

Name: \_\_\_\_\_  
PC: Conic Sections

Date: \_\_\_\_\_

Do Now:

Ms. Loughran

1. Given  $\frac{5(x+1)^2}{15} + \frac{3y^2}{15} = 15$ . Find each of the following.

Center:  $(-1, 0)$

$$\frac{(x+1)^2}{3} + \frac{y^2}{5} = 1$$

Major axis length:  $2\sqrt{5}$

VMA

Minor axis length:  $2\sqrt{3}$

$$a^2 = 5, a = \sqrt{5} \updownarrow$$

$$b^2 = 3, b = \sqrt{3} \leftarrow$$

Vertices:  $(-1, \pm\sqrt{5})$

$$c^2 = 5 - 3 = 2$$

$$c = \sqrt{2} \updownarrow$$

Covertices:  $(-1 \pm \sqrt{3}, 0)$

Foci:  $(-1, \pm\sqrt{2})$

2. Given  $\frac{(y+1)^2}{49} - \frac{(x-3)^2}{25} = 1$ . Find each of the following.

Center:  $(3, -1)$

VTA

Vertices:  $(3, -1 \pm 7)$   $\left\{ \begin{array}{l} (3, -8) \\ (3, 6) \end{array} \right.$

$$a^2 = 49, a = 7 \updownarrow$$

$$b^2 = 25, b = 5$$

Foci:  $(3, -1 \pm \sqrt{74})$

$$c^2 = 49 + 25 = 74$$

$$c = \sqrt{74} \updownarrow$$

Asymptotes:  $y + 1 = \pm \frac{7}{5}(x - 3)$

## Continuing in yesterday's Hyperbola packet...

4. Find the coordinates of the center, foci, and vertices, and the equations of the asymptotes of the graph of  $\frac{(x-5)^2}{25} - \frac{(y+1)^2}{9} = 1$ . Then graph the hyperbola.

HFA

Center:  $(5, -1)$

$a = 5 \Rightarrow$

$b = 3$

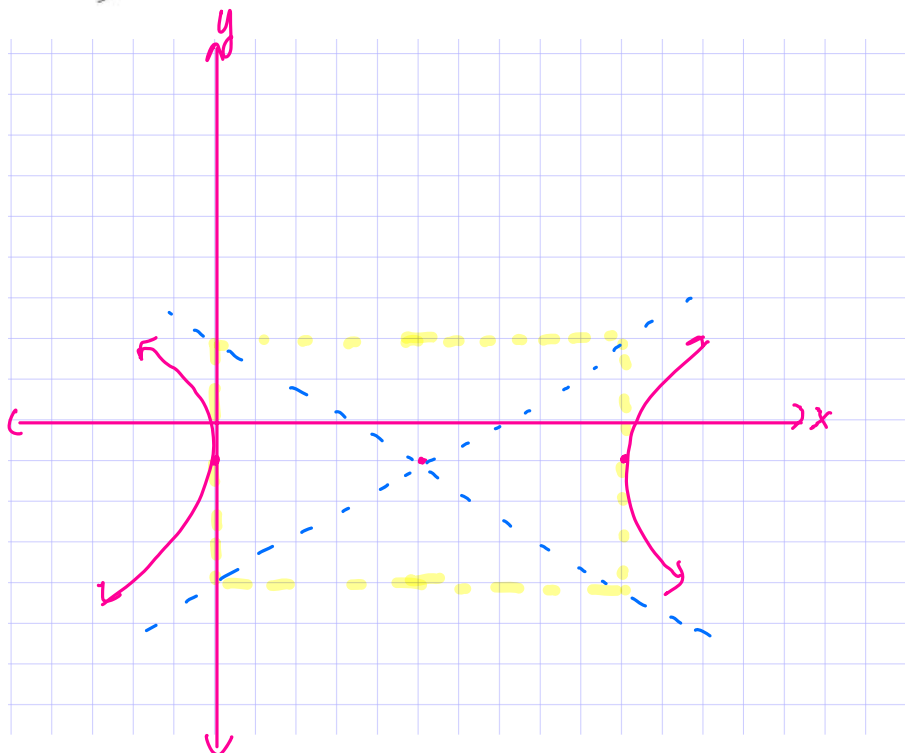
$c^2 = 34$

$c = \sqrt{34} \Rightarrow$

Vertices:  $(5 \pm 5, -1)$   $\left\{ \begin{array}{l} (10, -1) \\ (0, -1) \end{array} \right.$

