1)^2 = 1$



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



Writign Equations of Hyperbolas: Use the information provided to write the standard form equation of each hyperbola.

11) Vertices: $(-1, 5), (-1, -3)$
Foci: $(-1, 6), (-1, -4)$

12) Vertices: $(-10, -5), (-10, -13)$
Foci: $(-10, -4), (-10, -14)$

13) Vertices: $(9, 6), (9, -18)$
Foci: $(9, 7), (9, -19)$

14) Vertices: $(6, 12), (6, 4)$
Foci: $(6, 13), (6, 3)$

15) Vertices: $(-9, 13), (-9, 5)$
Foci: $(-9, 14), (-9, 4)$

16) Vertices: $(5, 5), (-5, 5)$
Foci: $(13, 5), (-13, 5)$

17) Vertices: $(-1, -7), (-11, -7)$
Foci: $(7, -7), (-19, -7)$

18) Vertices: $(-7, 12), (-7, -12)$
Foci: $(-7, 13), (-7, -13)$

19) Vertices: $(1, -8), (-5, -8)$
Foci: $(3, -8), (-7, -8)$

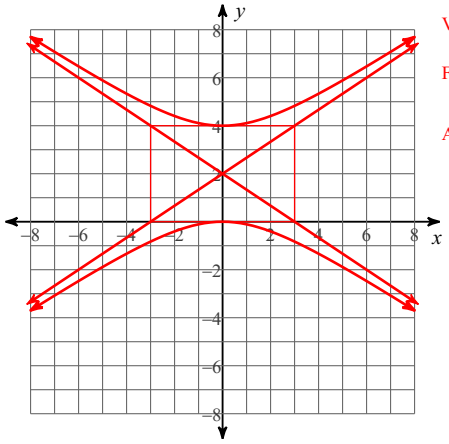
20) Vertices: $(-2, -2), (-2, -10)$
Foci: $(-2, -1), (-2, -11)$

Precalculus Name_____

Hyperbolas Graphing and properties

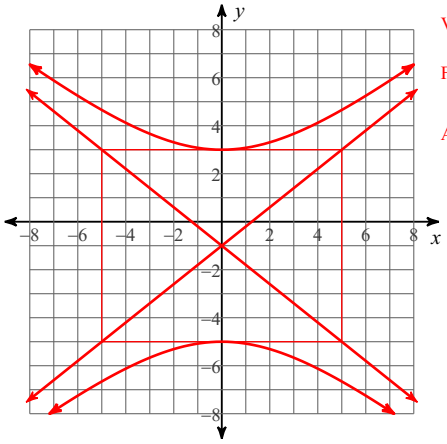
Identify the vertices, foci, and asymptotes of each. Then sketch the graph.

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



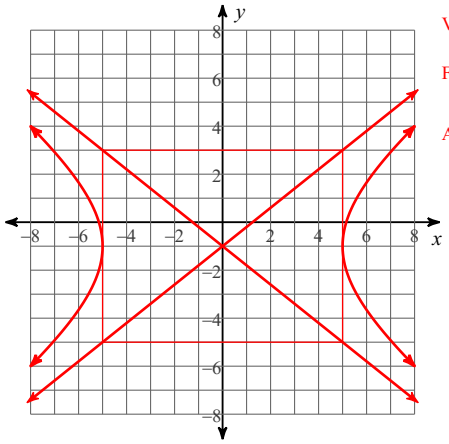
Vertices: $(0, 4)$ $(0, 0)$
Foci: $(0, 2+\sqrt{13})$ $(0, 2-\sqrt{13})$
Asym.: $y = \frac{2}{3}x + 2$ $y = -\frac{2}{3}x + 2$

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



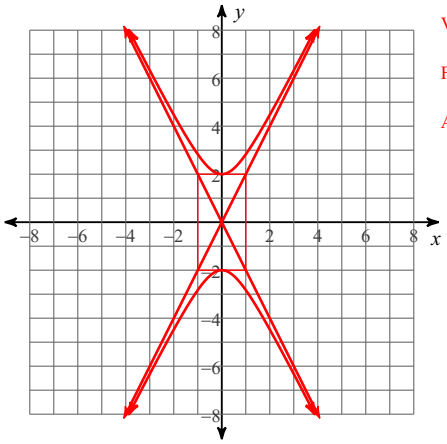
Vertices: $(0, 3)$ $(0, -5)$
Foci: $(0, -1+\sqrt{41})$ $(0, -1-\sqrt{41})$
Asym.: $y = \frac{4}{5}x - 1$ $y = -\frac{4}{5}x - 1$

