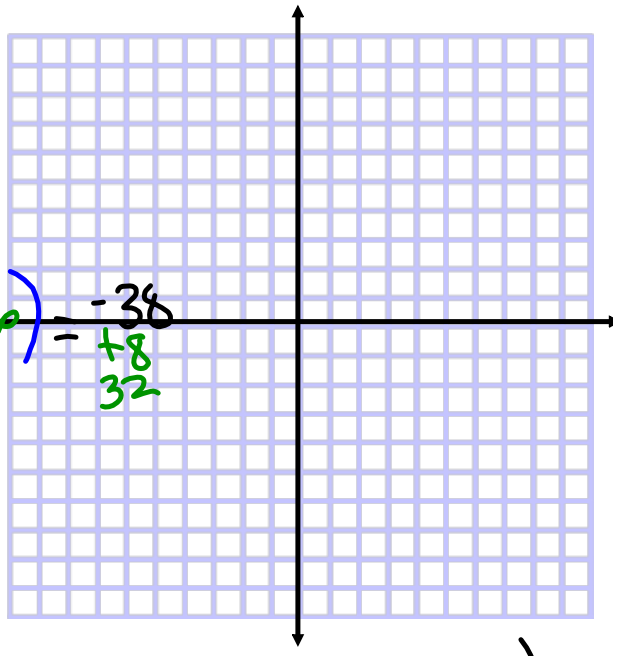
Warm-Up: Graph the following:

$2x^2 - 8x + 2y^2 + 16y = -38$

$2(x^2 - 4x + 4) + 2(y^2 + 8y + 16) = -38 + 8 + 32$

$2(x-2)^2 + 2(y+4)^2 = 2$

$(x-2)^2 + (y+4)^2 = 1$



center: (2, -4)

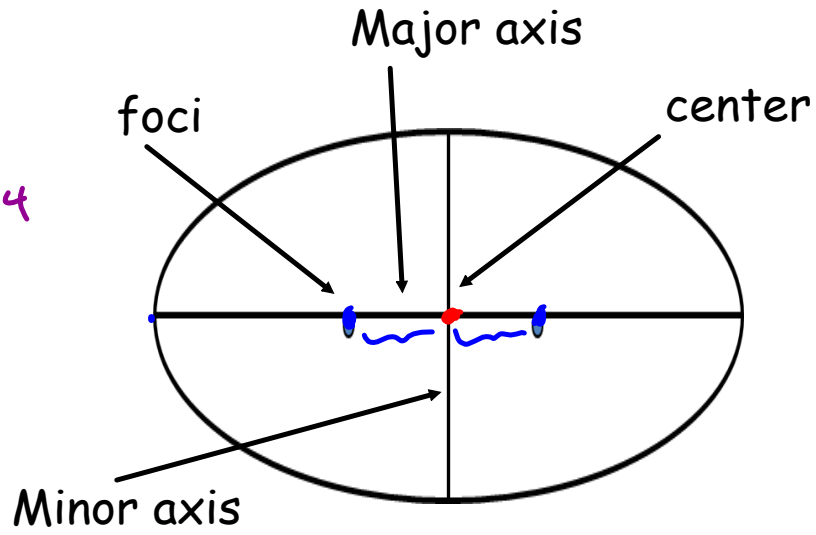
radius: 1

Lesson 9.2
Ellipses

Ellipses:

An ellipse is the set of all points, the sum of whose distances from two distinct points (called the foci) is constant.

$d_1 + d_2 = d_3 + d_4$



http://www.youtube.com/watch?v=29esLneio3o

ELLIPSES

The standard form of the equation of an ellipse with center (h,k) and major and minor axes of lengths 2a and 2b, respectively, where 0<b<a, is:

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

Major axis is horizontal

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

Major axis is vertical

ELLIPSES

C is the distance of the foci from the center and can be found with this formula:

$$c^2 = a^2 - b^2$$

Eccentricity measures the roundness of an ellipse and is given by the equation:

$$e = \frac{c}{a}$$

If e is close to 0, then the ellipse is nearly circular.

If e is close to 1, then the ellipse is elongated (less circular).

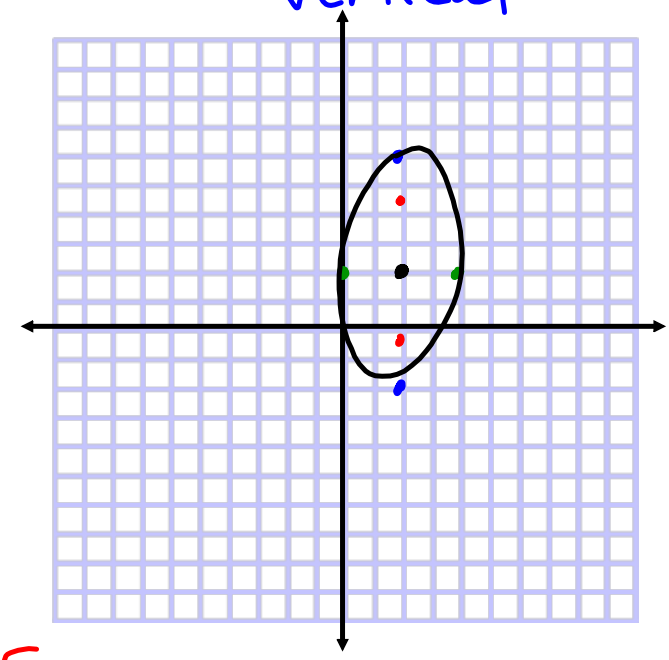
Graph:

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

b^2 a^2

Center: (2,2)

Vertical



$a = 4$

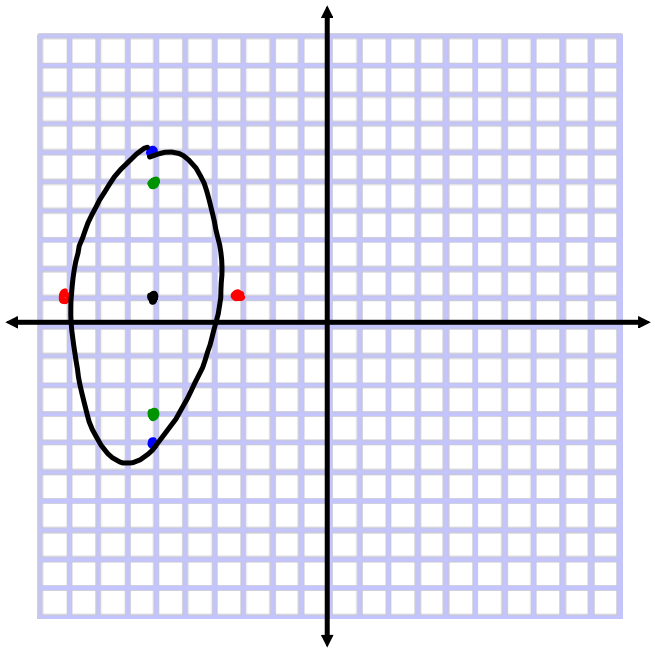
$b = 2$

$c^2 = 16 - 4$

$c = \sqrt{12}$ or $2\sqrt{3}$

Graph:

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



Center $(-6,1)$

$a=5$

$b=3$

$c^2=25-9$

$c=4$

Graph:

$$4x^2 + 9y^2 = 36$$

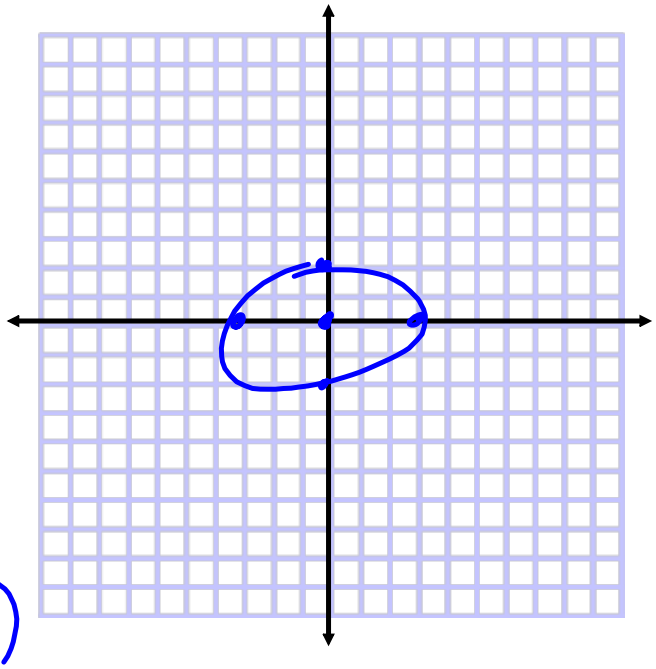
$\frac{4x^2}{36} + \frac{9y^2}{36} = \frac{36}{36}$

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

$a = 3$

$b = 2$

center $(0,0)$



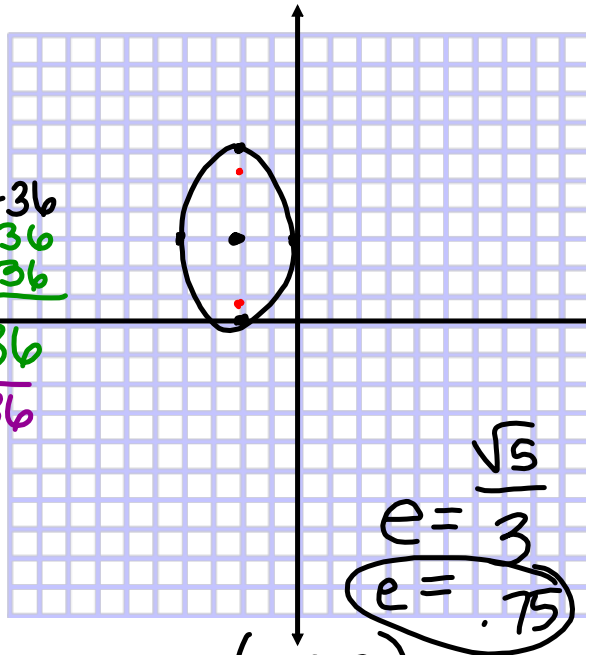
Graph:

$9x^2 + 36x + 4y^2 - 24y = -36$

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

$\frac{9(x+2)^2}{36} + \frac{4(y-3)^2}{36} = \frac{36}{36}$

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



center: $(-2, 3)$

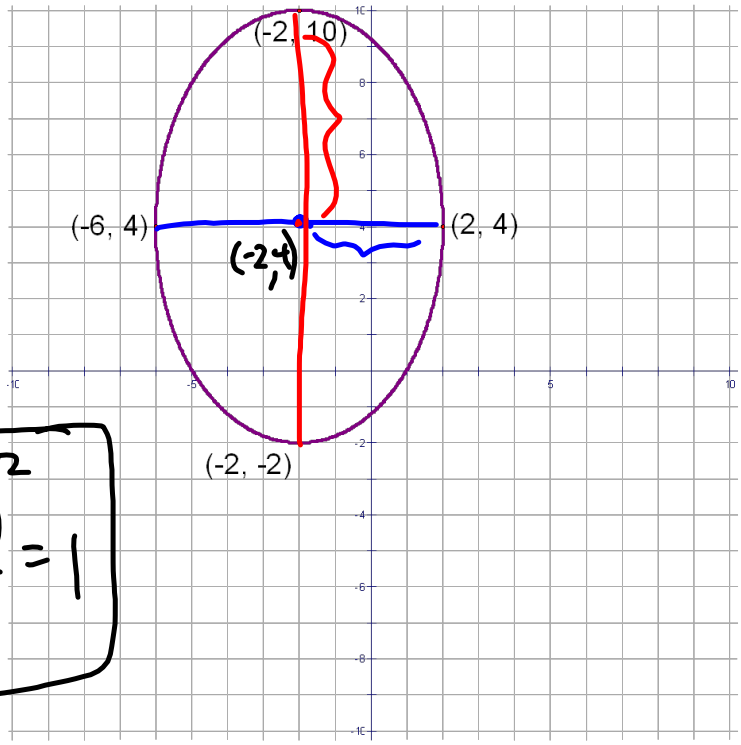
$a = 3$
$b = 2$
$c = \sqrt{5}$

$e = \frac{\sqrt{5}}{3}$
$e = .75$

Find the center, vertices, foci, and eccentricity.

$c^2 = 9 - 4$

Find the equation in standard form:



Center: $(-2, 4)$

$a = 6$

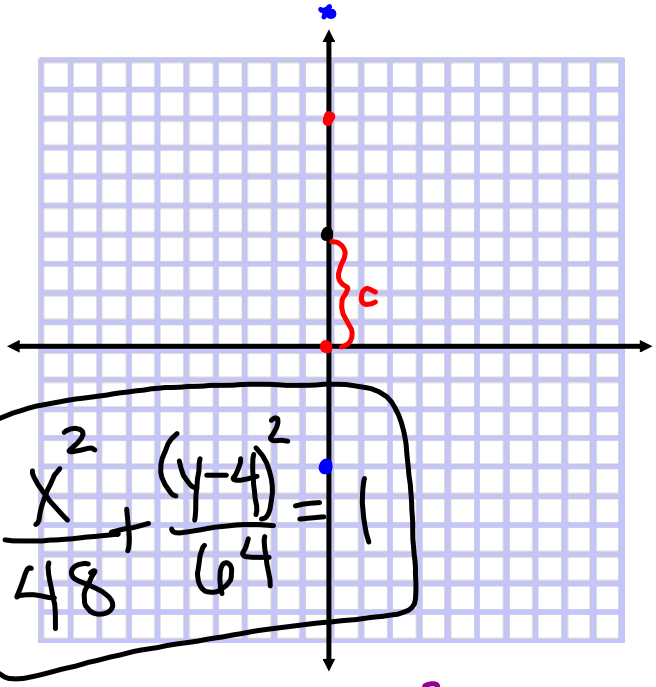
$b = 4$

$$\frac{(x+2)^2}{16} + \frac{(y-4)^2}{36} = 1$$

Find the standard equation:

$Foci: (0, 0)\ and\ (0, 8)$

$major\ axis\ length = 16$



center (0, 4)

$a = 8$

$b =$

$c = 4$

$16 = 64 - b^2$

$b^2 = 48$

$$\frac{x^2}{48} + \frac{(y-4)^2}{64} = 1$$