Foci:  $(5 \pm \sqrt{34}, -1)$

asym:  $y + 1 = \pm \frac{3}{5}(x - 5)$



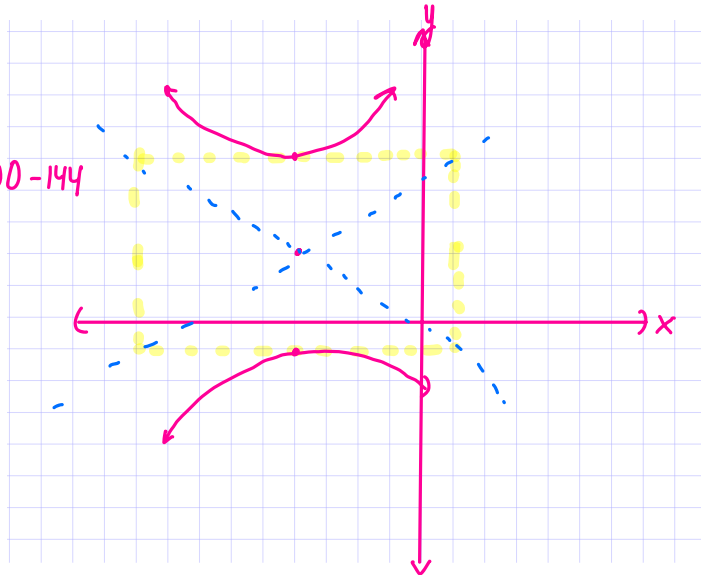
5. Find the coordinates of the center, foci, and vertices, and the equations of the asymptotes of the graph of  $25y^2 - 9x^2 - 100y - 72x - 269 = 0$ . Then graph the hyperbola.

$$25y^2 - 100y - 9x^2 - 72x = 269$$

$$25(y^2 - 4y + 4) - 9(x^2 + 8x + 16) = 269 + 100 - 144$$

$$\frac{25(y-2)^2}{225} - \frac{9(x+4)^2}{225} = \frac{225}{225}$$

$$\frac{(y-2)^2}{9} - \frac{(x+4)^2}{25} = 1$$



Center:  $(-4, 2)$  VTA

$a = 3$   $\updownarrow$

$b = 5$

$c^2 = 34$

$c = \sqrt{34}$   $\updownarrow$

Vertices:  $(-4, 2 \pm 3) \left\langle \begin{matrix} (-4, 5) \\ (-4, -1) \end{matrix} \right.$

foci:  $(-4, 2 \pm \sqrt{34})$

Asym:  $y - 2 = \pm \frac{3}{5}(x + 4)$

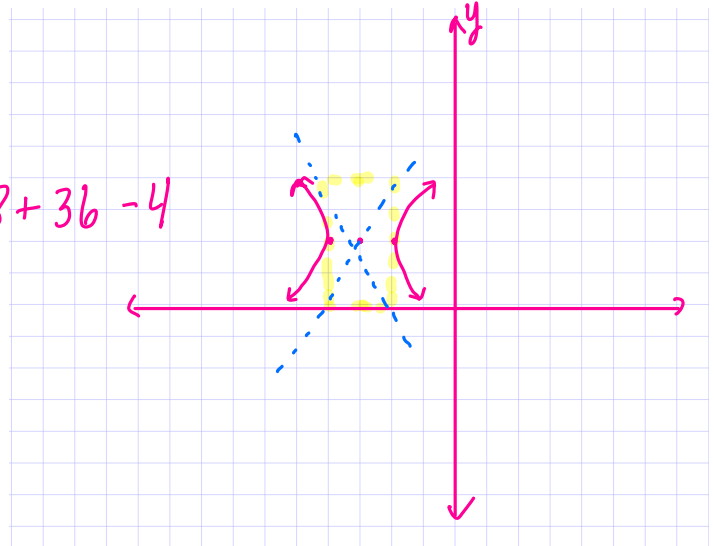
6. Find the coordinates of the center, foci, and vertices, and the equations of the asymptotes of the graph of  $4x^2 - y^2 + 24x + 4y + 28 = 0$ . Then graph the hyperbola.