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



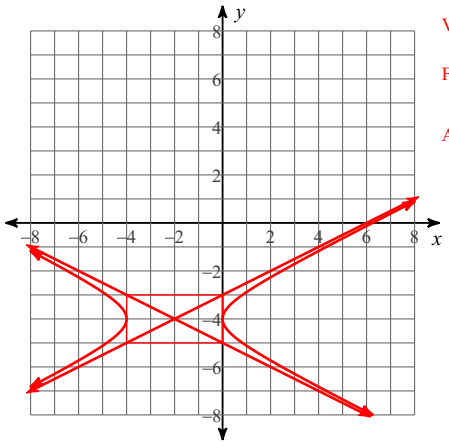
Vertices: $(5, -1)$ $(-5, -1)$
Foci: $(\sqrt{41}, -1)$ $(-\sqrt{41}, -1)$
Asym.: $y = \frac{4}{5}x - 1$ $y = -\frac{4}{5}x - 1$

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



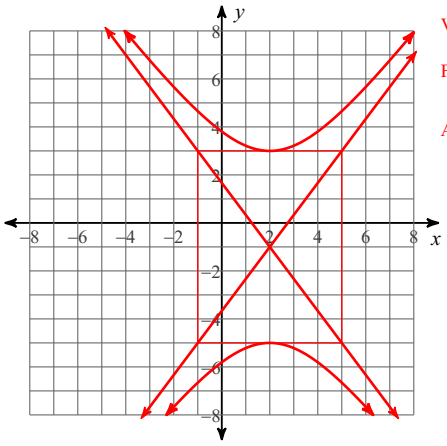
Vertices: $(0, 2)$ $(0, -2)$
Foci: $(0, \sqrt{5})$ $(0, -\sqrt{5})$
Asym.: $y = 2x$ $y = -2x$

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



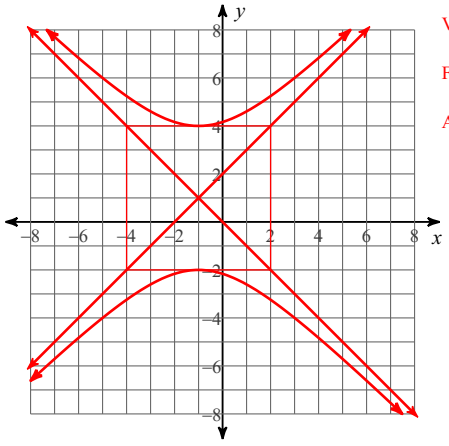
Vertices: $(0, -4)$
$(-4, -4)$
Foci: $(-2 + \sqrt{5}, -4)$
$(-2 - \sqrt{5}, -4)$
Asym.: $y = \frac{1}{2}x - 3$
$y = -\frac{1}{2}x - 5$

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



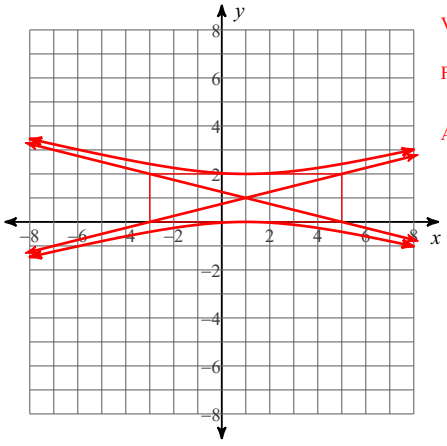
Vertices: $(2, 3)$
$(2, -5)$
Foci: $(2, 4)$
$(2, -6)$
Asym.: $y = \frac{4}{3}x - \frac{11}{3}$
$y = -\frac{4}{3}x + \frac{5}{3}$

