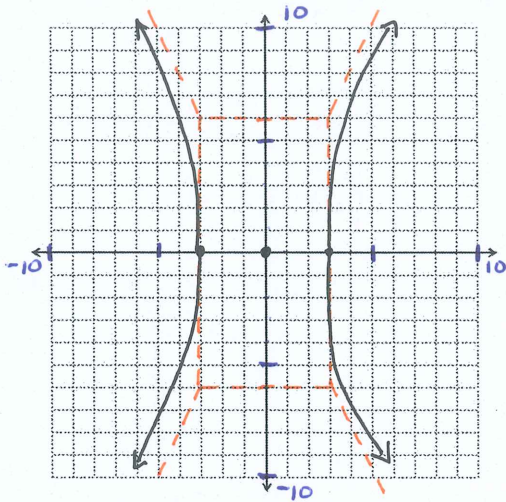


In Problems 1 - 2, (a) find the standard form of the equation of the hyperbola, if necessary, (b) find the center, vertices, foci, and asymptotes of the hyperbola, and (c) sketch the hyperbola.

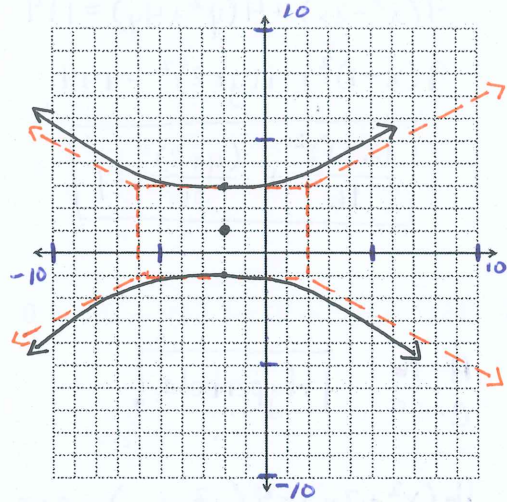
1.  $\frac{x^2}{9} - \frac{y^2}{36} = 1$



B) Center  $(0,0)$       VERTICES  $(\pm 3,0)$

Foci  $(\pm\sqrt{45}, 0)$       Asymptotes  $y = \pm 2x$

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



B) Center  $(-2,1)$       VERTICES  $(-2,3)$   
 $(-2,-1)$

Foci  $(-2, 1 \pm \sqrt{20})$       Asymptotes  $y = 1 \pm \frac{1}{2}(x+2)$

Find the standard form of the equation of the hyperbola with the given characteristics.

3. Center:  $(0,0)$  Vertices:  $(\pm 2,0)$  Foci:  $(\pm 4,0)$

$a=2$      $c=4$   
 $B = \sqrt{16-4}$   
 $B = \sqrt{12}$

HORIZONTAL  
 $\frac{(x-h)^2}{A^2} - \frac{(y-k)^2}{B^2} = 1$

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

4. Vertices:  $(0,2), (0,6)$  Foci:  $(0,0), (0,8)$

$a=2$      $c=4$   
 $B = \sqrt{16-4}$

VERTICAL  
 $\frac{(y-k)^2}{A^2} - \frac{(h-k)^2}{B^2} = 1$

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

Classify the graph of the equation as a circle, a parabola, an ellipse, or a hyperbola. Then write the equation in standard form.

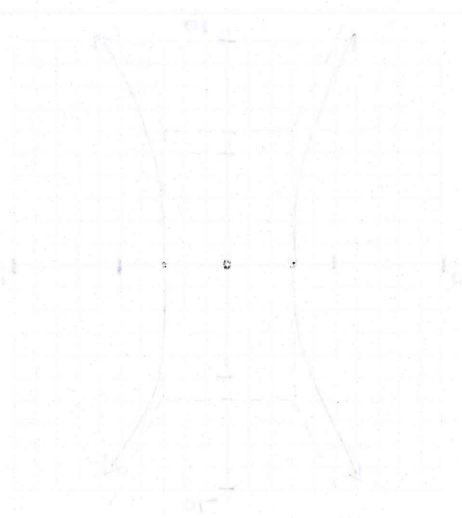
5.  $9x^2 + 4y^2 - 18x + 16y - 119 = 0$

$A=9$   
 $C=4$  **Ellipse**

$$9(x^2 - 2x) + 4(y^2 + 4y) = 119$$

$$9(x-1)^2 + 4(y+2)^2 = 144$$

$$\frac{(x-1)^2}{16} + \frac{(y+2)^2}{36} = 1$$



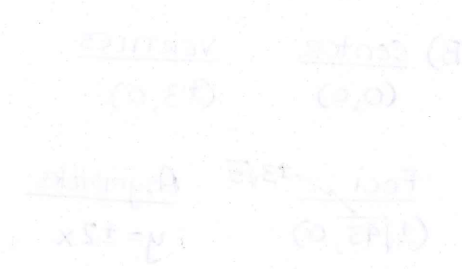
6.  $16x^2 - 9y^2 + 32x + 54y - 209 = 0$

$A=16$   
 $C=-9$  **Hyperbola**

$$16(x^2 + 2x) - 9(y^2 - 6y) = 209$$

$$16(x+1)^2 - 9(y-3)^2 = 144$$

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



7.  $y^2 + 12x + 4y + 28 = 0$

$A=1$   
 $C=0$  **PARABOLA**

$$y^2 + 4y = -12x - 28$$

$$(y+2)^2 = -12(x+2)$$

8.  $x^2 + y^2 + 2x - 6y = 0$

$A=1$   
 $C=1$  **CIRCLE**

$$x^2 + 2x + y^2 - 6y = 0$$

$$(x+1)^2 + (y-3)^2 = 10$$

