

Lesson 86 Objective: SWBAT find the equation of an ellipse given features of it.

Kickoff

- Find the ellipse-practice worksheet from Thursday.
- Write everything that you recall about ellipses!



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Ellipses

- They are an oval shape.
- when a^2 is under x it's horizontal when a is under y it's vertical.
- a is length of major axis. b is length of minor axis.
- Two foci! Found by: $c^2 = b^2 + a^2$

horizontal: $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$
 vertical: $\frac{(x-h)^2}{b^2} + \frac{(y-k)^2}{a^2} = 1$

(h,k) Center

major axis bigger #  minor axis smaller # 

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3) $\frac{(x-7)^2}{4} + \frac{(y+3)^2}{9} = 1$

Center $(7, -3)$
 $a = 3 \rightarrow$ vertical
 $b = 2$
 Vertical

$a^2 = b^2 + c^2$
 $9 = 4 + c^2$
 $c = \pm\sqrt{5}$
 Foci $(7, -3 + \sqrt{5})$
 $(7, -3 - \sqrt{5})$

7) $25x^2 + 4(y-4)^2 = 100$

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

Center $(0, 4)$
 $a = 5$
 $b = 2$
 vertical

Foci $(0, 4 \pm \sqrt{21})$
 $a^2 = b^2 + c^2$
 $25 = 4 + c^2$
 $\pm\sqrt{21} = c$

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Ellipses Day 2

Horizontal Major Axis when $a > b$	Vertical Major Axis when $b < a$
Center at Origin $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$	Center at Origin $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$
Center Not at Origin $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$ Center = (h,k)	Center Not at Origin $\frac{(x-h)^2}{b^2} + \frac{(y-k)^2}{a^2} = 1$ Center = (h,k)

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Directions: Given the following components, determine the equation of the ellipse.
 Plan: Find a , b , horizontal or vertical axis, and the center. Then make equation!

1) Vertices: $(\pm 5, 0)$ and $(0, \pm 3)$
 horizontal
 Center $(0, 0)$
 $a = 5$
 $b = 3$

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

2) Vertices: $(0, -5)$ and $(8, -5)$
 Minor axis length of 3
 horizontal
 Center $(4, -5)$
 $a = 4$
 $b = 3$

$\frac{(x-4)^2}{16} + \frac{(y+5)^2}{9} = 1$

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3) Foci: $(0, 0)$ and $(0, 4)$
 Major axis length of 20
 vertical
 Center $(0, 2)$
 $a = 10$
 $b = ? \sqrt{96}$
 $c = 2$

$a^2 = b^2 + c^2$
 $100 = b^2 + 4$
 $96 = b^2$

$\frac{(x)^2}{96} + \frac{(y-2)^2}{100} = 1$

4) Vertices: $(12, 0)$ and $(-6, 0)$
 Foci: $(3 \pm \sqrt{65}, 0)$
 horizontal
 Center $(3, 0)$
 $a = 9$
 $b = ?$
 $c = \sqrt{65}$

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5) Complete the square to put in vertex form and then graph.

$$x^2 - 6x + 4y^2 + 16y = -21$$

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