

## Warm Up

**Convert to standard form:**

Circle

$$3x^2 + 3y^2 - 6x + 9y - 14 = 0$$

$$(3x^2 - 6x) + (3y^2 + 9y) = 14$$

$$3(x^2 - 2x + 1) + 3(y^2 + 3y + \frac{9}{4}) = 14 + \frac{27}{4}$$

$$3(x-1)^2 + 3(y + \frac{3}{2})^2 = \frac{95}{4}$$

$$(x-1)^2 + (y + \frac{3}{2})^2 = \frac{95}{12}$$

$$c: (1, -\frac{3}{2}) \quad r: \sqrt{\frac{95}{12}}$$

## Warm Up

$$y = mx + b$$

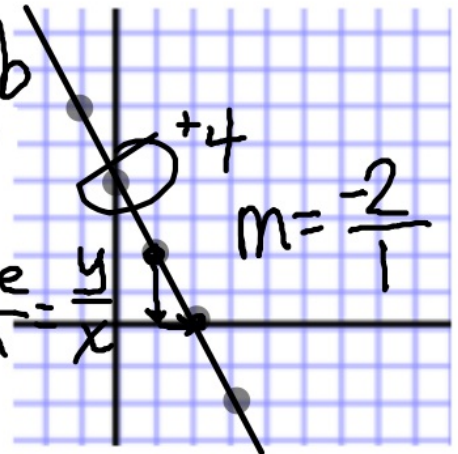
1. What is the equation for the line graphed at right?

(use slope-intercept form)

$$y = -2x + 4$$

$$m = \frac{\text{rise}}{\text{run}} = \frac{y}{x}$$

$$m = \frac{-2}{1}$$



Put into standard form:

$$5x^2 + 10x + 5y^2 + 50y + 5 = 0$$

$$5x^2 + 10x + 5y^2 + 50y = -5$$

$$5(x^2 + 2x + 1) + 5(y^2 + 10y + 25) = -5 + 5 + 125$$

$$5(x+1)^2 + 5(y+5)^2 = \frac{125}{5}$$

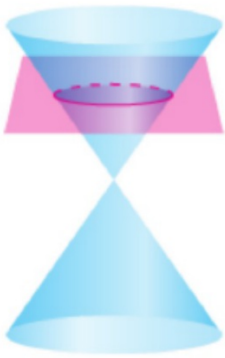
2.

$$(x+1)^2 + (y+5)^2 = 25$$

$$C: (-1, -5) \quad r: \sqrt{25} = 5$$

a). What type of conic is it?

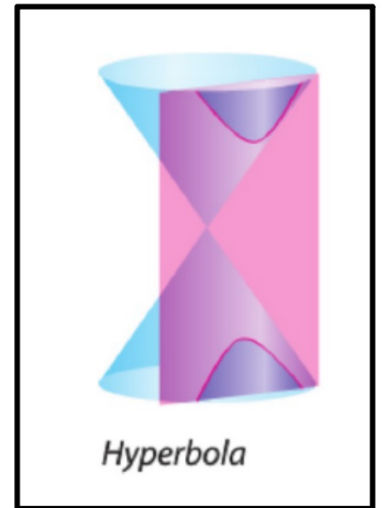
circle!



Circle



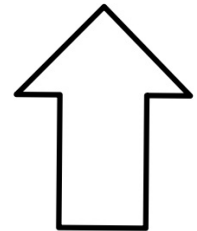
Ellipse



Hyperbola

Center  
radius

Center  
Semimajor  
Semiminor  
foci  
vertices  
covertices



## Graphing Hyperbolas

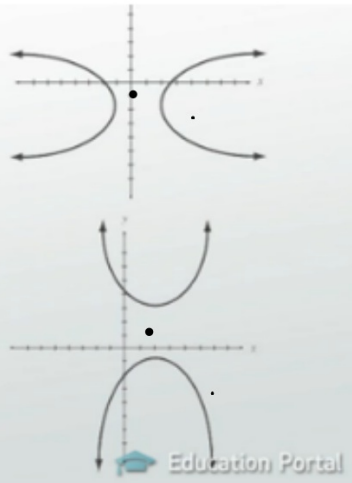
2 shapes that can happen:

