Converting General Form to Standard Form

Now **complete the square** to rewrite the following equations in standard form. An example is shown below:

Example:

$$x^2 + y^2 - 8x + 6y - 56 = 0$$

Move the constant
$$+56 \quad +56$$
$$x^2 + y^2 - 8x + 6y = 56$$

Group like terms together
$$(x^2 - 8x) + (y^2 + 6y) = 56$$

Take half of the middle

$$\left(x^2 - 8x + \left(\frac{-8}{2}\right)^2\right) + \left(y^2 + 6y + \left(\frac{6}{2}\right)^2\right) = 56 + \left(\frac{-8}{2}\right)^2 + \left(\frac{6}{2}\right)^2$$

coefficient, square it and

add it to both sides

Factor as a binomial squared,
and simplify the squared terms
$$\left(x - 4\right)^2 + \left(y + 3\right)^2 = 56 + \left(-4\right)^2 + \left(3\right)^2$$

$$\left(x - 4\right)^2 + \left(y + 3\right)^2 = 56 + 16 + 9$$

Simplify
$$\left(x - 4\right)^2 + \left(y + 3\right)^2 = 81$$

Guided Practice: Change the following equations to standard form. Then, identify the radius and center.

1. $x^2 + y^2 + 2x - 10y = -22$

2. $x^2 + y^2 + 14y + 24 = 0$

Standard Form: _____

Standard Form: _____

Radius: _____ Center: _____

Radius: _____ Center: _____

On your own: Rewrite in Standard form for a circle: $(x-h)^2+(y-k)^2=r^2$. Then, state the radius and center.

1. $x^2+y^2+8x=84$

2. $x^2+y^2-18y+65=0$

3. $x^2+y^2+20x-26y+268=0$

4. $x^2+y^2+14x-22y+134=0$