YuMi Deadly Maths

Prep Teacher Resource:

MG – My drink bottle

Prepared by the YuMi Deadly Centre
Faculty of Education, QUT

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ACKNOWLEDGEMENT

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refined and presented in professional development sessions.

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Prep Measurement and Geometry

My drink bottle

Learning goal	Students will compare the spaces within containers.
Content description	Measurement and Geometry – Using units of measurement • Use direct and indirect comparisons to decide which is longer, heavier or holds more, and explain reasoning in everyday language (ACMMG006)
Big idea	Measurement – capacity – continuous vs discrete
Resources	Non-breakable containers, bottles, baby bottles, cups, spoons, buckets, jugs, bowls, tubs, gallon drums, sand, animals (different sizes/shapes – frogs, octopus, fish, star), water, rice, pasta, blocks, play dough, sand, sandpit, pantyhose

Reality

Local knowledge	Name containers that are used for carrying water, milk, petrol. *Why do we fill drink bottles at school?*
Prior experience	Filling drink bottle/cups, filling the bath, filling petrol drums, filling tanks.
Kinaesthetic	Students compare their drink bottles with the others in their group. First student fills his/her drink bottle, pours it into a jug and marks the level. Next student repeats, pouring it into the same jug, and marks with a different colour to show the level the second drink bottle reached. *Which holds more/less?* Repeat process for others in the group. Reverse: Fill the jug and see how many drink bottles can be filled from the jug.

Abstraction

Body	Direct comparison: Choose long thin or short squat, different sizes of clear containers. Students estimate which container will hold the most/least. Fill one empty clear container so that it is full. Predict: *Will it hold more or less than the second empty clear container?* Pour contents from first into second. *Does the second hold more, less or the same? How do you know?* Repeat process for all containers and then place them in order smallest to largest. Take a cup and two different containers and fill them with rice. Tie the top of the pantyhose to a clothes hanger. Fill a level cup of rice and pour it into one leg of the pantyhose. *What has happened to that leg?* [It has dropped and become longer.] *Fill the cup again to the same level, pour it into the other leg of the pantyhose. What do you notice?* [Both legs are the same because they have the same amount of rice.] Now fill the containers with rice. On another pantyhose and hanger, pour the first container into one leg of the pantyhose. See how far it has dropped. Predict: *Will the second container have as much rice as the first? Will it be the same, longer or shorter? Why?* [same – both have same amount of rice; longer – because one has more rice; or shorter – because one doesn't have as much rice as the other] *Which container is heavier/lighter?* Indirect comparison (involves the use of an intermediary): Take three containers. *Without pouring the contents of one into another (direct comparison), what else could we do to find out which of two holds more?* Fill one empty clear container so that it is full and pour contents (water, rice or sand) into the measuring container and mark the place where it comes. Empty the intermediary container, fill the second container, pour contents into the intermediary container, mark the place where it comes, compare the two marks. *What do you notice? Which container holds the most/least?*
Hand	Students in groups of three fill same-sized clear plastic disposable glasses so that one is full, one is half full, and one is empty, and put them in order. Make a drawing of the full, half-full and empty glasses. Use a tall, thin container and compare with a short, fat container. *Which*

will hold more? How will you validate your estimate?

Mind Students shut their eyes and visualise an empty glass being filled from a bottle of milk; see drink bottles of different sizes and shapes. Visualise the glass when it is full, half full, nearly empty etc.

Creativity Students choose containers of different shapes and sizes (bowls, cups, buckets, tubs, jugs, plastic bottles) and select a material they are going to use from outside in the playground (e.g. water, sand, soft fall). Predict which container holds the most/least or the same amount. Check their estimates by measuring the capacity of the containers, tipping contents of one into the other (use the bucket for spills). They describe the capacities and draw the containers starting with the smallest and going up to the largest.

Mathematics

Language/ symbols space, full, empty, fill, pour, holds more, holds less, same, conclusion, compare, order

Practice Activities are language based.

Rotation: Four groups with students sorting different types of containers into biggest/ smallest; filling one container and then filling other containers to compare and order according to size.

Fill one container then pour contents into others.

Reverse, filling from small container to biggest and then from biggest to how many small containers.

1. Jugs, bottles, plastic glasses, water (plastic glasses to bottles, glasses to jugs, bottles to jugs; then reverse – *jugs give how many glasses/bottles, bottles give how many glasses?* Repeat process for 2, 3, 4).
2. Bowls, cups, spoons, rice.
3. Buckets (small and large), sand animals, sand.
4. Tubs (small and large), blocks (same-sized blocks).

Connections Relate to mass, e.g. filling a box.

Reflection

Validation Students select a container and tell a story about where and how they would use a container of that size. Explain why they selected that particular container.

Application/ problems Provide applications and problems in comparing and ordering capacity of containers so that students apply these in different contexts independently; e.g. lunch boxes/school bags that are packed for Prep students and their teenage sibling or their parent, different-sized box of chocolates for a big party and a small family dinner.

Extension **Flexibility**. Think of more than one way we could compare the capacity of containers, e.g. to fill the jug takes 2 bottles or 7 cups.

Reversing. Give examples in going from number of cups to fill the jug to the jug filling how many cups.

Generalising. How much the container holds describes its capacity. Different shapes may hold the same amount.

Changing parameters. Compare other features e.g. shape, mass, height.

Teacher's notes

- Use language-based consultation with students describing and explaining the differing capacities and situations where they would be used.
- Students need to be taught the skill of visualising: closing their eyes and seeing pictures in their minds, making mental images; e.g. show a picture of a cat, students look at it, remove the picture, students then close their eyes and see the picture in their mind; then make a mental picture of a different cat.
- Suggestions in Local Knowledge are only a guide. It is very important that examples in Reality are taken from the local environment that have significance to the local culture and come from the students' experience of their local environment.
- Useful websites for resources: www.rrr.edu.au; https://www.qcaa.qld.edu.au/3035.html
- Explicit teaching that **aligns with students' understanding** is part of every section of the RAMR cycle and has particular emphasis in the Mathematics section. The RAMR cycle is not always linear but may necessitate revisiting the previous stage/s at any given point.
- Reflection on the concept may happen at any stage of the RAMR cycle to reinforce the concept being taught. Validation, Application, and the last two parts of Extension should not be undertaken until students have mastered the mathematical concept as students need the foundation in order to be able to validate, apply, generalise and change parameters.