Standard form: $(x-h)^2 + (y-k)^2 = r^2$

Making a Perfect Trinomial Square

$$\boxed{* \left(\frac{b}{2}\right)^2 = c}$$

1) $x^2 - 10x + \dfrac{25}{c}$

$\left(\frac{-10}{2}\right)^2 = 25$

Factor: $-5 \overset{25}{\underset{-10}{\times}} -5 \Rightarrow (x-5)^2$

2) $x^2 + 11x + \dfrac{121}{4}$ $\quad c$

$\left(\frac{11}{2}\right)^2 = \frac{121}{4}$

$\dfrac{11}{2} \overset{\frac{121}{4}}{\underset{11}{\times}} \dfrac{11}{2} \Rightarrow \left(x+\frac{11}{2}\right)^2$

3) $x^2 + 14x + \dfrac{49}{c}$

$\left(\frac{14}{2}\right)^2 = 49$

$7 \overset{49}{\underset{14}{\times}} 7 \Rightarrow (x+7)^2$

Completing the Square...
But We Are Not Doing the Whole Thing!!!

1) Move c to the right side of the equation. Move a and b to the left.
2) Make a perfect trinomial square on the left. Remember what you add to one side, you must add to the other.
3) Factor on the left. Simplify on the right.
4) ~~Take the square root of both sides.~~
5) ~~Solve for x.~~

Directions: Do the first 3 steps of completing the square.

1) $x^2 = 27 - 6x$ $\longrightarrow$ $x^2 + 6x + \boxed{9} = 27 + \boxed{9}$
   $+6x \quad +6x$
   $\underset{c}{\underbrace{\qquad}}$

   $\left(\frac{6}{2}\right)^2 = 9$ $\boxed{(x+3)^2 = 36}$

Simplify 1st

2) $\dfrac{2x^2 + 8x = 12}{2}$ $\longrightarrow$ $x^2 + 4x = 6$

   $\left(\frac{4}{2}\right)^2 4$ $\quad x^2 + 4x + \boxed{4} = 6 + \boxed{4}$

   $\boxed{(x+2)^2 = 10}$

3) $y^2 + 16 = 8y$
   $+8y - 16 \quad +8y - 16$

   $y^2 + 8y = -16$

   $\left(\frac{8}{2}\right)^2 = 16$ $\quad y^2 + 8y + \boxed{16} = -16 + \boxed{16}$

   $\boxed{(y+4)^2 = 0}$

Writing the Standard Form of a Circle

- You will move "c" to the right side of the equation.
- Group your x's and group your y's.
- Do the first 3 steps of completing the square to the x and to the y.
- Write your final answer in standard form.

Directions: Write the equation of the circle in standard form.

4) $x^2 + y^2 + 6x - 10y + 9 = 0$

$-9 \quad -9 \qquad \left(-\frac{10}{2}\right)^2 = 25$

$\left(\frac{6}{2}\right)^2 = 9$

$x^2 + 6x + \boxed{9} + y^2 - 10y + \boxed{25} = -9 + \boxed{9} + \boxed{25}$

$\boxed{(x+3)^2 + (y-5)^2 = 25}$

5) $x^2 + y^2 - 18x - 22y + 2 = 0 \qquad \left(-\frac{22}{2}\right)^2 = 121$

$-2 \quad -2$

$\left(\frac{-18}{2}\right)^2 =$

$x^2 - 18x + \boxed{81} + y^2 - 22y + \boxed{121} = -2 + \boxed{81} + \boxed{121}$

$\boxed{(x-9)^2 + (y-11)^2 = 200}$

Application! Find the center and radius of the circle.

6) $x^2 + y^2 - 12x + 2y - 12 = 0$

$+12 \quad +12 \qquad \left(\frac{2}{2}\right)^2 = 1$

$\left(\frac{-12}{2}\right)^2 =$

$x^2 - 12x + \boxed{36} + y^2 + 2y + \boxed{1} = 12 + \boxed{36} + \boxed{1}$

$(x-6)^2 + (y+1)^2 = 49 \qquad \boxed{\begin{array}{l} C: (6,-1) \\ r: 7 \end{array}}$

7) $x^2 + y^2 + 3x + 8y + 9.25 = 0$

$-9.25 \quad -9.25 \qquad \left(\frac{8}{2}\right)^2 = 16$

$\left(\frac{3}{2}\right)^2 =$

$x^2 + 3x + \boxed{9/4} + y^2 + 8y + \boxed{16} = -9.25 + \boxed{9/4} + \boxed{16}$

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

$\boxed{\begin{array}{l} C: \left(-\frac{3}{2}, -4\right) \\ r: 3 \end{array}}$