Measurement 2

2.3.9

Word Wall: *make to ten,,*

Introduction

Students will measure, record and compare volume and capacity using a variety of uniform informal objects, discussing and sharing their findings.

Resources

- Assortment of containers in varying sizes and shapes: ice---cream bucket, teapot, water bottle, baking tray, jugs, ice cube trays and margarine containers.
- Coloured water
- Pebbles or marbles
- Unifix blocks
- Sand
- Measuring cup; egg cup, medicine cup, tablespoon

Time / Classroom Organisa3on

The activity process may be introduced in a whole or small group format. Allow 20 to 30 minutes for each part of the activity. Come together for discussion and reflection at the end and review the findings about measurement.

Australian Curriculum---Year Two

Compare and order several shapes and objects based on length, area, volume and capacity using appropriate uniform informal units (ACMMG037)

Proficiency Strand:

Fluency – using units (repeatedly) to compare measurements

Activity Process---Choosing a unit of measurement.

1. Gather materials: a container, water, sand, marbles, unifix. Explain to students that you want to find the best way to measure the capacity of a container (how much it holds).
2. Fill one container with the blocks or marbles. Ask: *Is the container full? Are there any spaces? How can we prove that there are spaces?* Suggest adding water to prove this.

3. Now, fill the container with the water. Ask: *Is the container full? Are there any spaces?* Repeat with sand.

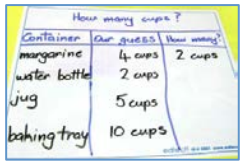
4. Discuss the most appropriate material to use for measurement. Discuss the advantages and disadvantages of each material, for example:

- *The unifix blocks leave many gaps*
- *The marbles are heavy, and leave less gaps than the unifix*
- *The sand is messy but fills the whole container*
- *The water is easy to use and fills the whole container.*

Repeat the activity using a square container. Measure the capacity using marbles and cubes. Draw conclusions about the most appropriate material to use to measure capacity.

Activity Process---Comparing and ordering volume

1. Explain to students that you are going to compare the capacity of containers to see how much each holds.
2. Provide each pair of students with a plastic measuring cup and four different containers. Ask the students why it is important that the measuring cups are the same size. (So that we can compare the measurements). Ask: *we have marbles and water – what would be the most appropriate measurement material to use? Why?*
3. Ask students to guess the number of cups of water that will fill each container and then check, using the plastic measuring cup. Record the guess and the actual amount on a whiteboard.



4. When students have finished, ask them to sort the containers from those that have the greatest volume to those that have the least.

4. Come together as a whole group and compare the findings. Using the tables of data, sort all the containers from those with the greatest volume to those that have the least. Display these findings in the classroom.

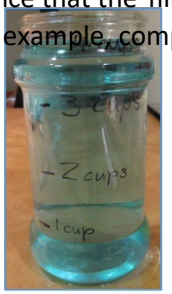
4. Repeat the activity using other units of measure, for example: eggcups, medicine cups and laundry powder scoops.

Source: Linthorne, C. & Serenc, M. 2005. *Jigsaw Maths Teacher Resource Book 2.* Firefly Press: Buderim p 151

Variations & Extensions

1. **Calibrating Bottles**

Resources: cup and large soft drink bottle or jar Students use a cup or similar measuring device to calibrate a larger container. Each time a cup of filling material is poured into the container, the student marks the level with a felt marker. Students discuss actions and results, describing the difference that the filling material made to the level, for example, compare water and marbles.



2. **Comparing Containers**

Resources: Sheets of thin cardboard, rice Students are given the same-sized sheet of thin cardboard and are asked to make a container that will hold rice. Students should be encouraged to create their own design. In small groups, students compare containers and explain how they were made.

Possible questions include:

- Whose container will hold the most/least rice?
- How could you work this out?

Groups are then given a bag of rice to compare the capacity of each container and order them from 'holds the most' to 'holds the least'.

Students repeat the activity with different filling material.

Source: Board of Studies NSW, Mathematics K-6 Units of work. p75 http://k6.boardofstudies.nsw.edu.au/files/maths/maths_k6_ws.pdf

Digital Resources

http://pbskids.org/cyberchase/games/liquidvolume/liquidvolume.html

Choose the most appropriate pot to fill the large container in the least number of turns.

Contexts for Learning

Play:

- Provide opportunities for students to pack objects into containers of different sizes and shapes using a variety of materials. Which takes up the most/least space?
- Students make models out of MAB blocks. They investigate how many different models they can make out of ten blocks.

Source: Tertini, J. 2004. *Queensland Targeting Maths, Year 2. Teaching Guide.* Pascal Press: Glebe. P84.

Investigation:

I filled a container with 20 spoonful's of rice. What might the container that I used look like? Do students look for a range of containers and do their estimates improve as they continue to look? As an extension for this activity, ask students to make a container out of card that will hold the 20 spoonful's of rice.

Source: Sullivan and Lilburn. 2010. *Open---ended maths ac)vities*. Oxford University Press: South Melbourne. p 58

Real life experience:

Make a container for a Fathers' Day gift. Look at the contents, for example: biscuits or a tie. Design a box that will fit the contents most closely.

Routines and Transitions:

Transition: Show students a variety of utensils used to measure the capacity of containers, for example: teaspoon, cup, bucket. Ask students which one they would use to measure the capacity of: a yoghurt container, an eggcup, a wheelbarrow, a wheelie bin, a milk carton, a coffee mug, an ice---cream container.

Assessment

Observe students as they participate in the variation and extension activities – *Comparing Containers*. Ask students to journal their understandings about measurement from this activity.

Note students' understanding of

- uniform units of measure
- Appropriate materials for measurement of capacity
- Using the same unit of measure to make comparisons
- Ordering containers according to their capacity.

Achievement Standard: order shapes and objects using informal units.

Background Reading

Students need to internalise the following ideas if they are to fully understand how 'measuring' works.

- We can use numbers to describe the size of a thing by selecting a unit and counting how many repeats of the unit it takes to match the thing as closely as possible
- A unit is itself a quantity; that is, it is the mass of the marble that is the unit, not the marble itself.
- The size of something doesn't change when you use a different---sized unit to measure it, but the number of units taken to match it may change.

We can say which of two things is bigger by comparing how many of the same unit match each.

These ideas develop more slowly than is often recognised. Having developed these ideas, however, students can see *why:*

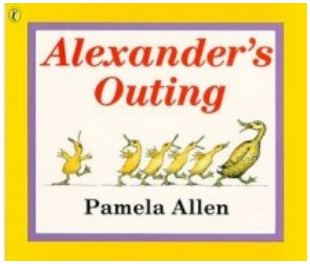
- We should generally use the same unit repeatedly to measure an object
- When comparing two things, the same unit should be chosen for each.

Source: *First steps in Mathematics – Measurement: Indirect Measure Estimate,* 2010. Rigby: Port Melbourne. P 28---29

Picture Books for Mathematics Learning

There is a wide range of children's literature, such as picture books that may directly or indirectly promote mathematics learning. Shatzer (2008) emphasised the importance of choosing literature that both constructs mathematical meaning and makes connections to students' lives. Research suggests that shared book experiences assist in mathematical concept development in the early years

"Mathematical" picture books are defined as picture books with mathematical content present in both the text and images. *Alexander's Outing,* Allen, is a descriptive, narrative text that provides opportunities for problem solving and mathematical reasoning



Year three NAPLAN Numeracy test links

- Measurement – volume and capacity

Links to Related MAGs

1.1.7 – Measurement – informal units –1
1.3.8 = Measurement – informal units --- 2
2.1.9 – Measurement --- 1
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