Stage 6 Mathematics Life Skills

## MLS – M1 Everyday Measurement

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### Overview

| MLS- M1 Everyday Measurement | Unit Duration |
| --- | --- |
| Measurement is an important skill for life and in this topic, students focus on measurement skills, terminology and strategies, and apply these to everyday contexts.  |  |

| Subtopic focus | Outcomes |
| --- | --- |
| The focus of this subtopic is developing skills in measuring length, mass, temperature and energy using appropriate measuring devices, levels of accuracy and metric units. Where appropriate, the skills developed should be applied to relevant real-life situations. The knowledge, understanding and skills in this subtopic build on Life Skills Years 7–10 outcomes and content for Measurement and Geometry | A student:* explores mathematical concepts, reasoning and language to solve problems MALS6-1
* engages with appropriate tools, units and levels of accuracy in measurement MALS6-3
* engages with mathematical skills and techniques, including technology, to investigate, explain and organise information MALS6-13
* communicates mathematical ideas and relationships using a variety of strategies MALS6-14
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| Related Mathematics Standard outcomes | ****Related Numeracy CEC outcomes**** |
| MS11-1, MS11-3, MS11-9, MS11-10, MS1-12-1, MS1-12-3, MS1-12-9, MS1-12-10, MS2-12-1, MS2-12-3, MS2-12-9, MS2-12-1 | N6-1.1, N6-1.2, N6-1.3, N6-2.2, N6-3.1, N6-3.2 |

All outcomes referred to in this unit come from the [Stage 6 Mathematics Life Skills Syllabus](https://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/stage-6-learning-areas/stage-6-mathematics/mathematics-life-skills-2017)
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### Adjustments

Examples of adjustments can be found on the NESA website under [Adjustments](https://www.educationstandards.nsw.edu.au/wps/portal/nesa/11-12/Diversity-in-learning/stage-6-special-education/adjustments).

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| Student’s name | Adjustments |
| e.g. John Smith | Requires learning material to be printed on blue paper. |
|  |  |

### Unit of learning

| ContentStudents learn to: | Suggested teaching strategies and resources | Differentiation and modifications | Date and initial |
| --- | --- | --- | --- |
|  | Revision of what and how can we measure?* Using visual prompts, teacher to ask students to list a range of things they can measure. For example:
* I can measure my height
* I can measure how cold a fridge is
* I can measure ingredients to bake a cake
* Teacher to discuss that measurement is used to answer questions such as: how big, how long, how deep, how heavy.**Resource**: Skwarek video - [What can be measured](https://www.skwirk.com.au/esa/what-can-be-measured)