### Horizontal Hyperbola

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

### Vertical Hyperbola

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



$(h, k)$  = Center

$x^2$  = Horizontal Hyperbola

$y^2$  = Vertical Hyperbola

$a$  = semi transverse axis

$b$  = semi conjugate axis

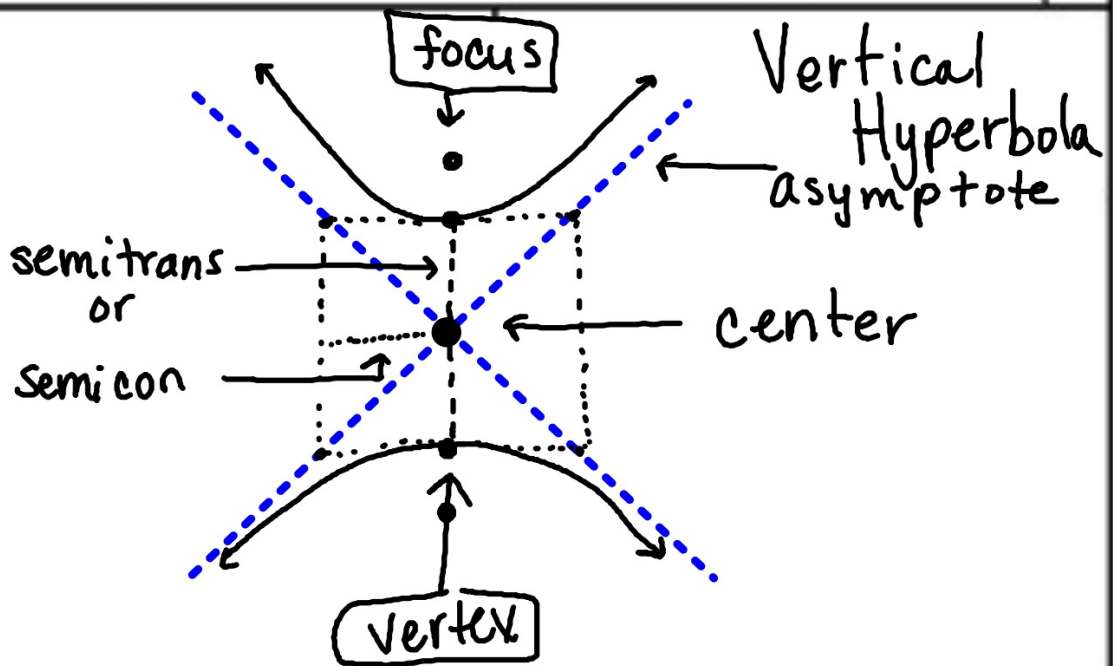
- = Asymptotes

$$y = mx + b$$

$$y = -mx + b$$

st  
den.

# HYPERBOLA



FORMULA FOR C:  $c^2 = a^2 + b^2$

## Center

The central  
point of the hyperbola.



$(h, k)$

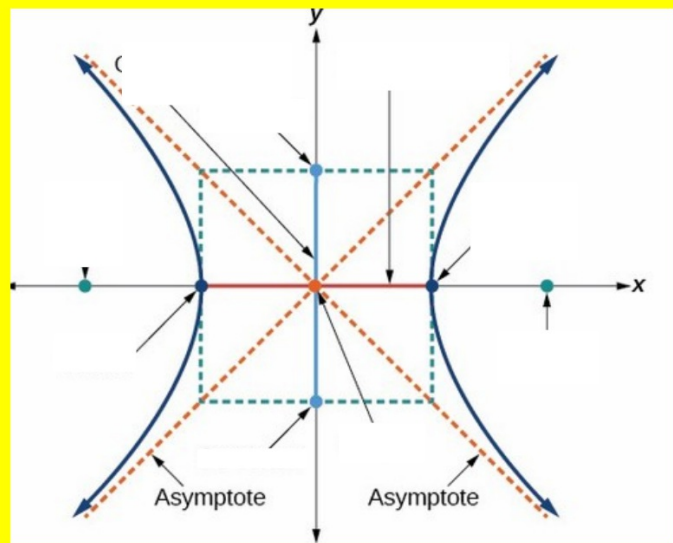
## **Vertices**

2 points on the hyperbola  
that connect the transverse or  
conjugate axis.

## Asymptotes

2 imaginary lines created by the semitrans and semicon axes that the hyperbola cannot cross.

