Sketch each hyperbola. Give the equations for the asymptotes.

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

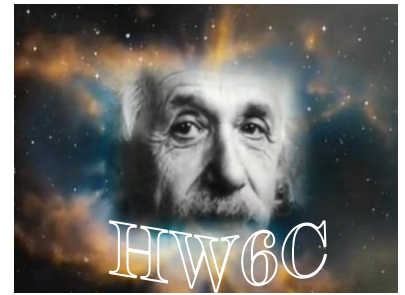2) $\dfrac{y^2}{16} - \dfrac{x^2}{4} = 1$

3) $x^2 - y^2 = 1$

4) $4y^2 - x^2 = 4$

5) $25x^2 - 16y^2 = 400$

6) $xy = 4$

7) $xy = -4$

8a) Sketch the hyperbola for the equation: $xy = 12$ and give the equations for the asymptotes.

8b) Predict where the graph for $(x + 3)(y + 4) = 12$ will be and predict the asymptote equations.

9) Determine, algebraically, the point or points of intersection for the following system of equations:
$$x^2 - y^2 = 1$$
$$x + y = 5$$

Find the equation of the hyperbola, with center at the origin that satisfies the given conditions.

10) A vertex (6, 0) and a focus (10, 0)

11) A vertex (0, -12) and a focus (0, -13)

12) A vertex (0, -2) and an asymptote with equation $y = -x$

13) A vertex (8, 0) and an asymptote with equation $y = \dfrac{1}{2}x$

Sketch the hyperbola. Find the coordinates of the vertices and foci. Name the slopes for the asymptotes.

14) $\dfrac{(x-6)^2}{36} - \dfrac{(y-8)^2}{64} = 1$

15) $\dfrac{(y+5)^2}{16} - \dfrac{x^2}{9} = 1$

16) $y^2 - x^2 - 2y + 4x - 4 = 0$

17) $x^2 - 4y^2 - 2x + 16y - 19 = 0$

Find the equation of the hyperbola that satisfies the given conditions.

18) Center is (5, 0); one vertex is (9, 0);
     one focus is (10, 0)

19) Vertices are (4, 0) and (4, 8);
     asymptotes have slopes ±1

20) Foci are (-1, 1) and (7, 1); length of
     the major axis is 6 units

21) Vertices are (-2, 4) and (-2, -2);
     one focus is (-2, -4)

For all graphs, see Mr. Paull

1) y = ±2/3x

11) $\dfrac{y^2}{144} - \dfrac{x^2}{25} = 1$

16) V: (2, 2), (2, 0)

2) y = ±2x

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

F: $(2, 1 + \sqrt{2}), (2, 1 - \sqrt{2})$

3) y = ±x

13) $\dfrac{x^2}{64} - \dfrac{y^2}{16}$

asymp: ±1

4) y = ±1/2x

14) V: (12, 8), (0, 8)

17) V: (3, 2), (-1, 2)

5) y = ±5/4x

F: (16, 8), (-4, 8)

F: $(1 + \sqrt{5}, 2), (1 - \sqrt{5}, 2)$

6) x = 0, y = 0

asymp: ±4/3

asymp: ±1/2

7) x = 0, y = 0

15) V: (0, -1), (0, -9)

18) $\dfrac{(x-5)^2}{16} - \dfrac{y^2}{9} = 1$

8) x = 0, y = 0

F: (0, 0), (0, -10)

19) $\dfrac{(y-4)^2}{16} - \dfrac{(x-4)^2}{16} = 1$

9) x = -3, y = -4

asymp: ±4/3

20) $\dfrac{(x-3)^2}{9} - \dfrac{(y-1)^2}{7} = 1$

10) $\dfrac{x^2}{36} - \dfrac{y^2}{64} = 1$

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