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



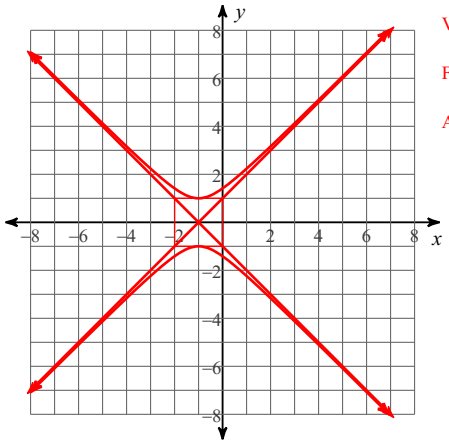
Vertices: $(-1, 4)$
$(-1, -2)$
Foci: $(-1, 1 + 3\sqrt{2})$
$(-1, 1 - 3\sqrt{2})$
Asym.: $y = x + 2$
$y = -x$

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



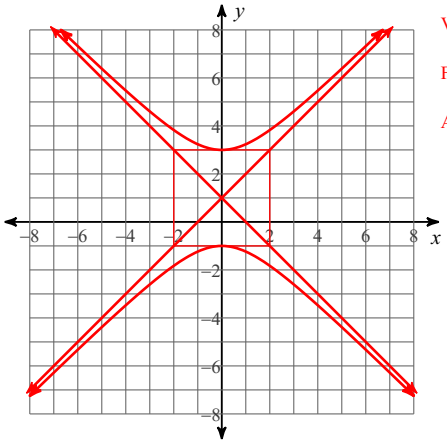
Vertices: $(1, 2)$
$(1, 0)$
Foci: $(1, 1 + \sqrt{17})$
$(1, 1 - \sqrt{17})$
Asym.: $y = \frac{1}{4}x + \frac{3}{4}$
$y = -\frac{1}{4}x + \frac{5}{4}$

9) $y^2 - (x+1)^2 = 1$



Vertices: $(-1, 1)$
$(-1, -1)$
Foci: $(-1, \sqrt{2})$
$(-1, -\sqrt{2})$
Asym.: $y = x + 1$
$y = -x - 1$

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



Vertices: $(0, 3)$
$(0, -1)$
Foci: $(0, 1 + 2\sqrt{2})$
$(0, 1 - 2\sqrt{2})$
Asym.: $y = x + 1$
$y = -x + 1$

Writign Equations of Hyperbolas: Use the information provided to write the standard form equation of each hyperbola.

11) Vertices: $(-1, 5), (-1, -3)$
Foci: $(-1, 6), (-1, -4)$

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

12) Vertices: $(-10, -5), (-10, -13)$
Foci: $(-10, -4), (-10, -14)$

$$\frac{(y+9)^2}{16} - \frac{(x+10)^2}{9} = 1$$

13) Vertices: $(9, 6), (9, -18)$
Foci: $(9, 7), (9, -19)$

$$\frac{(y+6)^2}{144} - \frac{(x-9)^2}{25} = 1$$

14) Vertices: $(6, 12), (6, 4)$
Foci: $(6, 13), (6, 3)$

$$\frac{(y-8)^2}{16} - \frac{(x-6)^2}{9} = 1$$

15) Vertices: $(-9, 13), (-9, 5)$
Foci: $(-9, 14), (-9, 4)$

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

16) Vertices: $(5, 5), (-5, 5)$
Foci: $(13, 5), (-13, 5)$

$$\frac{x^2}{25} - \frac{(y-5)^2}{144} = 1$$

17) Vertices: $(-1, -7), (-11, -7)$
Foci: $(7, -7), (-19, -7)$

$$\frac{(x+6)^2}{25} - \frac{(y+7)^2}{144} = 1$$

18) Vertices: $(-7, 12), (-7, -12)$
Foci: $(-7, 13), (-7, -13)$

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

19) Vertices: $(1, -8), (-5, -8)$
Foci: $(3, -8), (-7, -8)$

$$\frac{(x+2)^2}{9} - \frac{(y+8)^2}{16} = 1$$

20) Vertices: $(-2, -2), (-2, -10)$
Foci: $(-2, -1), (-2, -11)$

$$\frac{(y+6)^2}{16} - \frac{(x+2)^2}{9} = 1$$