They help you create the shape.





## **Foci**

2 focus points of the hyperbola. Their formula is:

$$c^2 = a^2 + b^2$$

## Conics Brochure "Creative Title"

Circles

Hyperbolas

Ellipses

- Pictures
- Equations
- Vocabulary explained
- Information about each

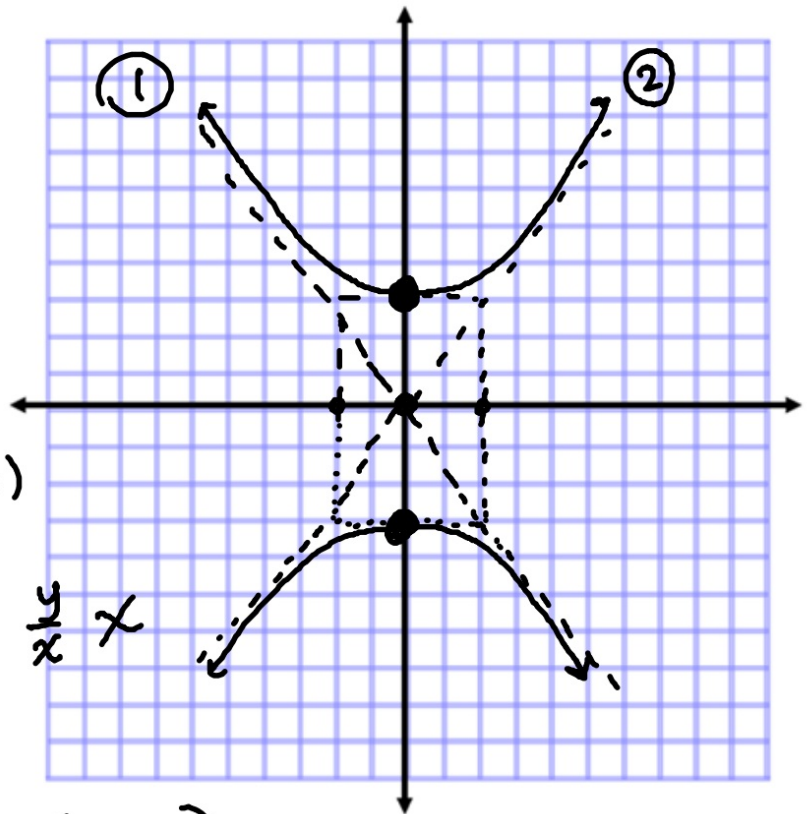
Find vertices, semi transverse and semi conjugate axes, and asymptotes:

1.  $\frac{4y^2}{36} - \frac{9x^2}{36} = \frac{36}{36}$

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

$$\left(\frac{y}{3}\right)^2 - \left(\frac{x}{2}\right)^2 = 1$$

- Center:  $(0,0)$
- $y^2$   $\curvearrowright$
- $a = 3$  semitrans ( $y$ )
- $b = 2$  semicon ( $x$ )
- asymptotes  $m = \frac{y}{x} \times$ 
  - ①  $-\frac{3}{2}x$
  - ②  $\frac{3}{2}x$
- vertices:  $(0,3) + (0,-3)$



