Name _______________________________ Hour ________ Date _____________

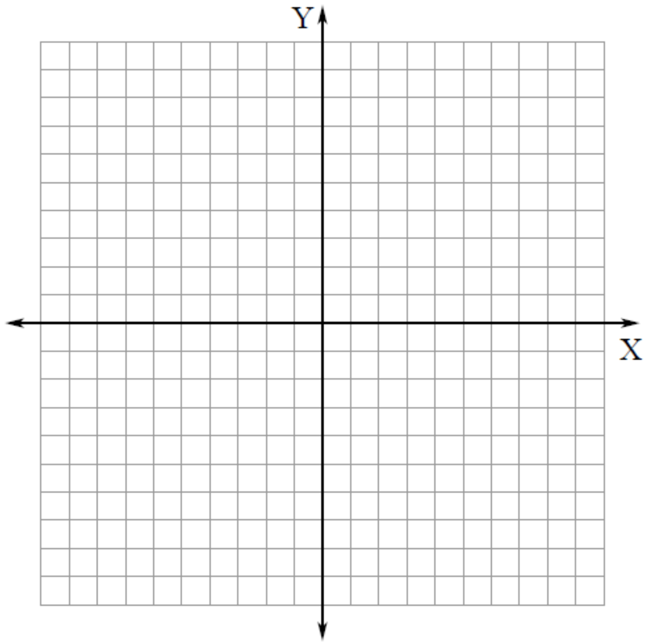
Algebra 2: Section 7-3 CIRCLES, part II

Equation of a Circle: $(x - h)^2 + (y - k)^2 = r^2$

Where **(h, k) is the center** and **r is the radius**.

We know how to identify the center and a radius of a circle when given the following format:

CIRCLE: $(x - 3)^2 + (y + 2)^2 = 25$ C (___ , ___) r = ____



However, sometimes the equation isn't in this standard form!

For Example: $x^2 + y^2 + 16x - 22y - 20 = 0$ IS the equation of a circle! BUT, it seems impossible to tell what's the center (h, k) and the radius, r, in this particular format.

So, we have to manipulate this equation to make it look like the standard: $(x - h)^2 + (y - k)^2 = r^2$

This process of making equation look standard form is called **"Completing the Square."**

This is a process of creating perfect square binomials. Let's try a basic example:

Example: Convert $x^2 + 8x - 9$ into a binomial square form of $(a + b)^2$

Here is a step-by-step process to convert to standard $(x - h)^2 + (y - k)^2 = r^2$ form using:

Example One: $x^2 + y^2 + 16x - 22y - 20 = 0$

Step 1: Arrange the equation in descending powers of x, then y. Move the constant to the right.

Step 2: Make sure the coefficient on x^2 and y^2 is 1. If not, factor it out. (See Examples 3,4)

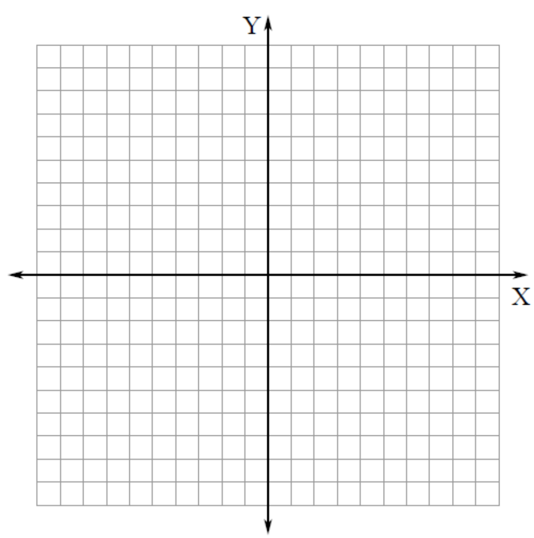
Step 3: Create a "perfect square trinomial." Take half of the x-coefficient, then square it. This goes in the box. Do the same procedure for the y-coefficient.

Step 4: Since we just added two foreign values to the left side of the equation, you MUST add the same amount to balance the right side of the equation!

Step 5: Transform both trinomials into their perfect square Binomial equivalent:

Step 6: Now we have Standard Form:

C (___ , ___) r = ____



Example Two: $x^2 + y^2 + 2x + 4y = 9$

Example Three: $2x^2 + 2y^2 - 6x + 16y - 40 = 0$

Example Four: $36y + 5 = -4x^2 - 4y^2$