**MATHEMATICS STAGE 3**

**TEACHING AND LEARNING OVERVIEW**

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| TERM:  | WEEK: 1 | STRAND: MEASUREMENT & GEOMETRY | **SUB-STRAND: VOLUME AND CAPACITY 1** | **WORKING MATHEMATICALLY:** **MA3-1WM & MA3-3WM** |
| OUTCOMES: MA3-11MG | **Selects and uses the appropriate unit to estimate, measure and calculate volumes and capacities, and converts between units of capacity.** |
| **CONTENT:**  | **Choose appropriate units of measurement for volume and capacity.*** Select and use appropriate units to measure the capacities of a variety of containers, e.g. millilitres for a drinking glass, litres for a water urn
* Measure the volume of rectangular containers by packing them with cubic-centimetre blocks
* Explain the advantages and disadvantages of using cubic-centimetre blocks as a unit to measure volume
* Describe the arrangements of cubic-centimetre blocks in containers in terms of layers, e.g. 5 layers of 8 cubic-centimetre blocks
* Recognise the need for a formal unit larger than the cubic-centimetre
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| ASSESSMENT FOR LEARNING(PRE-ASSESSMENT) | * **Worksheet** – Calculating the volume of regular and irregular 3D shapes constructed with centimetre-cube blocks.
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| WARM UP / DRILL | * **Volume Speed Challenge-** students construct as many 3D shapes as possible from a specified amount of centicubes (e.g. 10 centicubes) in two minutes (without duplication).
* **Times Table Drill-** students participate in a whole class times table game (e.g. Buzz Off, Bing Bang Bong, etc).
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| TENS ACTIVITYNEWMAN’S PROBLEMINVESTIGATION  | * Jack bought square tiles to line the sides and base of his swimming pool. The length of each square tile is 20cm.
* How many square tiles does Jack need to coat the sides and base of a pool which is 10 m long, 6 meters wide and 3 m deep?
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| QUALITY TEACHING ELEMENTS | **INTELLECTUAL QUALITY** | **QUALITY LEARNING ENVIRONMENT** | **SIGNIFICANCE** |
| * Deep knowledge
* Deep understanding
* Problematic knowledge
* Higher-order thinking
* Metalanguage
* Substantive communication
 | * Explicit quality criteria
* Engagement
* High expectations
* Social support
* Students’ self-regulation
* Student direction
 | * Background knowledge
* Cultural knowledge
* Knowledge integration
* Inclusivity
* Connectedness
* Narrative
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| RESOURCES | Student grid-books, rulers, worksheets on volume and capacity (cubic centimetres), IWB visual presentation on volume andcapacity, |

**TEACHING AND LEARNING EXPERIENCES**

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| WHOLE CLASS INSTRUCTION MODELLED ACTIVITIES | GUIDED & INDEPENDENT ACTIVITIES |
| * **Explicitly communicate lesson outcomes and work quality.**
* **Teach and review** the differences between the terms *volume* and *capacity*. This can be achieved through an experiment with oranges. Students displace an orange to find its volume and then squeeze the juice of the same orange to find its capacity.
* **Define and reinforce metalanguage used in the unit** e.g. volume, capacity, mass, three-dimensional shape (3D shape), prisms, cube, rectangular prism, full, space, cubic-centimetre, cubic-metre, container, centicubes, displace, side, face, regular shape, irregular shape, edge, millilitre, litre, packing, layers, mL, $cm^{3}$.
* **Discuss** the advantages and disadvantages of using cubic-centimetre blocks as a unit to measure volume.
* **Discuss** the need for a formal unit larger than the cubic-centimetre.
 | LEARNING SEQUENCERemediationS2 or Early S3 | * Review terms in volume and capacity, using manipulatives as needed.
* Revise three-dimensional shapes.
* **Don’t Get Wet:** Students find out how many cups of water are needed to fill each container. Students must estimate first.
* Students investigate the measurements (mL) down the side of a jug.
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| LEARNING SEQUENCES3 | * **I wonder?** Students estimate how many millilitres (mL) of water each container will hold. Students check their estimates with a measuring jug and record their results in their workbooks.
* **Investigation:** Set up a table with a variety of containers (with measurements in mL down the side) and fill each container with a different amount of liquid (liquid can be coloured with food die to help students differentiate one from another). Students measure the capacities of each container.
* **Worksheet:** Students match the container/object with the unit of measurement e.g. litres for a bucket, millilitres for a glass, etc.
* **Investigation:** Students measure the volumes of rectangular containers by packing them with cubic-centimetre blocks. By using the same containers from the previous activity, students can compare the capacity and volume ($cm^{3}$) measurements. Students describe arrangements of cubic-centimetre blocks in containers in terms of layers.
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| LEARNING SEQUENCEExtension Late S3 | * Water, Water, Everywhere: Students predict, collect and measure the amount of water a tree branch loses through transpiration (evaporation) over the period of a day. It is best to begin this experiment as early in the day as possible and to collect the water as late in the day as you can.

*Choose a nice leafy branch. How much water do you think you will be able to collect from it? Write down your predictions. Put a bag over your selected branch and tie it off. Now, make a pouch at the bottom of the bag and tie that off too. At the end of the day, carefully drain the water from the pouch into a measuring jug. What is the capacity of the water you have collected?* |
| **EVALUATION & REFLECTION** | **Student engagement: Achievement of Outcomes:****Resources: Follow up:** |

* All assessment tasks should be written in **red** and planning should be based around developing the skills to complete that task.
* Assessment rubrics or marking scale should be considered.