$$2. \quad \frac{x^2}{36} - \frac{y^2}{16} = 1$$

$$\left(\frac{x}{6}\right)^2 - \left(\frac{y}{4}\right)^2 = 1$$

$$\square c: (0, 0)$$

$$\square x^2 \text{ } \& \text{ } y^2$$

$$\square a = 6 \text{ (x)}$$

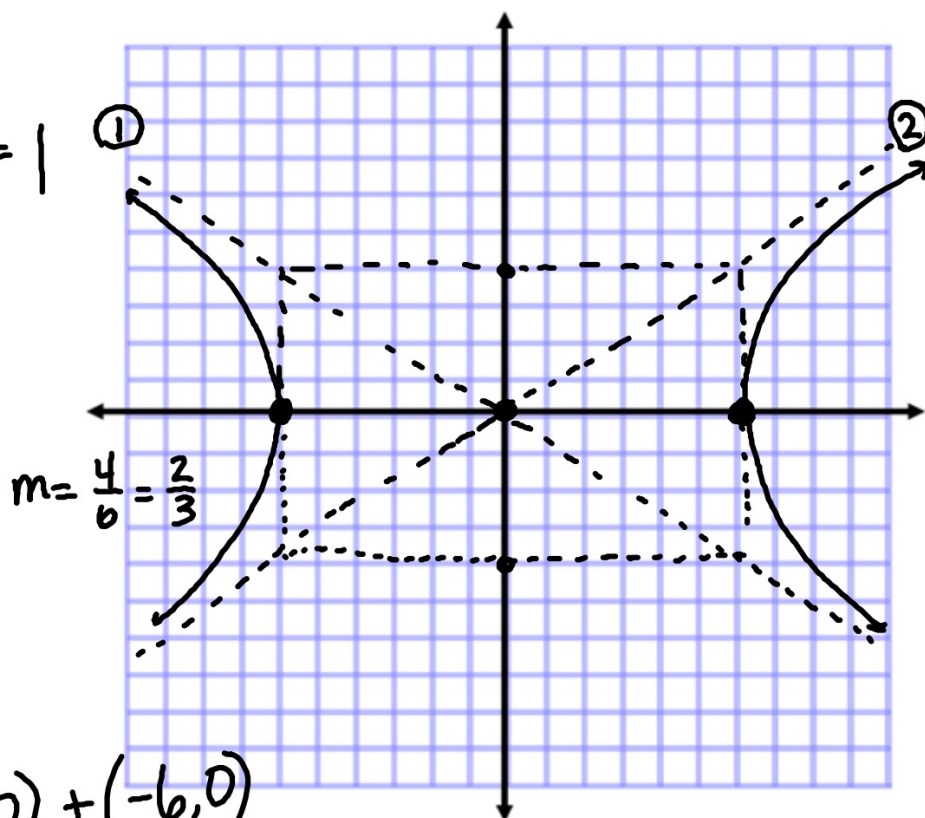
$$\square b = 4 \text{ (y)}$$

$\square$  Asymptotes:

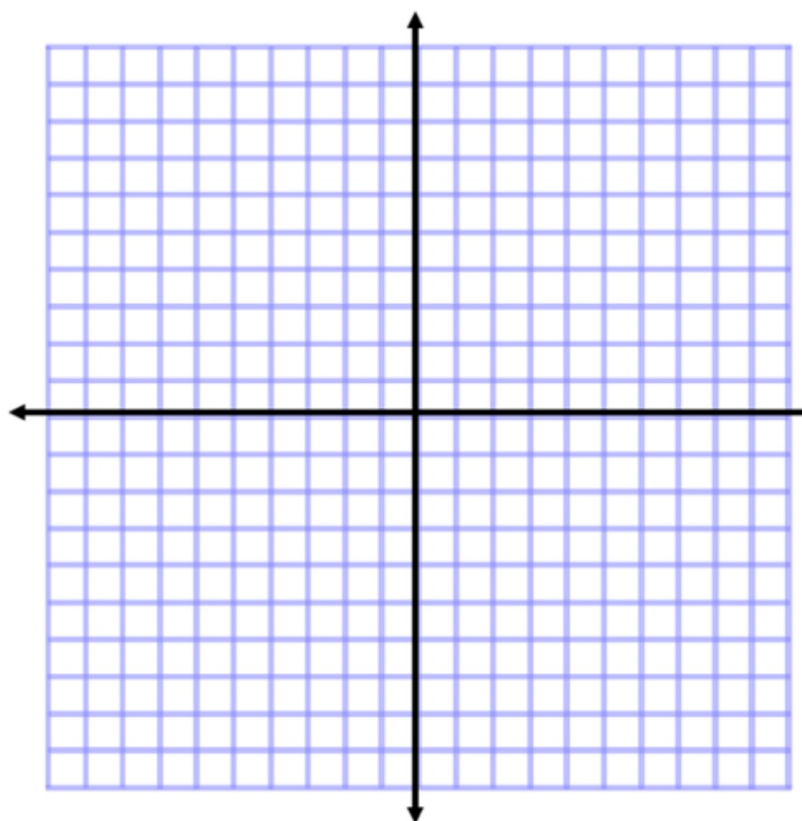
$$\textcircled{1} \quad y = -\frac{2}{3}x$$

