

IM2 Problem Set 1.7 - Introduction to Circles

BIG PICTURE of this UNIT:	<ul style="list-style-type: none">• 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
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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. Find the area and perimeter of a rectangle whose dimensions are 52 m by 39 m. No calculators.
4. 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. Use GEOGEBRA to work through the following question:
 - a. Use Geogebra to plot the point (0,0) as well as the point (-6,8)
 - b. Go to the CIRCLE tool in Geogebra and CONSTRUCT the circle whose center is at (0,0) and where one point is (-6,8).
 - c. Write down the equation of the circle.
 - d. Determine the radius of this circle. How is the radius related to the equation of the circle?
 - 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.

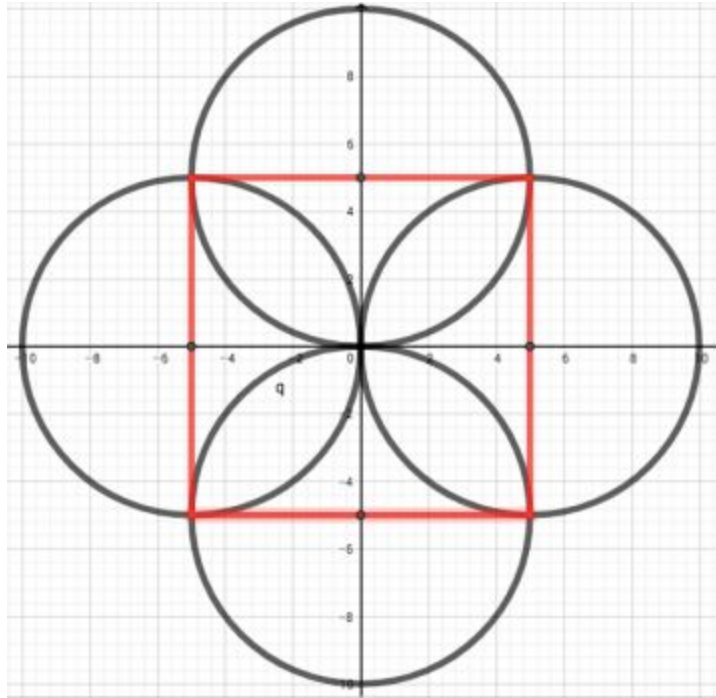
4. Given a circle with the endpoints of a diameter at $(-8,15)$ and $(8,-15)$, determine its equation.

PART 3 – Skills PRACTICE/Applications & GEOMETRY Contexts

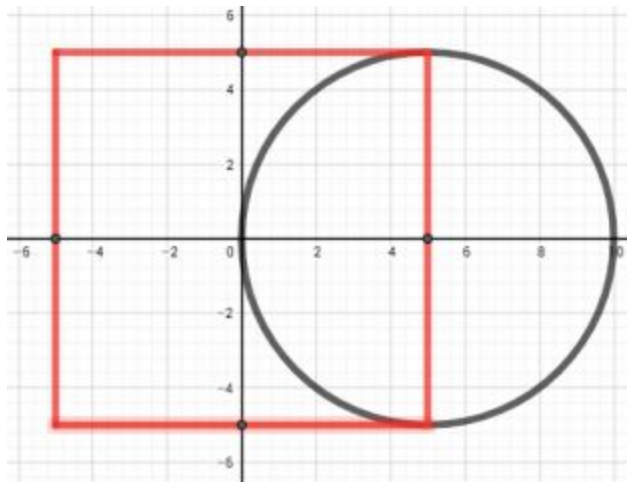
1. Given the circle with the equation of $x^2 + y^2 = 36$. Using ALGEBRA, determine: (you may VERIFY using Geogebra).
 - a. Determine the length of the radius of this circle
 - b. Determine the domain and range of this relation.
 - c. Determine the x - and y -intercepts of the circle
 - d. If $x = -3$, 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 $P(7,-24)$.
 - 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