Vocabulary development:* Students to create a list of comparative words relating to measurement using a [word cloud](https://worditout.com/word-cloud/create) creator tool.
* Students use visual pictures of a range of measuring tools, equipment and technology and predict what objects they might measure. Compare student answers with the real-life applications of the tools.**Resource**: Desmos activity – [How can I measure?](https://teacher.desmos.com/activitybuilder/custom/5f6035682087af4cada211ae)
* Students match an everyday task/activity to the correct measuring tool, device or technology that would be best to use for completion. For example:
* Checking the temperature of cooked food
* Measuring the floor to be covered with carpet**Resource**: Desmos Activity – [Measuring tools and technology](https://teacher.desmos.com/activitybuilder/custom/5f69574d0b9866347f0c8c7e)
* Teacher to discuss the definition of accuracy and precision and the importance of accuracy in measurement using real world contexts. Students to consider ‘what could go wrong if my measurements are not accurate?’
* Teacher to briefly review the two main systems of measurement used (Metric and Imperial) and discuss that in Australia and most parts of the world people use the Metric system.**Resource**: ABC Education video – [Measurement mess up](https://education.abc.net.au/home#!/media/1566108/)
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| M1.2: Length |  |  |  |
| * recognise language and comparative language that relates to length, for example:
* tall
* short
* taller
* shorter
* longer than
* height
* distance
* ruler
* tape measure
* odometer
* centimetre Literacy icon Literacy icon
* recognise metric units of length, their abbreviations and conversions between them
* recognise appropriate units and devices to measure lengths Critical and creative thinking icon Critical and creative thinking icon
* estimate and compare lengths and distances, for example:
* the length of the hallway compared to the length of the carpet you want to put in the hallway Critical and creative thinking icon Critical and creative thinking icon
* estimate and measure lengths using a range of devices in everyday situations
* use and compare the accuracy of using different devices, for example:
* measure the length of a dining table with a tape measure and a 30-centimetre ruler Critical and creative thinking icon Critical and creative thinking icon Personal and social capability icon Personal and social capability icon
* investigate ways to measure distances that are not straight or accessible, for example:
* using a piece of string on a map, readings on the car odometer Critical and creative thinking icon Critical and creative thinking icon
* convert between metric units of length
* solve problems involving length, for example:
* buying a garden hose that is long enough for a yard that is 20 m long
* buying curtains for a window that is 1.2 m wide
* choosing a tablecloth to cover the full length of the table Critical and creative thinking icon Critical and creative thinking icon Literacy icon Literacy icon Personal and social capability icon Personal and social capability icon
 | Vocabulary development:* Teacher to encourage students to develop language for estimating lengths. For example, “*the seat is twice as long as me*” or “*this piece of wood is the shortest*”.
* Working in pairs, ask students to compare the size of their hands. Ask students to consider:
* Whose hand is *bigger*?
* Are your fingers *longer*?
* Who has the *broader* hand?
* Which hand span stretches *further*?
* Using concrete materials students compare materials and judge the relative size of the quantity of the materials. For example, “*I will need 6 sheets of paper to cover the desk*”.

Using units of length* Review units of measurement for length: millimetres, centimetres and metres are used to measure small lengths or distances. We use kilometres to measure longer distances. We use measuring equipment like rulers, tape measures and trundle wheels to measure length.**Resource**: Skwirk video -[Centimetres](https://www.skwirk.com.au/esa/centimetres)
* Students create a reference sheet for length units of measurement showing conversion between the units. **Resource**: Units-of-Measurement-reference-sheet.DOCX
* Students select the unit of measurement most suitable for measuring a range of selected items, eg, pen, table, wall or an outdoor area. Students to consider which tool would be best selected to measure each item. **Resources**:
* Maths is Fun – [Measuring puzzles](https://www.mathsisfun.com/puzzles/measuring-puzzles-index.html)
* [Choosing measurements of length](https://easyteaching.net/maths-resources/measurement-worksheets/length-weight-temperature/#length)
* Students should have an opportunity for practical application of measurement skills by using rulers, tape measures and trundles to measure and record a variety of objects. **Resources:**
* [Online Measurement Workshop](https://mrnussbaum.com/measurement-workshop-online)
* [Various measurement worksheets and activities](http://www.primaryresources.co.uk/maths/mathsE1.htm).

Investigating the accuracy of measurements* Students measure a large selected location in the school or community using a trundle wheel. Where possible, have multiple students/people complete the measurement and record the results onto a table. Students to compare the results and consider the following:
* Were all the results identical?
* What could be some explanations for different results (encourage students to consider mishandling of the equipment, different walking patterns, mistakes etc)
* How can we make a decision about the most accurate measurement? (encourage students to consider comparison measurements, double-checking)

**Extension**: some students may cover the use of calculating average sums here.Calculating with units of length* Students practice adding and subtracting measurements with the same units to problem solve in measurement contexts. For example:
* One shelf is 65cm another is 74cm. What is the total length?
* Window A is 110m high and Window B is 96cm. How much shorter is Window B?
* I need to cut 10 pieces of rope each measuring 50cm. How much rope do I need?

