Goals:

* I can write the equation of an ellipse.

**HW: Complete problems on the back**

**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 $(9, -2)$.

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| 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: $$\frac{\left(y-k\right)^{2}}{a^{2}}+\frac{\left(x-h\right)^{2}}{b^{2}}=1$$ |  |
| 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: $\left(-5, -1\right)$ and $\left(1, -1\right)$

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



Answers are to the right