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“Shooting” for Coordinates & the Equation of a Circle



For this activity, you will be gaining more practice with plotting coordinates. You will also be determining the equation of a circle using 2 points and converting a general form for the equation of a circle to the standard form.

Goals:

* Students will be able to plot points on a coordinate plane using prior knowledge.
* Students will be able to discover the equation of a circle given points using prior knowledge.
* Students will be able to take the general form of an equation of circle and convert to the standard form for an equation of a circle.

Objectives:

* Given a Nerf gun, students will plot points on a coordinate plane. Students will then find the equation of a circle in standard form using 2 points.
* Given a the general form for the equation of circle, students will convert the equation to standard form and will then name the center point and will plot/”shoot” the point.

Materials:

* Nerf Gun
* Nerf Gun Bullets (preferably w/ suction cups at end)
* Coordinate Plane (projected/drawn on board)
* Student Worksheet
* Pencil

Procedure:

* Decide whether you will be working individually or in pairs.
* “Shoot”/Plot 2 points on the coordinate plane and keep record of them.
* Follow steps listed below in the space provided in order to find the equation of a circle.
* Given the general form for the equation of a circle, find the standard form.
* Determine the center and “shoot”/plot your coordinate (center).

Definitions & Formulas

* Circle: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Completing the Square: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Equations of a Circle:
  + Standard Form: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + General Form: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Distance Formula: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Find the Equation of a Circle Given a Center Point and Point Passing Through the Circle.***

**“Shooting” Points**

Using the Nerf gun, plot (“shoot”) two points on the coordinate plane provided. Record your coordinates below.

Coordinate #1: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Coordinate # 2: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Step 1:** Determine which of your two coordinates will be the center and which will be the other.

Center Point: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Point Passing Through: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Step 2:** Find the radius. What formula will you need to use?

Radius = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Step 3:** Using the information above, give the standard form for the equation of a circle by plugging in.

Equation of a circle: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Convert the Following Equation of a Circle from General Form to Standard Form***

**Step 1:** Group the terms!

**Step 2:** Divide each term by the coefficient of the

**Step 3:** Think about how you are going to convert the equation to standard form. What are you going to use?

**Step 4:** Find/Record the center point and then plot (“shoot) it on the coordinate plane.

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

***Conclusions***

1. Why do we use the distance formula when given the center point and point that passes through the circle?
2. Is there a rule that we can say in regards to (h, k) when the equation is in standard form?
3. What do we use to convert the equation of a circle from general form to standard form?

Additional Questions: Complete on separate sheet of paper.

1. Find the equation of a circle given the point (9,-5) and the center point (-4,-6).
2. Convert the equation of circle from general form to standard form and name the center.
3. Convert to standard form and name the center.
4. Given (1, 4) as the center point and (3, 7) as a point that passes through the circle find the equation of the circle.

☺ Bonus ☺

* What would happen to your equations for #1 and #4 if you reflected the center points over the y-axis? The x-axis? The line y=x? Find your new equations for each and describe what happens.

Sources:

* <http://www.algebra.com/algebra/homework/Circles.faq.question.61514.html>
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* [http://www.mathsisfun.com/algebra/circle-equations.html](http://http/www.regentsprep.org/Regents/math/algtrig/ATC1/circlelesson.htmwww.mathsisfun.com/algebra/circle-equations.html)
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