Unit 7 Obj.2–Converting to Descriptive Form

What happens when the equation is not perfectly set up in Standard Form to where we can identify everything?

Answer: We Complete The Square

Example #1: $x^2 + y^2 + 8x - 18y + 93 = 0$

$$x^2 + 8x + y^2 - 18y = -93$$

$$x^2 + 8x + \underset{(4)^2}{16} + y^2 - 18y + \underset{(-9)^2}{81} = -93 + \underset{16+81}{97}$$

$$(x+4)^2 + (y-9)^2 = 4$$

$C = (-4, 9)$

$r = \sqrt{4} = 2$

Example #2: $x^2 + y^2 - 5x + 4y - \frac{23}{4} = 0$

$x^2 - 5x + \frac{25}{4} + y^2 + 4y + 4 = \frac{23}{4} + \frac{41}{4}$

$\left(-\frac{5}{2}\right)^2 \qquad (2)^2$

$\frac{25}{4} + \frac{16}{4}$

$\left(x - \frac{5}{2}\right)^2 + (y+2)^2 = \frac{64}{4}$

$\left(x - \frac{5}{2}\right)^2 + (y+2)^2 = 16$

$C = \left(\frac{5}{2}, -2\right)$

$r = \sqrt{16} = 4$

Example #3: Show that the circle with equation $x^2 + y^2 + 20 = 2(5x - 2y)$ is congruent to the circle with center (0,0) and radius 3. Indicate the translation needed to map the first circle to the second circle.

Remember, the first circle has a center of (0,0) and radius of 3.....so the equation must be

$x^2 + y^2 = 9$ $C = (0,0)$ $r = \sqrt{9} = 3$

$x^2 + y^2 + 20 = 2(5x - 2y)$

$x^2 + y^2 + 20 = 10x - 4y$

$x^2 - 10x + \underset{(-5)^2}{25} + y^2 + 4y + \underset{(2)^2}{4} = -20 + \underset{25+4}{29}$

$(x-5)^2 + (y+2)^2 = 9$ $C = (5,-2)$ $r = \sqrt{9} = 3$

$C = (0,0) \rightarrow 5 \quad 2\downarrow$

$C' = (5,-2)$