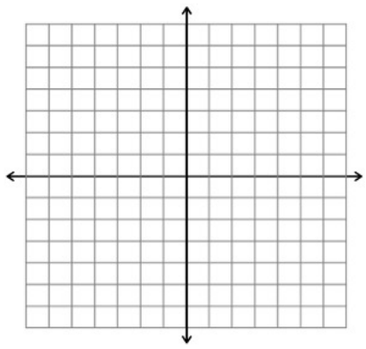
Name: _____ **Precalculus Unit 11, Lesson 4**

Aim: Ellipses

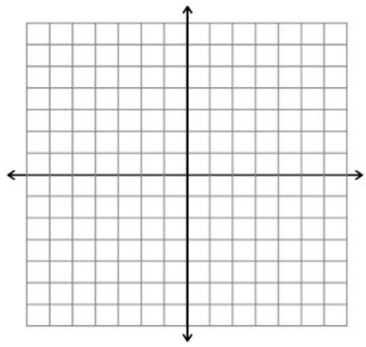
I. Do Now:

1. Graph each ellipse.

(a) $4x^2 + 25y^2 = 100$

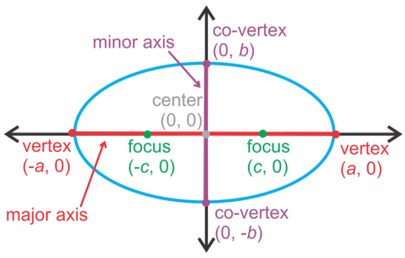


(b) $25x^2 + 4y^2 = 100$



II. Terminology:

An *ellipse* is the locus of all points whose total distance from two fixed points (called the *foci*) is constant.



horizontal major axis

Length of Major Axis: _____

Length of Minor Axis: _____

$c =$ the distance from the center to each focus

Eccentricity (e): a value that describes the "roundness" of the ellipse.

$$e = \frac{c}{a}$$

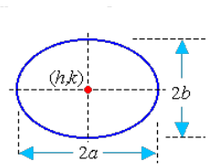
In an ellipse, $0 < e < 1$.
If $e = 0$, the graph is a circle.

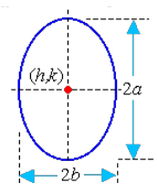
How do we find the foci if we know the values of a and b?
(i.e., find an equation that relates a, b, and c.)

III. Standard Form of the Equation of An Ellipse: If $0 < b < a$ and the center is (h, k),

$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$ is an ellipse with a *horizontal* major axis.

$\frac{(x-h)^2}{b^2} + \frac{(y-k)^2}{a^2} = 1$ is an ellipse with a *vertical* major axis.

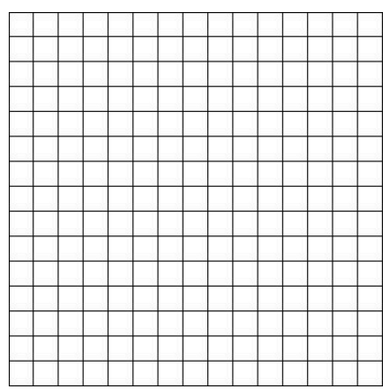




IV. Applications:

2. Find the standard form of the equation of an ellipse with foci at (0, 1) and (4, 1) and a major axis of length 6.

3. Sketch the graph of the ellipse whose equation is $x^2 + 4y^2 + 6x - 8y + 9 = 0$.



4. (if time) Find the center, vertices, and foci of the ellipse given by $4x^2 + y^2 - 8x + 4y - 8 = 0$.

HW46
- Read pages 763 – 766.
- p. 769: 4, 5, 6, 7, 13, 15