Converting units of length* Using the previously created reference sheet, students to practice converting units of mm, cm, m and km.**Resources**:
* [Numeracy Wrap: The Long and Short](https://schoolsequella.det.nsw.edu.au/file/d1ec7eca-0ba0-453d-bce3-c0abf544309c/1/12317.zip/index.htm)
* [Converting units of length tarsia puzzle](https://www.tes.com/teaching-resource/converting-units-of-length-basic-using-tarsia-12189126)
* Using real world applications, students practice converting units of measurements. For example:
* A student wants to complete a 2 km run. If the track at school is 500m, how many laps do they need to finish the run?
* If I have 6m of fabric, how many tablecloths measuring 120cm can I make?
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| M1.3: Mass |  |  |  |
| * recognise language and comparative language that relates to mass, for example:
* light
* heavy
* lighter
* heavier
* weight
* scales
* gram Literacy icon Literacy icon
* recognise metric units of mass, their abbreviations and conversions between them Critical and creative thinking icon Critical and creative thinking icon Literacy icon Literacy icon
* recognise appropriate units and devices to measure mass Literacy icon Literacy icon
* estimate and measure masses using a range of devices in everyday situations, for example:
* a packed suitcase
* a cat when establishing how much medicine to administer
* ingredients when following a recipe Critical and creative thinking icon Critical and creative thinking icon
* estimate and compare masses, for example:
* the mass of different brands of hand luggage Critical and creative thinking icon Critical and creative thinking icon
* measure masses with a requested degree of accuracy, for example:
* cooking ingredients to the nearest gram when following a recipe
* convert between metric units of mass
* solve problems involving mass, for example:
* how many oranges to use in a recipe that needs 1.2 kg of oranges
* what can be stored on a shelf if the maximum mass the shelf can hold is 10 kg Critical and creative thinking icon Critical and creative thinking icon Literacy icon Literacy icon Personal and social capability icon Personal and social capability icon
 | **Teacher notes**: 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 those with a smaller volume. However, it may be helpful to compare materials such as iron and foam for students to realise that the larger volume does not necessarily have the larger mass. Mass may also be confused with weight. 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. The correct expression is that an object has a mass of one kilogram. Use of precise language will assist students to distinguish between these two concepts.Vocabulary development:* Encourage students to use language associated with mass by posing the following question: “I want to pack my school bag carefully so the heavier items are on the bottom? How can I decide how to pack my bag?”

Measuring mass* Teacher to lead a discussion on what measurement devices could be used. Provide a range of concrete materials that could be packed into a school bag.Resource: Skwirk video - [Mass](https://www.skwirk.com.au/esa/mass)
* Students explore informal and formal ways of measuring mass. Encourage students to pick up the items to estimate their mass and use scales to compare their estimation to accurate results. Encourage students to identify safe handling of weights by asking them to consider when the bag would become too heavy to carry.

Investigating accuracy of mass measurements* Students identify situations when accuracy in mass measurement is important, for example when using chemicals or medicines.
* Students to practice using digital and analogue scales to determine mass of a range of everyday objects. Students to discuss which tool provides the most accurate reading of mass.**Resources**:
* [Mostly Postie](http://www.ictgames.com/mobilePage/mostlyPostie/index.html) analogue scales online interactive
* [Reading analogue scales](https://easyteaching.net/maths-resources/measurement-worksheets/length-weight-temperature/#weight)
* Teacherled – [Interactive scale](https://www.teacherled.com/iresources/scales/mass/)

