Lesson 85 Objective: SWBAT find key features and graph an ellipse.

Kickoff

Identify which conic graph is the equation for each of the following.

$(x-h)^2 + (y-k)^2 = r^2$ → circle

$(x-h)^2 = 4p\,(y-k)$ →

$(y-k)^2 = 4p(x-h)$ →

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7 $x^2+16y=0$

8 $x^2-18x-12y+84=0$

9 $y^2-10y-12x+1=0$

10 V $(-5,1)$
F $(-5,-1)$
d $y=3$
LOS $x=-5$

11 V$(4,2)$
f $(3,2)$
d $x=5$
LOS $y=2$

$(x-9)^2=12(y-3)$

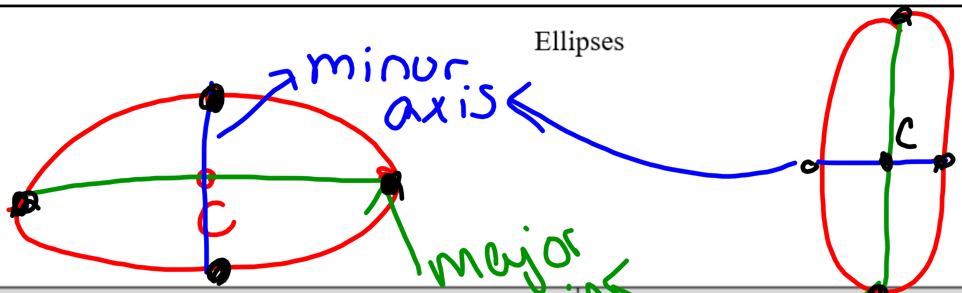
$x^2-18x+81=12y-36$
$\quad +36 \qquad +36$

$x^2-18x-12y+117=0$

$x^2-10x=12y-13+25$

$(x-5)^2$

Ellipses



a = length of major axis from c->V
2a = V->V of major axis

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

must = 1

* a^2 must be the larger #

b = length of minor c->V
2b = length of minor V->V

From the equation you can determine if the Ellipse has a Horizontal or Vertical Major Axis, the Center Point and the a and b values

$\frac{x^2}{9}+\frac{y^2}{\boxed{16}}=1$	$\frac{x^2}{25}+\frac{y^2}{4}=1$	$\frac{(x-3)^2}{\boxed{36}}+\frac{(y+7)^2}{25}=1$	$\frac{(x+1)^2}{9}+\frac{(y-4)^2}{4}=1$
Axis: Vertical	Axis: horiz.	Axis: horizontal	Axis: horiz.
Center: (0,0)	Center: (0,0)	Center: (3,-7)	Center: (-1,4)
a: 4	a: 5	a: 6	a: 3
b: 3	b: 2	b: 5	b: 2

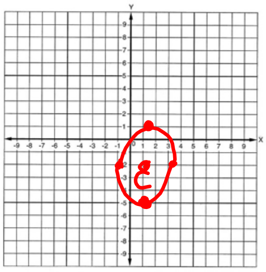
Graph the following ellipses:

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

Vertical

Center (1,-2)

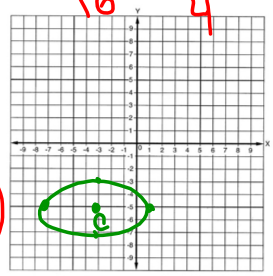
a = 3
b = 2



Vertices
(1,1) (3,-2)
(1,-5) (-1,-2)

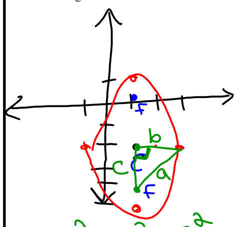
2) $4(x+3)^2+16(y+5)^2=64$

$\frac{(x+3)^2}{16}+\frac{(y+5)^2}{4}=1$



horiz (-3,-5)
a = 4
b = 2

Determining the foci:



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

center $(1,-2)$

$a=3 \rightarrow$ vertical

$b=2$

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

Foci

$9=4+c^2$

$-4 \quad -4$

$\sqrt{5}=\sqrt{c^2}$

$\pm\sqrt{5}=c$

Foci

$\boxed{\begin{array}{c}(1,-2+\sqrt{5})\\(1,-2-\sqrt{5})\end{array}}$

$\frac{(x+3)^2}{16}+\frac{(y+5)^2}{4}=1$

horizontal

Center $(-3,-5)$

$a=4 \leftarrow$

$b=2$

$\boxed{\begin{array}{cc}\text{Vertices} & \\ (1,-5) & (-3,-7)\\ (-7,-5) & (-3,-3)\end{array}}$

Foci

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

$16=4+c^2$

$\sqrt{12}=\sqrt{c^2}$

$\pm 2\sqrt{3}=c$

$(-3+2\sqrt{3},-5)$

$(-3-2\sqrt{3},-5)$

Ellipses-Practice

Directions: Find the center, the length of the major axis, length of the minor axis, coordinates of the vertices, graph and find the coordinates of the foci.

1) $\frac{x^2}{36}+\frac{y^2}{4}=1$

2) $\frac{(x-3)^2}{25}+\frac{(y-14)^2}{100}=1$

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

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