Volume and Capacity 1

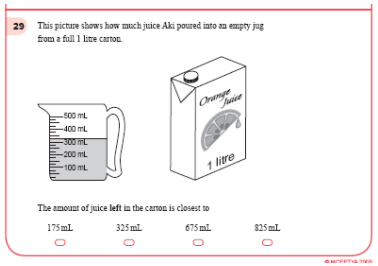
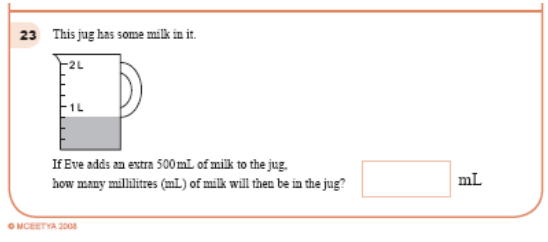
Stage 3 Outcome

A student:
› describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions MA3-1WM
› gives a valid reason for supporting one possible solution over another MA3-3WM
› selects and uses the appropriate unit to estimate, measure and calculate volumes and capacities, and converts between units of capacity MA3-11MG

Language: Students should be able to communicate using the following language: capacity, container, volume, layers, cubic centimetre, **cubic metre**, measure, estimate.

Teaching and Learning Activities	Notes/ Future Directions/Evaluation	Date/ LAC Icons
Ignition Activity **http://mathsstarters.net/numbersgame**		
Explicit Mathematical Teaching The attribute of volume is the amount of space occupied by an object or substance and is usually measured in cubic units, eg cubic centimetres (cm^3) and cubic metres (m^3).Capacity refers to the amount a container can hold and is measured in units, such as millilitres (mL), litres (L) and kilolitres (kL). Capacity is only used in relation to containers and generally refers to liquid measurement. The capacity of a closed container will be slightly less than its volume – capacity is based on the inside dimensions, while volume is determined by the outside dimensions of the container. It is not necessary to refer to these definitions with students (capacity is not taught as a concept separate from volume until Stage 4). Once students are able to measure efficiently and effectively using formal units, they could use centimetre cubes to construct rectangular prisms, counting the number of cubes to determine volume, and then begin to generalise their method for calculating the volume.The cubic metre can be related to the metre as a unit to measure length and the square metre as a unit to measure area. It is important that students are given opportunities to reflect on their understanding of length and area so that they can use this to calculate volume.		Literacy

Whole Class Teaching **Five different ways to model 36cm^3** Task: Use 36 cubes to design a box that can hold 36 chocolates Discuss how a rectangular prism with a volume of 36 cubic centimetres could be built from cubic centimetre blocks (e.g. 3x4x3, 2x6x3, 4x9x1, 12x1x3). Pairs of students design and construct their 36 cm3 rectangular prism. Students display their diagrams, calculations and models and the class discusses the variations in rectangular prisms.		Literacy
Grid Prisms Pairs of students or individual students design and make rectangular prisms by folding, cutting and taping the nets of prisms drawn on 1 cm grid paper. Students find the volume of the prism in cubic centimetres, and record how the volume was calculated or counted. As a reflection students explain the advantages and disadvantages of using cubic-centimetre blocks as a unit to measure volume.		Literacy Critical and creative thinking
Make a Cubic Metre Students discuss what a cubic metre is, and what is measured in cubic metres. Students estimate the size of a cubic metre, half a cubic metre and two cubic metres. Small groups make a skeleton model of a cubic metre with wooden dowel or plastic sticks, rolled newspaper or a commercial kit. Students check all dimensions with a metre rule or tape measure. Collect MAB blocks and flats from other classrooms, to make a model of a cubic metre. If possible, make one layer and at least one vertical column from blocks or ten flats placed together as a block. Students discuss how many cubic centimetres are in one layer, and how many cubic centimetres are in ten layers. The availability of materials may restrict this activity to a whole class demonstration and discussion, or a task completed by one small group at a time.		Literacy Critical and creative thinking
Guided Group/Independent Activities **Claustrophobia** Students use cubic metre models from a previous lesson to estimate then measure how many students can fit into a cubic metre. Small groups investigate how many students could fit into the classroom, if students were packed to the ceiling. How many rooms would be required for all of the students and teachers in the school? Record volumes using the abbreviation for cubic metres (m^3)		Critical and creative thinking
Loaves to the cubic metre Students investigate how many loaves of bread can be packed into 1 cubic metre. Suggestion: students make a scale drawing of one layer of loaves of bread, to find how the loaves can be arranged to fit 1 square metre, then calculate the number of layers.		Critical and creative thinking

What Went In? Students in pairs mark the water level on a container and then add a model built from centimetre blocks. The new level is marked and the model removed. Students calculate the volume of the model in cubic centimetres and the volume of water displaced in millilitres. The container is given to a second pair of students who estimate the volume of blocks that were added, and check by building and adding a model. The students compare their results with the original measurements.		Critical and creative thinking
How Deep? Students calculate the depth of water in containers when 1 litre of water has been poured into: a container with a base of 10 cm x 5 cm and height 30 cm a container with a base of 20 cm x 10 cm and height of 10 cm a container with a base of 30 cm x 7 cm and height of 10 cm. Students work in pairs to set problems for each other, increasing the volume of water and the dimensions of the containers.		Literacy Critical and creative thinking
Previous NAPLAN Questions **NAPLAN 2008-Year5**  29 This picture shows how much juice Aki poured into an empty jug from a full 1 litre carton. 500 mL 400 mL 300 mL 200 mL 100 mL Orange Juice 1 litre The amount of juice left in the carton is closest to 175 mL 325 mL 675 mL 825 mL **NAPLAN 2008-Year 7**  23 This jug has some milk in it. 2 L 1 L If Eve adds an extra 500 mL of milk to the jug, how many millilitres (mL) of milk will then be in the jug? mL © MCEETYA 2008		Literacy