

(A) Lesson Context

BIG PICTURE of this UNIT:	<ul style="list-style-type: none">• 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”?
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(B) Lesson Objectives:

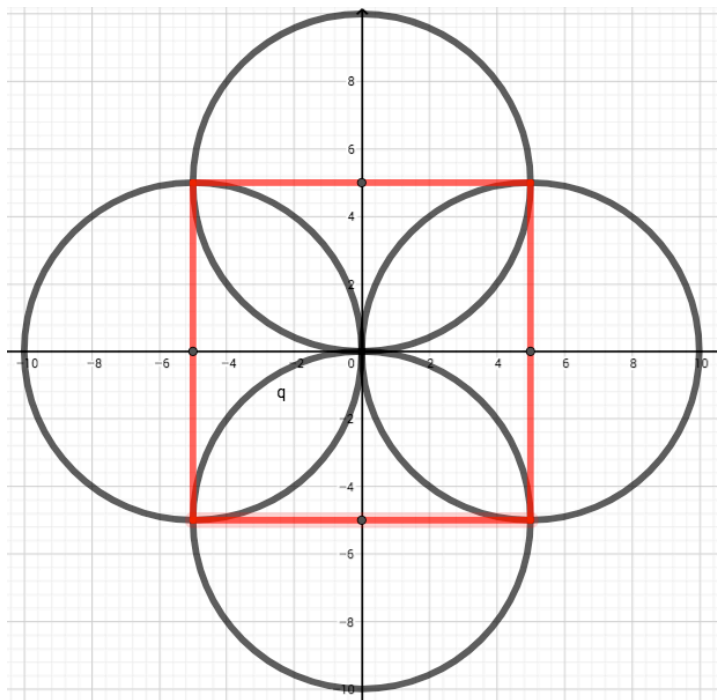
- Exploring the relationship between the midpoint, endpoints & circles (through geogebra)
- Determine the equation of a circle centred at the origin
- Explore and determine the equation of a circle NOT centred at the origin (through geogebra)

PART 1 – Skills REVIEW/EXPLORTION

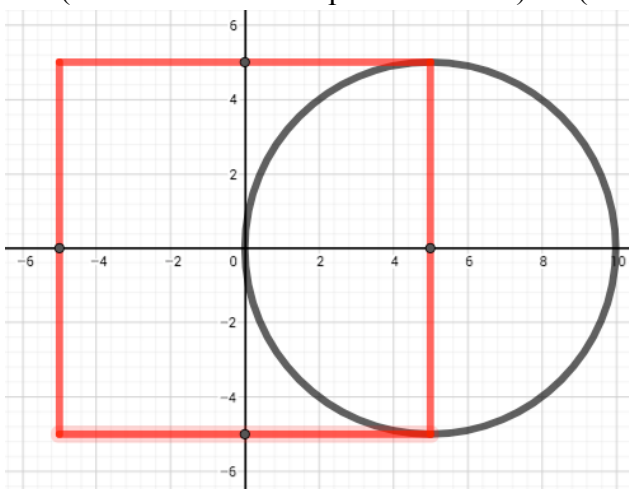
- Given the circle with the equation of $x^2 + y^2 = 25$. Using GEOGEBRA, perform the following:
 - Use the INPUT bar to write the equation.
 - Hence, determine the radius.
 - Hence, determine the x- and y-intercepts of the circle.
 - If $x = 3$, determine the value(s) for y .
 - If $y = -1.5$, determine the value(s) for x .
 - State the domain of this relation.
- Given the circle with the equation of $x^2 + y^2 = 100$. DO NOT GRAPH THIS CIRCLE YET
 - Use Geogebra to plot the point (0,0)
 - Verify that the point (10,0) is on the circle whose equation is $x^2 + y^2 = 100$. Plot this point.
 - Determine the radius.
 - Go to the CIRCLE tool in Geogebra and CONSTRUCT the circle whose center is at (0,0) and where one point is (10,0)
 - Determine the x- and y-intercepts of the circle.
 - If $x = 6$, determine the value(s) for y .
 - If $y = -3$, determine the value(s) for x .
- Given a circle with its center at (0,0) and containing point $(-5,12)$, determine its equation.
- Given a circle with the end points of a diameter at $(-8,15)$ and $(8,-15)$, determine its equation.

PART 1 – Skills REVIEW/EXPLORTION PART 2

1. Use Geogebra to construct the following pattern.



- i. Start with the red square (side length of ?)
- ii. Then add the first circle (to be located on the positive x-axis) → (radius of ...? and a center at...?)



- iii. Look at the equation of this circle. What do you notice about its equation and its center?
- iv. Add the other circles & record their equations

PART 2 – Skills PRACTICE/Applications & GEOMETRY Contexts

1. Given the circle with the equation of $x^2 + y^2 = 36$. Using ALGEBRA, determine: (you may VERIFY using Geogebra)
 - a. Determine the length of the radius of this circle
 - b. Determine the domain and range of this relation.
 - c. Determine the x- and y-intercepts of the circle
 - d. If $x = -3$, determine the value(s) for y
 - e. If $y = 2$, determine the value(s) for x

2. A circle has its center at $(0,0)$ and passes through the point $P(5,-12)$
 - a. Determine the equation of this circle.
 - b. Determine the co-ordinates of the other endpoint of the diameter that passes through point P .
 - c. The entire circle is now moved 3 units to the right and 3 units up.
 - i. Where is its center now?
 - ii. What is the radius of this circle?
 - iii. What is the equation of this new circle?
 - iv. Where are the x- and y-intercepts of this new circle?

3. The points $(a,5)$ and $(9,b)$ are on the circle $x^2 + y^2 = 125$. Determine the possible values of a and b . Round to one decimal place if necessary.

4. A rock is dropped into a pond, creating a circular ripple. The radius of the ripple increases steadily at 6 cm/sec. A toy boat is floating on the pond, 2.00m east and 1.00 m north of the spot where the rock was dropped. How long does it take the ripple to reach the boat?

5. A satellite orbits the Earth on a path modeled by the relation $x^2 + y^2 = 45\,000\,000$. A second satellite, in the same plane, is currently located at $(12\,504, 16\,050)$. Explain how you would determine whether this second satellite is inside or outside of the orbit on the first satellite.