MATHEMATICS

YEAR 7

ACHIEVEMENT STANDARD

By the end of Year 7, students solve problems involving the comparison, addition and subtraction of integers. They make the connections between whole numbers and index notation and the relationship between perfect squares and square roots. They solve problems involving percentages and all four operations with fractions and decimals. They compare the cost of items to make financial decisions. Students represent numbers using variables. They connect the laws and properties for numbers to algebra. They interpret simple linear representations and model authentic information. Students describe different views of three-dimensional objects. They represent transformations in the Cartesian plane. They solve simple numerical problems involving angles formed by a transversal crossing two parallel lines. Students identify issues involving the collection of continuous data. They describe the relationship between the median and mean in data displays.

Students use fractions, decimals and percentages, and their equivalences. They express one quantity as a fraction or percentage of another. Students solve simple linear equations and evaluate algebraic expressions after numerical substitution. They assign ordered pairs to given points on the Cartesian plane. Students use formulas for the area and perimeter of rectangles and calculate volumes of rectangular prisms. Students classify triangles and quadrilaterals. They name the types of angles formed by a transversal crossing parallel line. Students determine the sample space for simple experiments with equally likely outcomes and assign probabilities to those outcomes. They calculate mean, mode, median and range for data sets. They construct stem-and-leaf plots and dot-plots.

WORK SAMPLE PORTFOLIOS

This portfolio is a resource to support teachers in planning an implementation of the Foundation to Year 10 Australian curriculum in the Mathematics learning area. It comprises a collection of student work illustrating evidence of student learning in relation to the achievement standard. Each work sample in the portfolio varies in terms of how much time was available to complete the task and/or the degree of scaffolding provided by the teacher. They have been annotated by classroom teachers as part of the Consistency of Teacher Judgement Process.

ABOVE STANDARD

Assessment Task-Measurement Investigation

Date commenced:	**Date due:**
Learning Area/s: Mathematics	

Year 7 achievement standard: *Use formulas for the area and perimeter of rectangles and calculate volumes of rectangular prisms*
Content Descriptor: ***Measurement & Geometry***

- Establish the formulas for areas of rectangles, triangles and parallelograms and use these in problem solving (ACMMG159)
- Calculate volumes of rectangular prisms (ACMMG160)
- Draw different views of prisms and solids formed from combinations of prisms (ACMMG161)

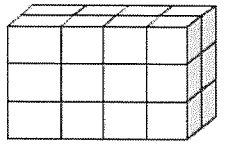
Student Name:		**Year Level: 7**		
Name of Task: Measurement Investigation		**Teacher: Mrs Dore/Mr Volpi**		
Type of Task:	☐Oral	☐Written	☐Other	
Task Conditions:	☐Individual	☐Pair	☐Group Work	
	☐In Class	☐Homework	☐Other	
Opportunities to				
Access	Books	☐ Notes	☐ Library	☐Technology
Assessed by	☐ Self	☐Peer	☐ Teacher	

Task Description:

Calculate the volume and surface area of a given rectangular prism. Re-arrange the cubes in the rectangular prism to form a different rectangular prism. Write what you know about the volume of the new prism. Use isometric dot paper to draw examples of what the new prism may look like. Calculate the area of each face of the prism and the total surface area. Explain how you would construct the rectangular prism using 24 cubes, so that it had the largest possible surface area. Collate calculations in a table to demonstrate your answer. Provide a written explanation of your reasoning. Write a conclusion about what you discovered and how you discovered it.

Task Procedure

You Will:



- 1. Calculate the volume and surface area of this rectangular prism made from cubes with lengths of 1 cm.
- 2. This set of cubes is arranged to form a different rectangular prism.
- a. What do you know about the volume of the new prism?
- b. Use isometric dot paper to draw examples of what the new prism may look like.
- c. For at least 2 of your examples, calculate the area of each face of the prism and add these to find the total surface area.
- d. Explain how you would construct the rectangular prism using 24 cubes, so that it had the largest possible surface area.
- e. Collate your calculations in a table to demonstrate your answer.
- f. Provide a written explanation of your reasoning.
- g. Write a conclusion about what you discovered and how you discovered it.

RESOURCES: Interlocking cubes, paper for writing, pencil, eraser, calculator.

Measurement Investigation CRITERIA SHEET

Student: _____ Date: _____

Criteria	A	B	C	D	E
The student work demonstrates evidence of:					
Mathematical Understanding - recall & use of formulas (area, volume) - symbols (x, +, =) - measurement (cm^2 cm^3)	Comprehensive use of correct formulas, symbols and measurements	Thorough use of correct formulas, symbols and measurements	Satisfactory use of correct formulas, symbols and measurements	Limited use of correct formulas, symbols and measurements	Very limited use of correct formulas, symbols and measurements
Representation - labelled 3D diagram (isometric dot paper)	Controlled and accurate labelled drawing of 3D diagrams with a ruler, on isometric paper	Accurate labelled drawing of 3D diagrams with a ruler, on isometric paper	Credible labelled drawing of 3D diagrams with a ruler, on isometric paper	Variable drawing of 3D diagrams, on isometric paper	Minimal drawing of 3D diagrams
Problem solving - application of problem solving strategies	Effective and comprehensive step-by-step outline of problem solving strategies	Comprehensive step-by-step outline of problem solving strategies	Step-by-step outline of problem solving strategies, including majority of the correct steps	Step-by-step outline of problem solving strategies, including few of the correct steps	No step-by-step outline of problem solving strategies
Results - calculations	All area and volume results are accurate	Most of the area and volume results are accurate	Some of the area and volume results are accurate	Few of the area and volume results are accurate	None of the area and volume results are accurate
Explanation - communication of mathematical thinking, choices and strategies	Insightful and skilful communication of mathematical thinking	Informed and effective communication of mathematical thinking	Relevant and competent communication of mathematical thinking	Variable communication of mathematical thinking	Minimal communication of mathematical thinking
Conclusion - conclusions of investigation	Perceptive reflection on learning	Informed reflection on learning	Relevant reflection on learning	Limited reflection on learning	Very limited reflection on learning

