ELLIPSE EXPLORATION

AA 2: WK 12 BLOCK

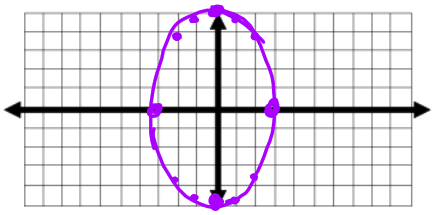
Solve the following for y and graph.

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

$\frac{y^2}{25}=1-\frac{x^2}{9}$

$y^2=25\left(1-\frac{x^2}{9}\right)$

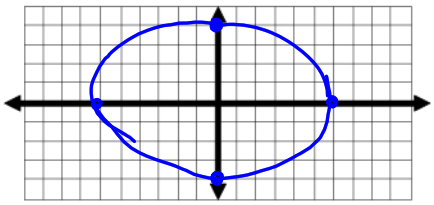
$y=\pm\sqrt{25\left(1-\frac{x^2}{9}\right)}$



x	y
0	±5
3	0
-3	0
1	±4.7
2	±3.7

2. $\frac{x^2}{36}+\frac{y^2}{16}=1$

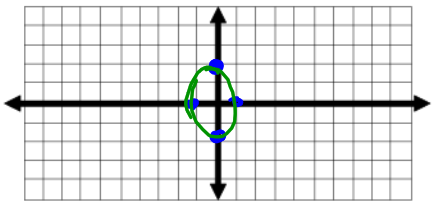
$y=\pm\sqrt{16\left(1-\frac{x^2}{36}\right)}$



x	y
0	±4
6	0
-6	0

3. $\frac{x^2}{1}+\frac{y^2}{4}=1$

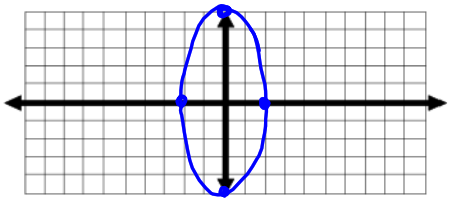
$y=\pm\sqrt{4(1-x^2)}$



x	y
0	±2
1	0
-1	0

4. $\frac{x^2}{4}+\frac{y^2}{25}=1$

$y=\pm\sqrt{25\left(1-\frac{x^2}{4}\right)}$



x	y
0	±5
2	0
-2	0

What do the graphs have in common?

oval-shaped

How do you know how far out on the x-axis to go?

$\sqrt{}$number under x^2

How do you know how far out ~~on the y-axis~~ to go?

$\sqrt{}$number under y^2

The standard form of the Ellipse is: $\frac{(x-h)^2}{a^2}+\frac{(y-k)^2}{b^2}=1$ centered at (h,k)

Rewrite these equations into standard form and graph. Then state the **vertices, co-vertices** of the ellipse. The vertices are the endpoints of the longer (major) axis of the ellipse. The co-vertices are the endpoints of the shorter (minor) axis of the ellipse.

must = 1

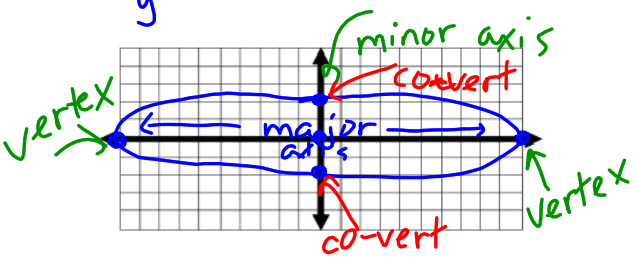
under x^2 $\sqrt{100}=10$ → on x-axis

under y^2 $\sqrt{4}=2$ → on y-axis

1. $x^2+25y^2=100$

$\frac{x^2}{100}+\frac{25y^2}{100}=\frac{100}{100}$

$\frac{x^2}{100}+\frac{y^2}{4}=1$



Vertices: (-10,0) (10,0)

Co-vertices: (0,2) (0,-2)

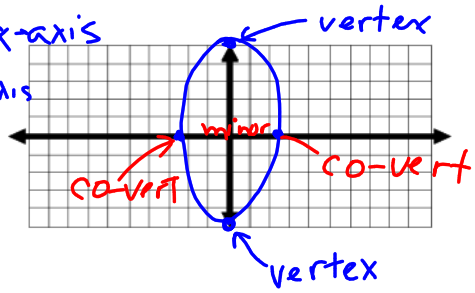
2. $5x^2+y^2=25$

$\frac{5x^2}{25}+\frac{y^2}{25}=\frac{25}{25}$

$\frac{x^2}{5}+\frac{y^2}{25}=1$

$\sqrt{5}\approx 2.2$ – x-axis

$\sqrt{25}=5$ y-axis



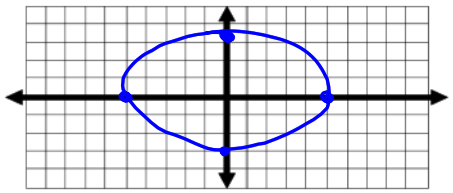
Vertices: (0,5) (0,-5)

