Richmond Public Schools
Curriculum Framework
Geometry

Strand: Polygons and Circles
G.12   The student will solve problems involving equations of circles.

Suggested Pacing	Cognitive Demand
First Nine Weeks	G.12
3 instructional days (including assessment)	Apply

Spiraling Down Standards	Spiraling Up Standards
6.7 The student will a) derive π (pi); b) solve problems, including practical problems, involving circumference and area of a circle; **8.10** The student will solve area and perimeter problems, including practical problems, involving composite plane figures.	

Essential Questions	Common Misconceptions
What is the relationship between the distance formula, the Pythagorean Theorem, and the equation of a circle? The Pythagorean Theorem, the Distance Formula, and the Standard Equation of a Circle are all analytically equivalent and represent the **same** relationship among points within a rectangular coordinate plane. There are slight differences in the naming of the points dependent upon which of the three situations is of interest. **What characteristics of circles are necessary to graph and write the equations of circles?**	• Students forget that the radius is squared in the equation, especially when the radius is an irrational number. Explaining the equation of the circle in terms of the Pythagorean Theorem will help students remember. • Students forget that inside the parentheses is subtraction, so they may forget to change the sign when finding the center. Students forget to switch the sign of the h and k from inside the parentheses in the equation. This is necessary because the h and k are inside the grouping symbols, which means that the shift happens opposite from what you would think.

You need to know the radius and center of the circle. **What relationship is there between the radius of a circle with regard to Standard Equation of a Circle and the hypotenuse of a right triangle with regard to the Pythagorean Theorem?** The radius of the circle is the same as the hypotenuse of the right triangle.	
Understanding the Standard	**Essential Knowledge and Skills**
• A circle is a locus of points equidistant from a given point, the center. • The distance between any point on the circle and the center is the length of the radius. • Standard form of the equation of a circle is $(x-h)^2 + (y-k)^2 = r^2$, where the coordinates of the center of the circle are (h, k) and r is the length of the radius. • The equation of a circle gives the coordinates of every point, (x, y), on the circle. • The midpoint formula and distance formula are important when determining the equation of a circle. • The equation of a circles with a given center and radius can be derived using the Pythagorean Theorem. • The midpoint of the diameter is the center of the circle.	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to** • Given a graph or the equation of a circle in standard form, identify the coordinates of the center of the circle. • Given the coordinates of the endpoints of a diameter of a circle, determine the coordinates of the center of the circle. • Given a graph or the equation of a circle in standard form, identify the length of the radius or diameter of the circle. • Given the coordinates of the endpoints of the diameter of a circle, determine the length of the radius or diameter of the circle. • Given the coordinates of the center and the coordinates of a point on the circle, determine the length of the radius or diameter of the circle. • Given the coordinates of the center and length of the radius of a circle, identify the coordinates of a point(s) on the circle. • Determine the equation of a circle given:

	o A graph of a circle with a center with coordinates that are integers; o Coordinates of the center and a point on the circle; o Coordinates of the center and the length of the radius or diameter; or o Coordinates of the endpoints of a diameter.

Vocabulary			**Instructional Activities Organized by Learning Objective**
Standard Form	Radius	Midpoint Formula	**Virginia Department of Education** ● Circles in the Coordinate Plane
Distance Formula	Integral Points	Equation of a Circle	
Diameter	Center	Endpoint	**Textbook** ● Geometry, ©2012, Price, et al, McGraw-Hill School Education Group page(s) 743-749

Assessment	**Instructional Activities (continued)**

1.   Powerschool Assessment
G.12 (E:1EYT8L)
 	
2.   Mulligan Checkpoint G.12
Checkpoint G.12
 	
3.   Formative Assessments (Paper)
G.12 FA
 	
4. Cumulative Assessment
(SOLs G.1a-d, G.2 a-c, G.3a-d, G.4a-d,g, G.12)
 9 Week Test
	Notes and Homework
	G.12 Notes and Key
	G.12 Homework and Key
	
	Resources
	● **Print**
	   ○ Coach book. Virginia edition Lesson 26 page(s) 207-213
	● **Technology**
	   ○ **Geogebra**
	      ■ Geogebra Exploration Activity
	   ○ **Youtube videos**
	      ■ Equation of a Circle
	   ○ **Quizizz Practice**

	■ G.12 Equation of a Circle Quizizz Practice ○ **DESMOS** ■ Equation of a Circle Tutorial **Instructional Activities** ● G.12 Equation of a Circle Practice Worksheet ● Collaboration Activity ● Circle Graphs Project
Cross-Curricular Connections	**Tiered Interventions**
Real World: Telecommunications towers emit radio signals that are used to transmit cellular calls. Each tower covers a circular area, and towers are arranged so that a signal is available at any location in the coverage area. (Textbook, p. 744) Using Equations of Circles to Find a lost cell phone	**Tier 3: Recall and Reproduction** Vocabulary Have students study flashcards, create their own flashcards, play a matching game or test themselves on Quizlet. Quizlet Flashcards Equation of a Circle ● Provide students or groups with rectangular graph paper or gridded dry-erase boards (and markers) so they may plot points and draw circles as needed throughout the lesson. **Tier 2: Basic Skills and Concepts** Drill and Practice Equation of Circle Drills Worksheet comparing radius, diameter, and radius squared **Tier 1: Strategic Thinking and Reasoning** Application Students complete the above Circle Graphs Project.