Feedback:

Signed: Date:

= cm^3

surface area. = cm^2

1-07-13

Measurement investigation (1)

21. $V = (4cm \times 3cm) \times 2cm$

$= 12cm \times 2cm$

$= 24 cm^3$

$SA = 2(4cm \times 3cm + 2cm \times 3cm + 4cm \times 2cm)$

$= 2(12cm + 6cm + 8cm)$

$= 2 \times 26cm$

$= 52cm^2$

22. (3) $V = (6cm \times 2cm) \times 2cm$

prism (1) $= 12cm \times 2cm$

$= 24 cm^3$

(2) $SA = 2(6cm \times 2cm + 2cm \times 2cm + 6cm \times 2cm)$

$= 2(12cm + 4cm + 12cm)$

$= 2 \times 28cm$

$= 56cm^2$

22a. The volume of both prisms above are the same because you are always using the same amount of cubes.

22b. is on isometric dot paper. 10-07-13

22c.

prism (1) $SA = 2(6cm \times 2cm + 2cm \times 2cm + 6cm \times 2cm)$

$= 2(12cm + 4cm + 12cm)$

$= 2 \times 28cm$

$= 56cm^2$

prism (2) $SA = 2(1cm \times 1cm + 1cm \times 24cm + 1cm \times 24cm)$

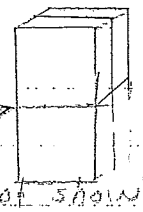
$= 2(1cm + 24cm + 24cm)$

$= 2 \times 49cm$

$= 98cm^2$

)-07-13 Measurement Investigation (2)

2d. You would put all 24 cubes in one big line so that only 1 face of each cube is not showing (e.g. because then more faces would be showing in this rectangular prism than any other.

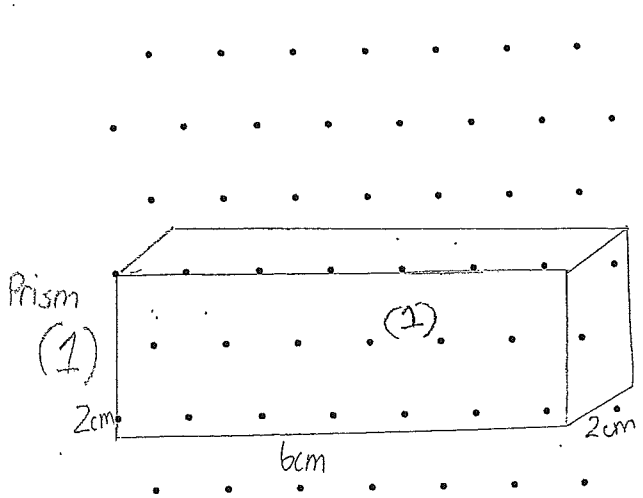


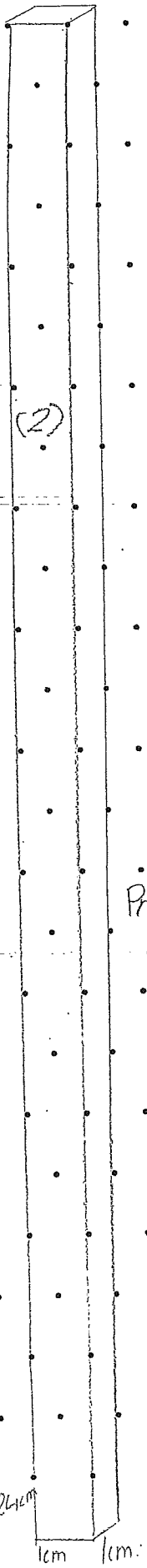
12e.

prism	length	width	height	volume	surface area
1	6cm	2cm	2cm	24cm^3	56cm^2
2	1cm	1cm	24cm	24cm^3	98cm^2
3	4cm	2cm	3cm	24cm^3	52cm^2
4	8cm	1cm	3cm	24cm^3	70cm^2
5	6cm	1cm	4cm	24cm^3	68cm^2

-07-13
12f. The table above told me that rectangular prism 2 has the largest surface area because you can see most of it, most of it is showing. And with rectangular prism 3, it has the smallest surface area because most of the cubes aren't showing.

12g. Throughout this investigation I found out that however many rectangular prisms you make with 24 cubes, you will always get the same volume for each one. I also learnt that your surface area depends on how many surfaces you can see.





Q2b.

ANNOTATION

KEY Colour / Number	ANNOTATION
(1)	3D drawings on isometric grid paper
(2)	Formula for surface area of rectangular prisms
(3)	Calculating volumes of various rectangular prisms
Comments:	