

| Mass 1 | | |
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| Stage 3 Outcome | | |
| <p>A student:</p> <ul style="list-style-type: none"> › describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions MA3-1WM › selects and applies appropriate problem-solving strategies, including the use of digital technologies, in undertaking investigations MA3-2WM › selects and uses the appropriate unit and device to measure the masses of objects, and converts between units of mass MA3-12MG | | <p>Language: Students should be able to communicate using the following language: mass, gross mass, net mass, measure, device, scales, tonne, kilogram, gram.</p> |
| Teaching and Learning Activities | Notes/ Future Directions/Evaluation | Date/ LAC Icons |
| <p><u>Explicit Mathematical Teaching</u></p> <p>Mass is defined as the amount of matter in an object but, like time and temperature, it cannot be seen. Students may confuse mass and volume because objects with a larger volume will often have more mass than with a smaller volume. However, if two contrasting materials are compared, for example, foam packaging and iron, students will quickly realize that the larger volume does not necessarily have the larger mass. Mass may also be confused with weight. Students may have some awareness of the difference between these two concepts now that space travel has been widely reported and astronauts have been shown to weigh less on the moon because the moon's gravitational field is not as strong as that of earth. Weight is a force that is affected by gravity and so as gravity changes, the weight of an object will change. So scientifically, it is incorrect to say an object weighs one kilogram because weight is measured in units of force (Newton's, named after Sir Isaac Newton who formulated the law of gravity). The correct expression is that an object has a mass of one kilogram. Use of precise language by teachers will assist students to distinguish between these two concepts when they encounter them in secondary school. The measurement framework for mass is slightly different from length, area and volume as units of mass are not spatially organized. Students learn to use an equal-arm balance to measure mass in Level 1.3 and then progress to the use of informal units in Level 2. The only concept at Level 3 is that of the relationship between the size of the unit and the number of units. For example, if four-block units are used to balance an</p> | |  Literacy |

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| <p>object, then four times as many will be needed if one block units are substituted. In levels 4, 5 and 6, students are progressively introduced to using and recording the formal units of measure, grams, kilograms and tonnes. As with length, area, and volume and capacity, it is important that students be given ample opportunities to select the units of measure and the measuring instruments which are appropriate to the task.</p> <p>NB Gross mass is the mass of the contents and the container. Nett mass is the mass of the contents only.</p> | |  Literacy |
| <p>Aussies Abroad Students work in small groups to investigate the gross and net weights of small plastic jars and large glass containers of vegemite. If several different examples are used, each container can be examined by a small group and then rotated to the next group. Students determine which containers would hold the greater volume of Vegemite and find how many of each container would fit into a 10 kilogram carton (students may choose to use a calculator). Compare the vegemite containers by finding the best value-for-money.</p> | |  Critical and creative thinking |
| <p>Lunchtime Students weigh and record each item in their lunch box. Express each item in grams. Total the number of grams of their lunch. Compare with other students. <i>Note:</i> ensure the students have access to scales that can accurately measure small masses in grams; lunches which have been ordered at the school canteen will need to be collected early to be available for the activity. Ask students to use kitchen scales at home to find the mass of their breakfast and dinner, then calculate the total mass of food eaten in a day.</p> | |  Critical and creative thinking |
| <p>Accurate Students work in pairs or small groups to check the accuracy of kitchen and bathroom scales by using mass pieces. Students draw a table to record the measure of each mass, and comment on the accuracy of each instrument. <i>Note:</i> ensure the kitchen scales used are able to measure a mass of more than two kilograms. If the scales are inaccurate, predict and measure what happens when the mass is increased.</p> | |  Critical and creative thinking |

Which unit would you use?

Students think of ten different animals, from very large, to small, and record this list. Beside each animal name, students write the unit of mass which may be used to measure each one. Students research the mass of several of the listed animals and record the results.
Students find the difference between the lightest animal and the heaviest animal; students find the number of small animals required to balance the mass of the largest animal.

Note: students may need to be reminded that resource material can refer to both imperial and metric measurements such as ton or tonne.
(pp. 134-135 *Teaching Measurement Stage 2 and Stage 3*)

- 1. Elephant = tonnes African Elephant = 4 tonnes
- 2. Giraffe = tonnes Giraffe = 2 tonnes
- 3. Rhino = tonnes African Rhino = 1 1/2 tonnes
- 4. Hippo = tonnes
- 5. Lion = Kilograms
- 6. Tiger = Kilograms
- 7. Dog = Kilograms
- 8. Cat = Kilograms
- 9. Mouse = Grams
- 10. Tadpole = Grams

Critical and creative thinking

Guided Group/Independent Activities

School bags full

Students in groups of four or five find the average mass of their full school bags. This measurement is used to calculate the mass of all bags in the class. Students predict the mass of all bags in the school.

How many teachers' bags or baskets make a tonne?

Critical and creative thinking

Cool

Using ice cube trays, find how many ice cubes would be needed to make a tonne of ice.

Critical and creative thinking

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| <p>Tonnes of Tables Students work in pairs or small groups to find the mass of all the desks in the school. Variation: Students nominate objects or materials to measure</p> | |  <p>Critical and creative thinking</p> |
| <p>Gross Mass and Nett Mass Students bring in a 'pantry item'. Students work in pairs to interpret information about mass on commercial packaging. Teacher supply problems involving gross mass and net mass, eg find the mass of a container given the gross mass and the net mass. Students select and use the appropriate unit and device to measure mass, eg electronic scales, kitchen scales. They determine the net mass of the contents of a container after measuring the gross mass and the mass of the container. Students find the approximate mass of a small object by establishing the mass of a number of that object, eg 'The stated weight of a box of chocolates is 250 g. If there are 20 identical chocolates in the box, what does each chocolate weigh?'</p> | |  <p>Literacy</p>  <p>Critical and creative thinking</p> |