

IM2 Problem Set 1.11 - Further Properties of Geometric Figures & Introduction to 3D Shapes

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
---------------------------	---

Part 1 - Skills Review

1. Find the length of the altitude from vertex A in the triangle defined by A(5,6), B(-3,4), C(7,-2). Hence, find the area of the triangle.
2. Use GEOGEBRA in this exercise. Given the following lines, find the (i) slope of the line and (ii) the angle the line makes with the positive x-axis:
 - a. $y = \frac{1}{2}x - 2$
 - b. $y = 3 - 2x$
 - c. $4x - 2y = 7$

Part 2 – Skills & Concept REVIEW/EXPLORATION

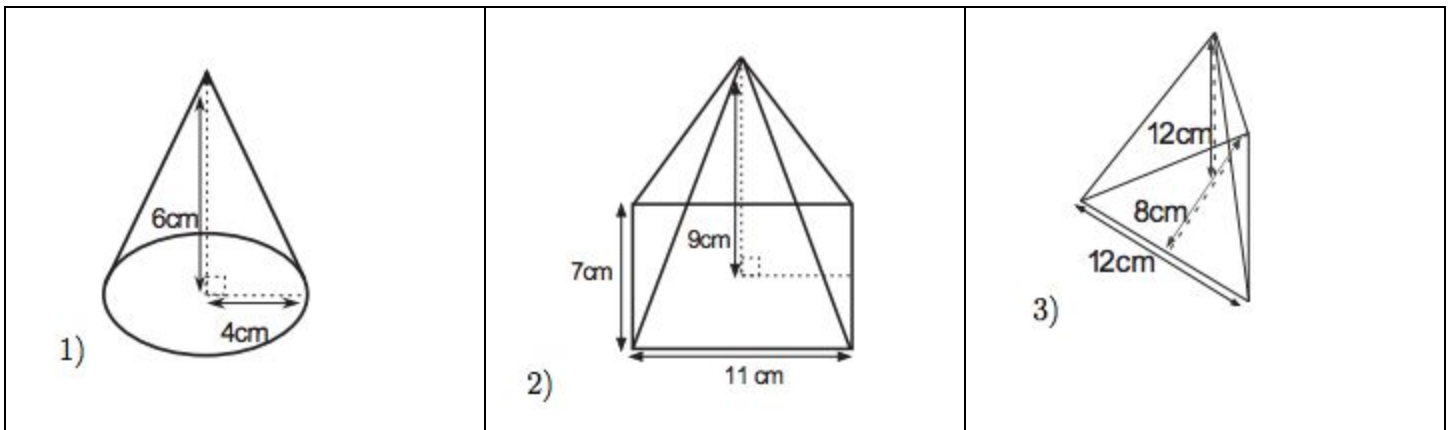
1. A polygon is defined by points R(-5, 1), S(5, 3), T(2, -1), and U(-8, -3).
 - a. Show that the polygon is a parallelogram.
 - b. Find the area of this parallelogram.
2. A triangle has vertices at L(-7, 0), M(2, 1), and N(-3, 5).
 - a. Verify that it is a right isosceles triangle.
 - b. Hence, find the area of this triangle.
 - c. This triangle is the base of a triangular prism whose length is 25 cm. Find the volume and area of this triangular prism.
 - d. **HL Challenge option:** This triangular prism will “just fit” into a cylindrical tube. Determine the dimensions of this tube and hence the volume and surface area of the tube.
3. ΔPQR has vertices at P(12, 6), Q(4, 0), and R(8, 6). Use analytic geometry to determine the coordinates of the centroid (the point where the medians intersect).

Part 3 – NEW Skills & PRACTICE

1. Working with Cones and Pyramids. A cone is a 3D figure that has a circular base and a rectangular face that wraps around the circumference of the base into a point, called a common vertex. The volume formula for a cone is: $V = \frac{1}{3} \pi r^2 h$

A pyramid is a 3D figure that has a polygon base, and all other triangular faces meet at a common vertex. The formula for a pyramid is: $V = \frac{1}{3} \times \text{area of base} \times \text{height}$

Find the volume of the following:



2. The Great Pyramids of Giza are named the Pyramid of Menkaure, the Pyramid of Khafre and the Pyramid of Khufu. The height and base area of each of these pyramids are: 65.5 m by 103.4 m^2 , 136.4 m by 215.25 m^2 , 138.8 m by 230.4 m^2 respectively. What is the volume of each of the Great Pyramids of Giza?

3. Find the volume of the following figures:

