Goals:

- I can write the equation of an ellipse.

HW: Complete problems on the back

Name: _____

Algebra II
Ellipses | Conics
Mr Hartzler

Example 1: Write an Equation Given the Vertices and Co-Vertices

Write an equation for the ellipse with vertices at $(6, -8)$ and $(6, 4)$ and the co-vertices at $(3, -2)$ and $(9, -2)$.

Look at the vertices and what do you see?	The x's don't change, so the ellipse is _____
Find the center of the ellipse using midpoint formula: $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$	Center: _____
The length of the major axis the distance between the two vertices.	Major axis length: _____
The length of the minor axis is the distance between the two co-vertices.	Minor axis length: _____
The equation for the ellipse: $$\frac{(y-k)^2}{a^2} + \frac{(x-h)^2}{b^2} = 1$$	
Finding foci: $$c^2 = a^2 - b^2$$ a is the distance from center to a co-vertex b is the distance from the center to a vertex This value is then added and subtracted to the center, but in the same direction as the vertices. This means the vertices, center, and foci are all in line with each other	

Example 2: Write an Equation Given the Vertices and Co-Vertices

Vertices: $(-2, -6)$ and $(-2,\ 4)$

Co-Vertices: $(-5, -1)$ and $(1, -1)$

Look at the vertices and what do you see? The x's don't change, so the ellipse is . . .	
Find the center of the ellipse using midpoint formula: $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$	Center: _____
The length of the major axis the distance between the two vertices.	Major axis length: _____
The length of the minor axis is the distance between the two co-vertices.	Minor axis length: _____
The equation for the ellipse: $\frac{(y-k)^2}{a^2} + \frac{(x-h)^2}{b^2} = 1$	
Finding foci: $c^2 = a^2 - b^2$ a is the distance from center to a co-vertex b is the distance from the center to a vertex This value is then added and subtracted to the center, but in the same direction as the vertices. This means the vertices, center, and foci are all in line with each other	

Write an equation for an ellipse that satisfies each set of conditions.

17. vertices at $(-6, 4)$ and $(12, 4)$, co-vertices at $(3, 12)$ and $(3, -4)$

18. vertices at $(-1, 11)$ and $(-1, 1)$, co-vertices at $(-4, 6)$ and $(2, 6)$

19 center at $(-2, 6)$, vertex at $(-2, 16)$, co-vertex at $(1, 6)$

20. center at $(3, -4)$, vertex at $(8, -4)$, co-vertex at $(3, -2)$

21. vertices at $(4, 12)$ and $(4, -4)$, co-vertices at $(1, 4)$ and $(7, 4)$

22. vertices at $(-11, 2)$ and $(-1, 2)$, co-vertices at $(-6, 0)$ and $(-6, 4)$

Answers are to the right

17. $\frac{(x-3)^2}{81} + \frac{(y-4)^2}{64} = 1$

18. $\frac{(y-6)^2}{25} + \frac{(x+1)^2}{9} = 1$

19. $\frac{(y-6)^2}{100} + \frac{(x+2)^2}{9} = 1$

20. $\frac{(x-3)^2}{25} + \frac{(y+4)^2}{4} = 1$

21. $\frac{(y-4)^2}{64} + \frac{(x-4)^2}{9} = 1$

22. $\frac{(x+6)^2}{25} + \frac{(y-2)^2}{4} = 1$