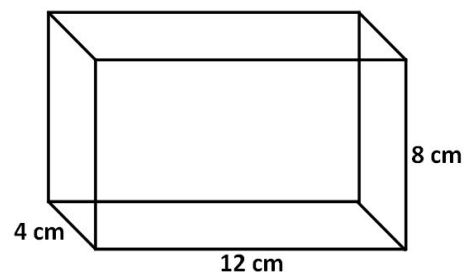


IM2 Problem Set 1.8 - Properties of Geometric Figures

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. Find the volume and surface area of the rectangular prism shown.
2. Expand and simplify $6(2x - 1) - 3(2x - 2)$
3. Write an equation that can be used to model the following scenario: I pay 10 cents/minute for phone calls and 6 cents/text for text messages and my monthly budget is \$25.00/month.
4. If $f(x) = 2x - 6$, then evaluate $f(2)$ as well as $f(-2)$.



Part 2 – Skills & Concept REVIEW/EXPLORATION

1. Show that any mid-segment constructed from any two sides of the triangle with vertices at $P(-7,9)$, $Q(9,11)$, and $S(1,-11)$ is parallel to the third side. Key Steps to be demonstrated:
 - a. Set up the diagram on Geogebra
 - b. Research unknown concepts (what is a midsegment?)
 - c. Use Geogebra to generate “relevant information”
 - d. We will use this “relevant info” to help us to plan a strategy for “showing” what we are required to show we will try to use analytical geometry in this step
 - e. Organize & present an solution
2. Show that the diagonals of the quadrilateral with vertices at $A(-6,4)$, $B(-2,6)$, $C(1,0)$ and $D(-3,-2)$ are equal in length. Make a conjecture about the type of quadrilateral. Key Steps to be demonstrated:
 - a. Set up the diagram on Geogebra
 - b. Research unknown concepts (different ways to find a triangle’s area? What is an “altitude”?)
 - c. Use Geogebra to generate “relevant information”
 - d. We will use this “relevant info” to help us to plan a strategy for “showing” what we are required to show we will try to use analytical geometry in this step
 - e. Organize & present an solution

3. Given the circle defined by $x^2 + y^2 = 125$, show that A(10,5) and B(-11,2) are on the circle and then secondly, show that the perpendicular bisector of CHORD AB goes through the center of the circle. Key Steps to be demonstrated:
- Set up the diagram on Geogebra
 - Research unknown concepts (What is a “chord”?)
 - Use Geogebra to generate “relevant information”
 - We will use this “relevant info” to help us to plan a strategy for “showing” what we are required to show we will try to use analytical geometry in this step
 - Organize & present an solution
4. **CHALLENGE Q:** Using the same triangle as before, with vertices at P(-7,9), Q(9,11), and S(1,-11), use algebraic methods to determine its area. Key Steps to be demonstrated:
- Set up the diagram on Geogebra
 - Research unknown concepts (different ways to find a triangle’s area? What is an “altitude”?)
 - Use Geogebra to generate “relevant information”
 - We will use this “relevant info” to help us to plan a strategy for “showing” what we are required to show we will try to use analytical geometry in this step
 - Organize & present an solution

Part 3 – Skills PRACTICE/Applications & GEOMETRY Contexts

- Show that the diagonals of quadrilateral ABCD are equal in length.
- Show that the diagonals of quadrilateral JKLM are perpendicular.
- $\triangle PQR$ has vertices at P(-2,1), Q(1,5) and R(5,2). Show that the median from vertex Q is the perpendicular bisector of PR.
- Show that the midsegments of a rhombus with vertices at R(-5,2), S(-1,3), T(-2,-1) and U(-6,-2) form a rectangle.

