(A) Lesson Context

BIG PICTURE of this UNIT:	• mastery with algebraic skills to be used in our work with co-ordinate geometry (midpoint, length, slope) • understanding various geometric properties of quadrilaterals & triangles • how do you really prove that something is "true"?		
CONTEXT of this LESSON:	Where we've been You know how to find a midpoint, a length and how to work with Geogebra	Where we are Using length and midpoint in developing and working with equations of circles	Where we are heading How can I prove various geometric properties of quadrilaterals and triangles?

(B) Lesson Objectives:

a. Exploring the relationship between the midpoint, endpoints & circles (through geogebra)
b. Determine the equation of a circle centred at the origin
c. Explore and determine the equation of a circle NOT centred at the origin (through geogebra)

(C) Analysis of a Circle Centered at the Origin

a. Given the circle with the equation of $x^2 + y^2 = 25$. Using GEOGEBRA, determine:

1. Use the INPUT bar to write the equation.
2. Determine the radius.
3. Determine the x- and y-intercepts of the circle.
4. If x = 3, determine the value(s) for y.
5. If y = -1.5, determine the value(s) for x.

b. Given the circle with the equation of $x^2 + y^2 = 100$.

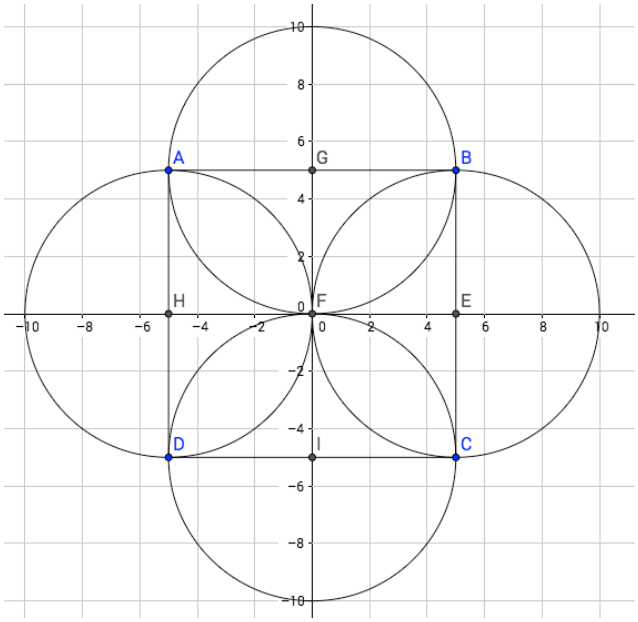
6. Determine the radius.
7. Determine the x- and y-intercepts of the circle.
8. If x = 6, determine the value(s) for y.
9. If y = -3, determine the value(s) for x.

c. Given a circle with its center at $(0,0)$ and containing point $(-5,12)$, determine its equation.

d. Given a circle with the end points of a diameter at $(-8,15)$ and $(8,-15)$, determine its equation.

(D) Analysis of a Circle NOT Centered at the Origin

a. Create the following figure on GEOGEBRA.



b. What is the center and the radius for the circle whose center is on the positive x-axis?

c. Suppose $P(x,y)$ is any point on that circle. Explain why it must be the case that $\sqrt{(x-5)^2+y^2}=5$.

d. Use that information to write an equation for the circle that does not include a **radical symbol** (square root).

e. Write similar equations for:

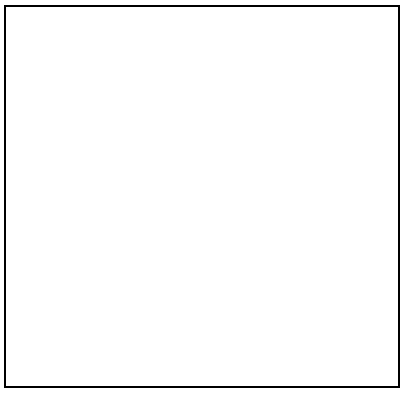
i. The circle whose center is on the positive y-axis.

ii. The circle whose center is on the negative x-axis.

ii. The circle whose center is on the negative y-axis.

c. Verify that the coordinates of the vertices of the square satisfy your equations of the four circles.

d. Use similar reasoning to find an equation of a circle with center $C(h,k)$ and radius r.



e. Compare your equation with those of your classmates. Resolve any differences.

f. Rewrite your equation for the case when $C(h,k)$ is the origin. What do you notice?

(E) Homework/Resources

Nelson 10 Chap 2.3 – Equation of a Circle,
(http://mrsantowski.tripod.com/2015IntegratedMath2/Homework/Nelson_10_Chap_2.3.pdf)
p91-93, #1, 2, 3, 4, 5, 6, 8, 15, 18b & for a Challenge: 9, 10, 11, 12, 18a

For advanced work & challenge, try http://www.kutasoftware.com/FreeWorksheets/GeoWorksheets/11-Equations%20of%20Circles.pdf