Co-vertices: $(\sqrt{5},0)$ $(-\sqrt{5},0)$

3. $9x^2+25y^2=225$

$\frac{9x^2}{225}+\frac{25y^2}{225}=\frac{225}{225}$

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



Vertices: (5,0) (-5,0)

Co-vertices: (0,3) (0,-3)

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

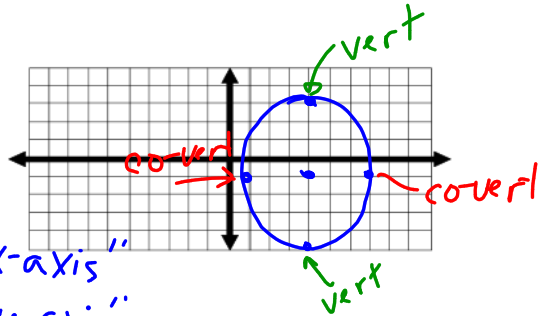
First find the center, then graph

Center: (4,-1)

from center

$\sqrt{9}=3$ on "x-axis"

$\sqrt{16}=4$ on "y-axis"



Vertices: (4,3) and (4,-5)

Co-vertices: (1,-1) and (7,-1)

What do we do if it's not in standard form????

Put it into standard form.

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

***Ex.* 1** $4x^2 + y^2 + 24x - 4y + 36 = 0$

* Regroup x's together and y's together and put # on other side

$4x^2 + 24x + y^2 - 4y = -36$

$4(x^2 + 6x + 9) + y^2 - 4y + 4 = -36 + 4 \cdot 9 + 4$ (36 or)

$\frac{4(x+3)^2}{4} + \frac{(y-2)^2}{4} = \frac{4}{4}$ * divide by 4

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

Ex. 2 $4x^2+25y^2-24x+200y+336=0$

$-336 \quad -336$

$4x^2-24x+25y^2+200y=-336$

$4(x^2-6x+\underline{9})+25(y^2+8y+\underline{16})=-336+4\cdot\underline{9}+25\cdot\underline{16}$

$\text{or } 36 \qquad \text{or } 400$

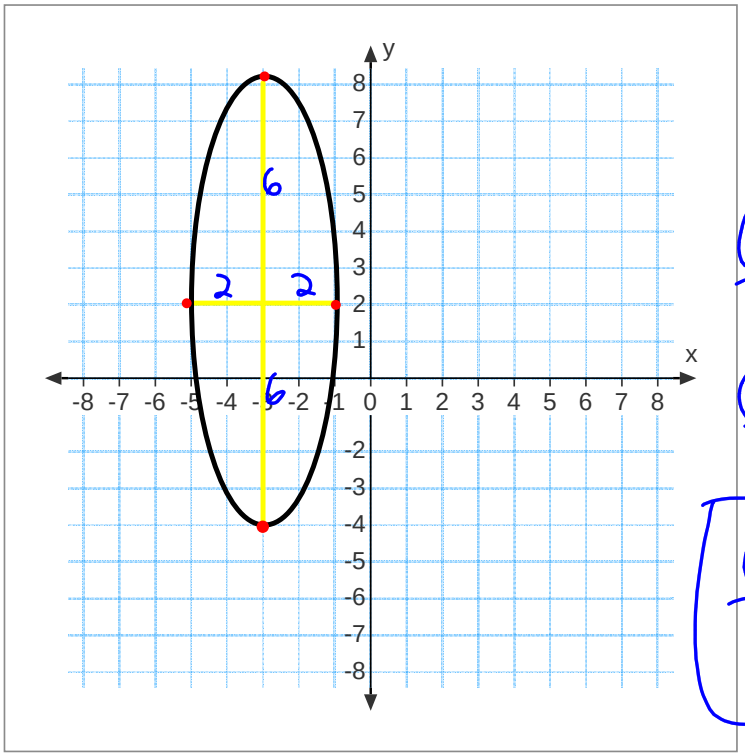
$\frac{4(x-3)^2}{100}+\frac{25(y+4)^2}{100}=\frac{100}{100}$

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

Ex.3 $72y + 8x^2 + 44 = 32x - 12y^2$

Skipped today

Ex.4 **Write the equation of the ellipse graphed in standard form.**



center
$(-3, 2)$

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

$\frac{(x-(-3))^2}{2^2} + \frac{(y-2)^2}{6^2} = 1$

$\frac{(x+3)^2}{4} + \frac{(y-2)^2}{36} = 1$