**MATHEMATICS STAGE 3**

**TEACHING AND LEARNING OVERVIEW**

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| TERM:  | WEEK: 1 | STRAND: Measurement & Geometry | **SUB-STRAND:** Mass 1 | **WORKING MATHEMATICALLY:** MA3-1WM, MA3-2WM |
| OUTCOMES: MA3-12MG | **Selects and uses the appropriate unit and device to measure the masses of objects, and converts between units of mass.** |
| **CONTENT:**  | **Choose appropriate units of measurement for mass (ACMMG108)*** recognise the need for a formal unit larger than the kilogram
* use the tonne to record large masses, eg, sand, soil, vehicles
* record masses using the abbreviation for tonnes (t)
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| LEARNING ASSESSMENT(PRE-ASSESSMENT) | * Quiz: You have one minute to list as many objects as you can, that have a mass greater than 1 tonne. One tonne is equivalent to how many kilograms? The abbreviation symbol to record kilograms is kg, what is it for tonnes? Students will record answers in workbooks.
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| WARM UP / DRILL | * Warm up Drill
* Students in pairs are to brainstorm objects found in a particular environment (eg, zoo) that have a mass of 1 tonne or greater. Student responses will be recorded using a table format on the IWB. Repeat exercise twice more using two to different environments (eg, construction site, national park)
* The teacher will then add a final column and check the approximate mass of selected objects; using the Web to find answers. Note: the table will be printed out and hung on the wall to act as a consolidation tool.

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| Environment | Objects with Predicted Mass of 1 Tonne (t) or More | Actual Mass of Objects using Abbreviation of Tonnes (t) |

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| TENS ACTIVITYNEWMAN’S PROBLEMINVESTIGATION  | If the total mass of an object is 2 tonnes, what are the dimensions? Is there more than one solution? (Refer to Whole class instruction activity 2: Using thousands blocks to explore the tonnes (t) unit of measurement). |
| 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 | Pens, student workbooks, thousands blocks, 1kg container, water, IWB, whiteboard, access to the Internet, flashcards and labels, scales, IPads. |

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| WHOLE CLASS INSTRUCTION MODELLED ACTIVITIES | GUIDED & INDEPENDENT ACTIVITIES |
| * **Define and reinforce metalanguage** e.g. tonne, formal unit, kilogram, mass, abbreviation used to record large masses for tonne (t).

**Whole class Instruction:*** **Flashcard prediction/sorting game:**

\*The teacher will show students a set of flashcards depicting objects that have a mass of greater or less than 1 tonne and ask: Does this object have a mass that is greater than 1 tonne? Student pairs will the write down the object and answer of yes or no. The student pair with the most correct answers wins and will be given a clue to the next part of the game (students’ pick of two objects and corresponding mass labels).\*The teacher will then stick the flashcards with objects that have a mass of greater than 1 tonne on the whiteboard, as well as, a set of labels with the equivalent mass of objects. Student pairs are to mentally sort and match the object to the correct label. Students will record answers in workbook. The class will then reconvene as a whole group and the teacher will enlist help of students to order flashcards and discuss answers/clarify and misconceptions.* **Using thousands block to explore to the tonnes (t) unit of measurement.**

\*Show students one of the base-10 thousand blocks and a 1kg container filled with 1 litre of water. Ask students to predict how much water will be displaced if we were to place the thousands block in the container. A= 1L. Discuss/explain that –base 10 thousands block is equivalent to 1kg or 1L of matter.\*Place a second thousand block adjacent to the first block and ask: What will a container this size and shape hold? What will the amount in the container weight? Repeat the discussion for 10 thousand blocks side by side (10 litres and 10 kilograms). Then make a 2-by-2 block layer (8 litres and 8 kilograms). Ask: What will be the amount inside the container in a 10-by-10 thousands blocks (eg, 100 litres and 100 kilograms).\*Ask students: How many thousands blocks would be in ten layers of 10-by-10 thousands block? A=1000 thousand blocks.\*Invite students to explore dimensions of different sized containers, eg, 2-by-2 thousand blocks = 20cm x 20cm; 10-by-10 thousand blocks = 1 metre by 1 metre and 10-by-10 –by 10 block would measure one metre by one metre by one metre and the mass inside the container would be 1000 kilograms/1000 L. Introduce the term ‘tonne’ and abbreviation (t). | LEARNING SEQUENCERemediationS2 or Early S3 | * Explore, investigate and revise smaller units of measurement used to record mass, eg, gram and kilogram. Refer to Measurement, Mass 2 Activities.
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| LEARNING SEQUENCES3 | * Whole Class Activity: Flashcard prediction and sorting game
* Student pair research task: Top 10 Things in (Insert Country) that have a Mass of 1 Tonne or More.
* Student pairs will be assigned a country and will create a list of ten things (eg, animals, famous monuments, etc.) that have a mass of one tonne or more.
* Students will research information online and order objects from smallest to largest by compiling data in form of a column graph, using suitable software program.
* Selected student groups will be invited to share findings with the class. Student work samples will be printed and hung on the classroom wall to be used as a consolidation tool.
* **Small group investigation: Balancing Act!**
* Working in groups of six or more, students will take turns to weigh themselves and then all students will record their answers in their workbooks using a table format. Next, students will then combine group members’ weight in order to find the aggregate student weight. Student groups will then work out how many students they would need (using the aggregate student weight) to balance 1-tonne.
* Students will then work individually to calculate how many students (using aggregate student weight) required to balance the mass of two \*objects (\*to be selected using flashcards and labels from previous activity).

OR * Whole Class activity: Using thousands blocks to explore the tonnes (t) unit of measurement.
* Small group investigation activity: Balancing Act! (Note: teacher will need provide two examples of objects that have a mass greater than one tonne, eg, The mass of a saltwater crocodile is 1,000kg on average (Male at 5.5m-5.8m).
* **Problem Solving Investigation Task: Creation of a Giant Animal Park**
1. The teacher will explain that the class will be investigating the unit of measurement used to record objects that have a mass of 1000 kilograms or more by creating a giant living animal park.
2. Prior to the lesson the teacher will have cut-out images and labels with names of living animals that have a mass greater than one tonne. Each student pair will be given a cut-out image and label of an animal which they will place on a graph (constructed by the class).
3. Student pairs will then :
4. Create a water enclosure for their assigned animal to use for bathing purposes or to dwell in. The enclosure will be drawn to scale, using either grid paper or a suitable computer software program such as Microsoft Word. Students will need to answer the following questions: What is the name of the animal? What is its’ mass weight? What are the dimensions of the enclosure? How much water is needed to fill the water enclosure? Provide justification of your answer (eg, students will need to take into consideration displacement of water).
5. Student pairs will then research the animal’s diet and work out how much it needs to eat in order to consume its own weight.
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| LEARNING SEQUENCEExtension Early S4 | * Extension of maths investigation part 3(b):
1. Students work out the total mass of food required to feed the animal for an extended period of time (eg, six months, year, etc.)
2. Devise a formula for calculating the total mass of feeding a variable number of the same animal its’ own weight in food.
3. Research the cost of food items (per kg) and calculate how much it would cost for animal to consume its’ own weight.
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| **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.