$$\textcircled{2} \quad y = \frac{2}{3}x$$

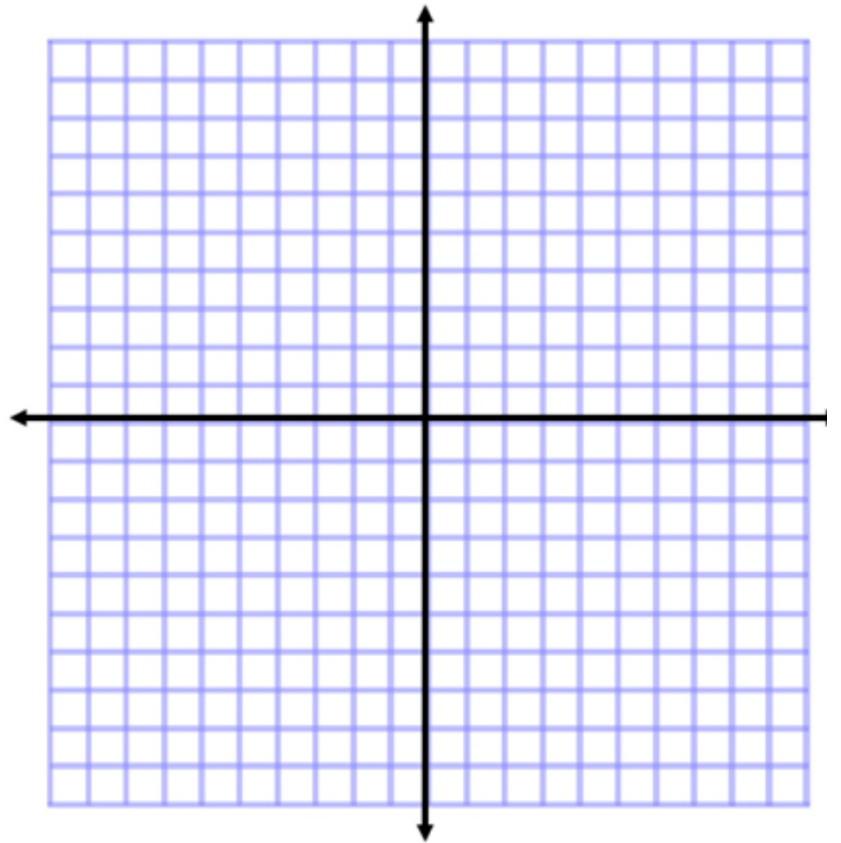
$\square$  vertices  $(6, 0) + (-6, 0)$



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



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



## **Mixed Review**

- Be careful: This sheet contains Circles, Ellipses, & Hyperbolas!
- Ask 3 Before Me
- See me at my stool for one-on-one help!

## Conic Sections – Me Project

For this project, you will be creating a picture that best represents yourself using Desmos online graphing calculator and what we've been learning about conic sections. Be creative in designing your image, but make sure to get approval from Ms. Grosse!

### Directions:

- 1) Create a Desmos account at [www.desmos.com](http://www.desmos.com)
- 2) Create an image that best represents you by writing equations for **ALL** 4 types of conic sections and by using various domain/range restrictions.
- 3) In the table provided, write the equation of each conic section in standard form & identify the key features when appropriate. Label each conic section on your picture with the clue number in a circle next to it after you've printed it out. Color your picture! The more creative and colorful, the better the score!
- 4) A **MINIMUM** of 10 conic section equations must be used to create your image. Any other equations used may be listed below in #11-15.
- 5) All mathematical calculations for finding the key features of each conic section must be shown on a separate sheet of paper.
- 6) Staple this paper together with your colored graph and sheet with any calculations from #5.



Equation in standard form and center/vertex listed	Domain & Range	Vertices or Axis of Symmetry	Co-Vertices or Radius	Focus/Foci	Length of Semi-major/Transverse & Semi-minor/Conjugate Axis	Asymptotes or Directrix
1. $(x-2)^2 + (y)^2 = 4$	D: $[0, 4]$ R: $[-2, 2]$	N/A	2	N/A	N/A	N/A
2. $\left(\frac{x-3}{3}\right)^2 + \left(\frac{y}{2}\right)^2 = 1$						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						

## **Exit Ticket**

Using the printed sheet. Label all of the parts of each shape accurately.

Do not leave anything blank.

This is an independent task.

