**Unit 1 Lesson #12: Circle Equations**



**Learning Targets:**

* **I can use the method of completing the square to identify the center and radius of a circle.**
* **I can use points located on a circle to correctly write the equation of a circle.**
* **I can use algebraic and graphic methods to find the solution of a linear-circular system of equations.**

**Circle Equations:**

When an equation is given in this form, it means the center is ALWAYS (0,0) and the radius is r.

 x2 + y2 = r2

 OR

 (x – h)2 + (y – k)2 = r2

More common way to see a circle equation! The center is (h, k) and the radius is r.

**Graphing Circles:**

Write the center and radius for each circle below. Then graph it on the coordinate plane.

1. (x – 3)2 + (y + 2)2 = 9 2.) x2 + y2 = 16

Center: \_\_\_\_\_\_\_\_\_\_\_ Center: \_\_\_\_\_\_\_\_\_\_\_

Radius: \_\_\_\_\_\_\_\_\_\_\_ Radius: \_\_\_\_\_\_\_\_\_\_\_

x

y

x

y

In the examples where we have graphed circle so far, we are used to seeing the equation of a circle written in standard form. However, it does not always have to be presented in this form. Sometime they will give it to you in general form, and it will be your job to manipulate the equation to get it into standard form.

 $(x – 4)^{2}+ (y+1)^{2} = 25$ $x^{2} + y ^{2}– 8x +6y +24 = 0$

 Standard Form General Form

**How to Write the Equation of a Circle in standard form using Complete the Square:**

Steps: Example: x2 + y2 – 8x + 6y + 24 = 0

1. Rearrange the equation by grouping all

x terms and all y terms.

1. Move the constant to the right hand side.

1. Take half of the b term from the x group, and

 square it. Add this value to each side.

1. Take half of the b term from the y group, and

 square it. Add this value to each side.

1. Factor the x group and the y group.

\*\*express each as a binomial squared ( )2 \*\*

1. Look at the new manipulated equation, and

identify the center and radius of the circle.

**Practice with Completing the Square on a Circle:**

Determine the center and radius of the circle by completing the square.

1) $x^{2} + y^{2} + 2x + 18y + 1 = 0$ 2.) $4x^{2}+4y^{2}-8x+16y+4=0$

**Writing the Equation a Circle:**

1. Write the equation of a circle with a center at $\left(-3,-2\right)$ and a radius of $7$.

**Linear – Circular Systems of Equations**

1. Solve the following system algebraically and graphically:

$$x^{2}+y^{2}=13$$

$$y+x=5$$

1. Solve the following system algebraically and check it graphically:

$$(x-2)^{2}+(y-1)^{2}=4$$

$$x+y=1$$

**Homework: none ☺**