Converting units of mass* Students to create a reference sheet for mass units of measurement showing abbreviations and conversion rates between the units.
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| M1.4: Temperature |  |  |  |
| * recognise language and comparative language that relates to temperature, for example:
* hot
* boiling
* lukewarm
* colder than
* thermometer
* degree
* Celsius Literacy icon Literacy icon
* recognise the unit C and its abbreviation
* recognise familiar temperatures, for example:
* human body
* freezing water
* boiling water
* recognise alternate units and measuring devices
* estimate and measure temperatures using a range of devices Critical and creative thinking icon Critical and creative thinking icon
* apply knowledge of temperature to make judgements or decisions, for example:
* a body temperature of 40C will likely require medical treatment
* a weather prediction of 13C will mean you should wear warm clothes
* do not put your hand in boiling water or get in a steaming hot bath Critical and creative thinking icon Critical and creative thinking icon Literacy icon Literacy icon Personal and social capability icon Personal and social capability icon
* solve problems involving temperature, for example:
* if it is 20C today and the weather forecast is for it to be 5 degrees cooler tomorrow, what will the temperature be? And what clothing should I wear? Critical and creative thinking icon Critical and creative thinking icon Literacy icon Literacy icon Personal and social capability icon Personal and social capability icon
 | Vocabulary development:* Encourage students to consider the following questions as an introduction to the importance of temperature:
* What temperatures are safe for the human body?
* What can happen to materials that are exposed to excessive heat or cold?
* What temperatures are linked to the terms boiling and freezing?
* Why is important to be accurate when measuring temperature?

Measuring temperature* Using the [interactive thermometer](https://www.mathsisfun.com/measure/thermometer.html) students to consider the importance of temperature regulation in real world contexts. For example:
* burns in kitchens or in manufacturing industries
* sunburn or dehydration in outdoor jobs
* hypothermia in workplaces with large cold stores or freezers
* food handling and storage
* Students practise reading thermometers and temperature scales in everyday contexts. Ask students to estimate, and then measure, at different temperatures. For example:
* a glass of cold water from the fridge
* a glass of water at room temperature
* a cup of white tea or coffee (make sure this is not near boiling)
* an ice cube or a packet of frozen peas
* ice-cream or an icy pole
* hot water from the tap**Resource**: [Reading a thermometer](https://mrnussbaum.com/reading-a-thermometer-online)
* Students apply skills of reading temperature to solve problems in an everyday context, For example:
* This morning the temperature was 23C which increased by 7C at lunch. What is the new temperature?
* Chicken needs to be cooked to a safe temperature of 75C. If the current temperature is 54C how many more degrees does the chicken need to be cooked before it is safe to eat?
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| M1.5: Energy |  |  |  |
| * identify units of energy commonly used in relation to human or household energy and their abbreviations, for example:
* kilojoules, calories, kilowatts Literacy icon Literacy icon
* recognise that kilojoules are used to describe the amount of energy gained when consuming food or drink Literacy icon Literacy icon Personal and social capability icon Personal and social capability icon
* recognise that energy is expended during physical activity Literacy icon Literacy icon Personal and social capability icon Personal and social capability icon
* recognise that watts and kilowatts are used to describe consumption of electricity in the home, for example:
* consider overall energy consumption on electricity bills or energy use of various appliances Sustainability icon Sustainability icon
* solve problems involving energy, for example:
* finding an energy-efficient refrigerator Sustainability icon Sustainability icon Critical and creative thinking icon Critical and creative thinking icon Literacy icon Literacy icon Personal and social capability icon Personal and social capability icon
 | **Teacher notes**: In Australia, we use kilojoules (kJ) to measure how much energy people get from consuming a food or drink. Food energy used to be measured in Calories (Cal) and some countries still use those units.Introducing energy* Teacher to discuss the use of energy measurement in real world contexts. Energy is how things change and move. It exists everywhere around us and takes different forms. It takes energy to cook food, to drive to school, to jump in the air and to power a light bulb.
* Teacher to discuss when we want to measure how much energy food provides to a human body we use a measurement called a kilojoule. A kilojoule is a unit of measure of energy, in the same way that kilometres measure distance. We can also use kilojoules to measure how much energy the human body has used from physical activities and exercise.**Resource**: [Kilojoules on the menu | an introduction to kilojoules](https://youtu.be/ZA2iiS5FTc4)
* Teacher to discuss when we want to measure how much energy it takes to use electrical items we use units of measurement called watts and kilowatts. By measuring our energy use in watts we can help to use less electricity which will save us money on electricity bills and is much better for the environment.**Resource**: [What's a Watt?](https://youtu.be/1__KjuGNzxc)