$$4x^2 + 24x - y^2 + 4y = -28$$

$$4(x^2 + 6x + 9) - (y^2 - 4y + 4) = -28 + 36 - 4$$

$$4(x+3)^2 - (y-2)^2 = 4$$

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



H TA Center  $(-3, 2)$

$a = 1$   $\rightleftarrows$

$b = 2$

$c^2 = 1 + 4 = 5$

$c = \sqrt{5}$   $\rightleftarrows$

Vertices:  $(-3 \pm 1, 2) \left\langle \begin{matrix} (-4, 2) \\ (-2, 2) \end{matrix} \right.$

foci:  $(-3 \pm \sqrt{5}, 2)$

Asym:  $y - 2 = \pm 2(x + 3)$

## Homework 05-01

Identify the vertices, foci, and direction of opening of each.

$$2) \frac{x^2}{121} - \frac{y^2}{81} = 1$$

Vertices:  $(11, 0), (-11, 0)$

Foci:  $(\sqrt{202}, 0), (-\sqrt{202}, 0)$

Opens left/right

$$4) \frac{x^2}{121} - \frac{y^2}{36} = 1$$

Vertices:  $(11, 0), (-11, 0)$

Foci:  $(\sqrt{157}, 0), (-\sqrt{157}, 0)$

Opens left/right

$$6) \frac{(y+8)^2}{36} - \frac{(x+2)^2}{25} = 1$$

Vertices:  $(-2, -2), (-2, -14)$

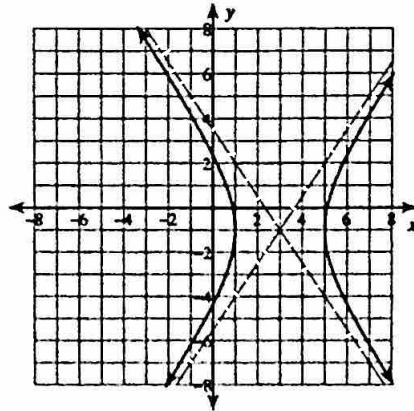
Foci:  $(-2, -8 + \sqrt{61}), (-2, -8 - \sqrt{61})$

Opens up/down

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

$$8) \frac{(x-3)^2}{4} - \frac{(y+1)^2}{9} = 1$$

$$C: (3, -1)$$



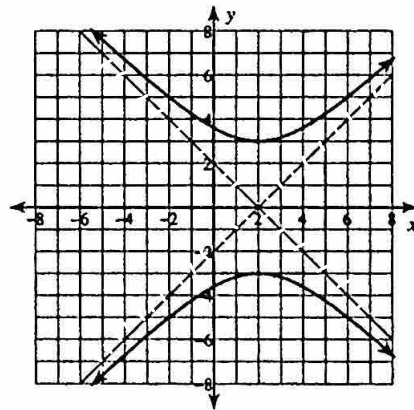
Vertices: (5, -1)  
(1, -1)  
Foci:  $(3 + \sqrt{13}, -1)$   
 $(3 - \sqrt{13}, -1)$

$$a = 2$$

$$b = 3$$

$$y + 1 = \pm \frac{3}{2}(x - 3)$$

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



Vertices: (2, 3)  
(2, -3)  
Foci:  $(2, 3\sqrt{2})$  or  $(2, \pm\sqrt{18})$   
 $(2, -3\sqrt{2})$

$$C: (2, 0)$$

$$a = 3, b = 3$$

$$y = \pm 1(x - 2)$$