IM2 Problem Set 1.5 - Introduction to Circles

BIG PICTURE of this UNIT:	• mastery with linear algebraic skills to be used in our work with coordinate geometry (midpoint, length, slope) • understanding various geometric properties of quadrilaterals, triangles & circles • how do you really "prove" that something is "true"? • introduction to working with 3D shapes

Part 1 - Skills Review

1. Solve the equation $5^2 + y^2 = 13^2$ for y.
2. Find the distance between the points A(5,-4) and B(-3,-8) and find the midpoint of this line segment.
3. Solve the linear system defined by the equations $y = 2x - 5$ and $4x - 2y = 8$. Explain your solution.
4. Find the area and perimeter of a rectangle whose dimensions are 52 m by 39 m. No calculators.
5. Evaluate $4^2 + 3^{-1} + 2^0$.

Part 2 – Concept EXPLORATION

1. Given the circle with the equation of $x^2 + y^2 = 25$. Using GEOGEBRA, perform the following:

    a. Use the INPUT bar to write the equation.
    b. Determine the radius.
    c. Determine the x- and y-intercepts of the circle.
    d. If $x = 3$, determine the value(s) for y.
    e. If $y = -1.5$, determine the value(s) for x.
    f. State the domain of this relation.

2. Given the circle with the equation of $x^2 + y^2 = 100$. DO NOT GRAPH THIS CIRCLE YET ……

    a. Use Geogebra to plot the point (0,0)
    b. Verify that the point (-6,8) is on the circle whose equation is $x^2 + y^2 = 100$. Plot this point.
    c. Determine the radius of the circle.
    d. Go to the CIRCLE tool in Geogebra and CONSTRUCT the circle whose center is at (0,0) and where one point is (-6,8).
    e. Determine the x- and y-intercepts of the circle.
    f. If $x = 8$, determine the value(s) for y.
    g. If $y = -3$, determine the value(s) for x.

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

4. Given a circle with the endpoints of a diameter at (-8,15) and (8,-15), determine its equation.

PART 3 – 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 coordinates 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?

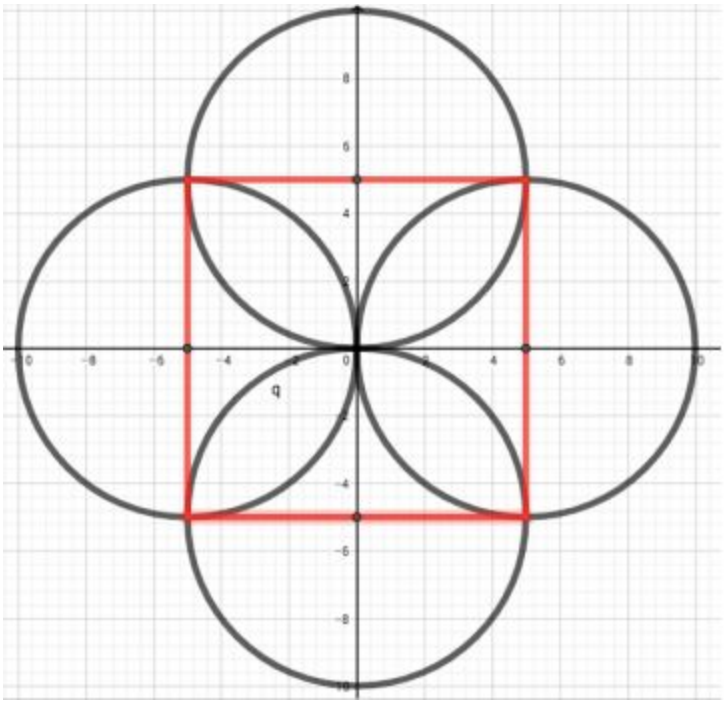
3. The points $(a,5)$ and $(9,b)$ are on the circle $x^2 + y^2 = 125$. Determine the possible values of a and b. Round to one decimal place if necessary.

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, 2.00 m 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 (12504, 16050). Explain how you would determine whether this second satellite is inside or outside of the orbit on the first satellite.

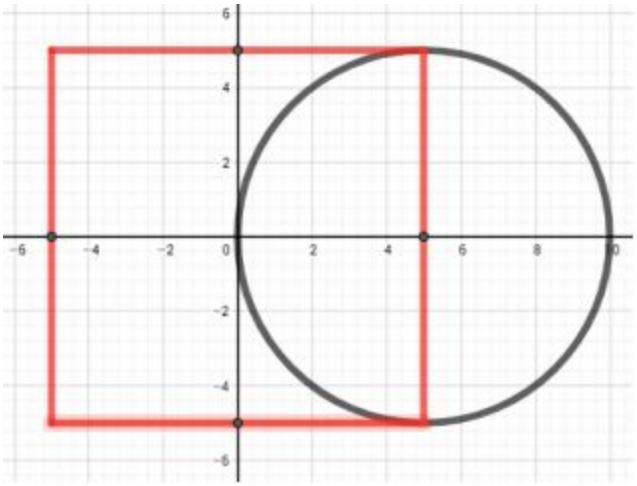
PART 4 – Skills REVIEW/EXPLORATION PART 2

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 …….