Vocabulary development:* Encourage students to develop their understanding of language relating to energy measurement for both food and power, for example ‘*this snack has 400 kilojoules*’ ‘*this light bulb uses less watts than the other one*’

Calculating and comparing energy* Students to compare different energy amounts in a wide variety of prepared food products by identifying and recording the kilojoule amount on the packaging. Students to record results in a table or order from largest to smallest kilojoule count. Students to consider the following:
* which product has the most kilojoules?
* which product had the least kilojoules?
* can I predict which product will have more kilojoules just by looking at it?
* Students use the [burn your kilojoules](https://www.gethealthynsw.com.au/healthier-you/tools-and-calculators/burn-your-kilojoules/) to estimate the number of kilojoules they need for healthy living.
* They investigate the calorie’s in foods using the [calorie counter Australia](https://www.caloriecounter.com.au/)
* They can then calculate their daily kilojoule total by converting calories to kilojoules.
* Students explore the use of kilojoules in measuring physical activity and exercise. They use the [kilojoule calculator](https://www.gethealthynsw.com.au/healthier-you/tools-and-calculators/burn-your-kilojoules/) to measure the rate of kilojoules consumed for different physical activities.
* Students plan out a typical healthy day outlining foods to be consumed with a total kilojoule count. **Extension**: students could consider the use of physical exercise in their daily plan and the impact on the overall kilojoule ‘use’ on the human body.
* Students explore the use of energy measurement in the home and workplace. They investigate the conversion of watts into kilowatts and megawatts and consider different electrical devices that would be used. For example a light bulb requires a small amount of energy and can be measured in watts, whereas a large power plant would measure its energy use in megawatts.**Resources**: [SMUD's Watts Up? Measuring Your Energy Use](https://www.youtube.com/watch?v=RkgH6Ba8s9A)
* Students compare the energy use of a range of different everyday appliances using the [energy appliance calculator](https://www.energy.gov/energysaver/save-electricity-and-fuel/appliances-and-electronics/estimating-appliance-and-home). Students to consider the following questions:
* which appliances are likely to use the most energy?
* how might people be able to use less energy in the home?
* how will using less energy impact on the overall cost of electricity in the home?
* Students identify ways to reduce the overall energy consumption in the home and explore the use of energy saving techniques and devices.**Resource**: [Energy Saver Kids](https://www.energystar.gov/index.cfm?c=kids.kids_index)
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### Evaluation

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### Glossary

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| Term | Description |
| estimate | An approximate judgment or calculation of an amount of something |
| length | A measure of a line segment that is unaffected by changing the orientation of the line |
| mass | The measure of the amount of matter in an object |
| weight | The measure of how heavy an object |

### Supplementary resources

#### Measurement:

* Teaching Measurement Stage 2 and Stage 3 resources <https://schoolsequella.det.nsw.edu.au/file/ce0d6d8b-7d38-487e-b42b-b264e90aec18/1/teaching-measurement-S2-S3.pdf>
* First Step Mathematics: Measurement Book 1 <http://det.wa.edu.au/stepsresources/detcms/navigation/first-steps-mathematics/>
* Introducing attributes of measurement <http://www.scootle.edu.au/ec/viewing/S4999/index.html>

#### Mass:

* Great Grams – estimating 100g <https://nzmaths.co.nz/resource/great-grams>
* Supermarket Shopping – estimating 1 kg <https://nzmaths.co.nz/resource/supermarket-shopping>

#### Temperature:

* Risky Stuff – work, health and safety topic relating to temperature <http://www.safe-t1.net.au/assets/files/resource/Risky_stuff.pdf>
* BBC Teach – Temperature <https://www.bbc.co.uk/teach/skillswise/temperature/zh4ghbk>

#### Energy:

* Measuring Electricity – energy consumption <http://www.powertosavetexas.net/Content/schoolProgram/PUCT_Teacher_Lesson_2.pdf>
* Money Smart: Light Up the Globe <https://moneysmart.gov.au/teaching-resources/light-up-the-globe>