Try These - Solutions:

a) Since the equation is in standard form the center is $(-12,13)$ and the radius in $\sqrt{144} = 12$.

b

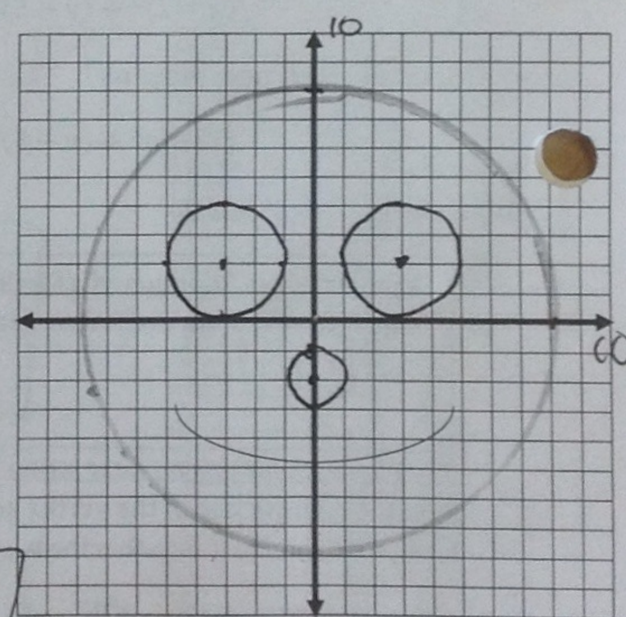
b) Add 5 to each side to rewrite the equation as $x^2 + (y - 4.5)^2 = 10$.
The center is $(0,4.5)$ and the radius is $\sqrt{10}$.

c) As stated in the hint, we need to complete the square twice to rewrite in standard form.
Remember, to complete the square for an expression $x^2 + bx$ we need to add $\left(\frac{b}{2}\right)^2$.

$$x^2 + 6x + y^2 - 10y = 2$$
$$x^2 + 6x + \left(\frac{6}{2}\right)^2 + y^2 - 10y + \left(-\frac{10}{2}\right)^2 = 2 + \left(\frac{6}{2}\right)^2 + \left(-\frac{10}{2}\right)^2$$
$$(x^2 + 6x + 9) + (y^2 - 10y + 25) = 36$$
$$(x + 3)^2 + (y - 5)^2 = 36$$
$$\textit{Center}: (-3,5), \qquad \textit{Radius} = 6$$

Practice Problems 1

Write each equation in standard form for a circle and sketch their graphs on the same axe to the right.



1. $(x - 3)^2 + (y - 2)^2 - 4 = 0$

$(x-3)^2 + (y-2)^2 = 4$

$\boxed{c: (3,2) \quad r = 2}$

2. $x^2 + 4 = 5 - (y + 2)^2$

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

$\boxed{c(0,-2) \quad r = 1}$

3. $x^2 + 6x + y^2 - 4y = -9$

$x^2 + 6x + 9 + y^2 - 4y + 4 = -9 + 9 + 4$

$(x+3)^2 + (y-2)^2 = 4$

$\boxed{c(-3,2) \quad r = 2}$

4. $x^2 + y^2 + 4y - 60 = 0$

$x^2 + y^2 + 4y + 4 = 60 + 4$

$x^2 + (y+2)^2 = 64$

$c(0,-2)$
$r = 8$

If you graphed them correctly, they should make you happy! =)

Standard Form Equation of an Ellipse

In general, the standard form equation of a ellipse with a semimajor axis of a, and a semiminor axis of b

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

This gives us focal axes are $y = k$ and $x = h$ and foci of $(h \pm k, k)$ and $(h, k \pm c)$, with the Pythagorean relation $a^2 = b^2 + c^2$

Practice Problems

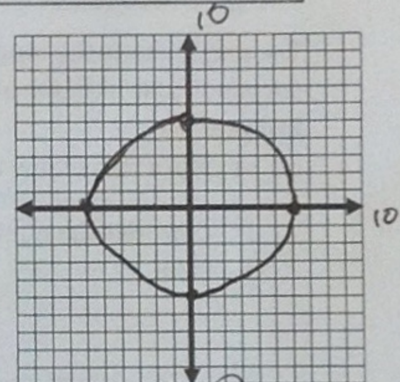
For each of the ellipses below, graph them and find the length of the major and minor axis.

1. $\frac{x^2}{36} + \frac{y^2}{25} = 1$

$a = \sqrt{36} = 6$

$b = \sqrt{25} = 5$

$\boxed{\text{Major} = 12 \quad \text{Minor} = 10}$

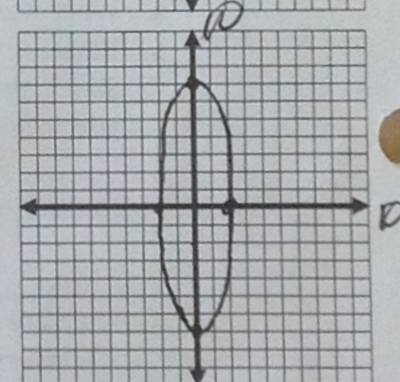


2. $\frac{x^2}{4} + \frac{y^2}{49} = 1$

$a = \sqrt{4} = 2$

$b = \sqrt{49} = 7$

$\boxed{\text{Major} = 14 \quad \text{Minor} = 4}$

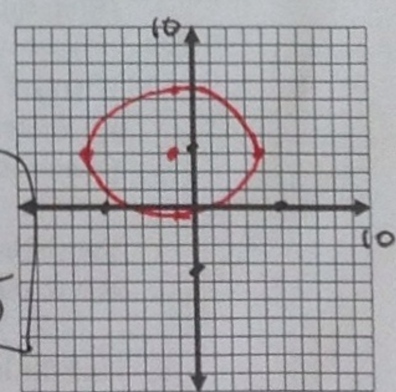


3. $\frac{(x+1)^2}{25} + \frac{(y-3)^2}{10} = 1$

$a = \sqrt{25} = 5$

$b = \sqrt{10} \approx 3.16$

$\boxed{\text{Major} = 10 \quad \text{Minor} = 2\sqrt{10}}$



4. $\frac{4x^2 + 36y^2}{144} = \frac{\cancel{128}\ 144}{144}$ (hint: make it equal 1 first)

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

$a = 6$

$b = 2$

$\boxed{\text{Major} = 12 \quad \text{Minor} = 4}$

$\frac{4x^2 + 36y^2}{128} = \frac{128}{128}$

$\frac{x^2}{32} + \frac{y^2}{\frac{128}{36}} = 1 \quad \boxed{\frac{x^2}{32} + \frac{y^2}{32/9} = 1}$