

# MATHEMATICS LIFE SKILLS STAGE 6

## DRAFT OUTCOMES AND CONTENT FOR CONSULTATION

*To be read in conjunction with the Mathematics General Stage 6 Draft Syllabus.*

20 JULY – 31 AUGUST 2016

© 2016 Copyright Board of Studies, Teaching and Educational Standards NSW for and on behalf of the Crown in right of the State of New South Wales.

This document contains Material prepared by the Board of Studies, Teaching and Educational Standards NSW for and on behalf of the Crown in right of the State of New South Wales. The Material is protected by Crown copyright.

All rights reserved. No part of the Material may be reproduced in Australia or in any other country by any process, electronic or otherwise, in any material form, or transmitted to any other person or stored electronically in any form without the prior written permission of the Board of Studies, Teaching and Educational Standards NSW, except as permitted by the Copyright Act 1968.

When you access the Material you agree:

- to use the Material for information purposes only
- to reproduce a single copy for personal bona fide study use only and not to reproduce any major extract or the entire Material without the prior permission of the Board of Studies, Teaching and Educational Standards NSW
- to acknowledge that the Material is provided by the Board of Studies, Teaching and Educational Standards NSW
- to include this copyright notice in any copy made
- not to modify the Material or any part of the Material without the express prior written permission of the Board of Studies, Teaching and Educational Standards NSW.

The Material may contain third-party copyright materials such as photos, diagrams, quotations, cartoons and artworks. These materials are protected by Australian and international copyright laws and may not be reproduced or transmitted in any format without the copyright owner's specific permission. Unauthorised reproduction, transmission or commercial use of such copyright materials may result in prosecution.

The Board of Studies, Teaching and Educational Standards NSW has made all reasonable attempts to locate owners of third-party copyright material and invites anyone from whom permission has not been sought to contact the Copyright Officer.

Phone: (02) 9367 8289

Fax: (02) 9279 1482

Email: [mila.buraga@bostes.nsw.edu.au](mailto:mila.buraga@bostes.nsw.edu.au)

Published by:

Board of Studies, Teaching and Educational Standards NSW

GPO Box 5300

Sydney NSW 2001

Australia

[www.bostes.nsw.edu.au](http://www.bostes.nsw.edu.au)

D2016/49795

## STAGE 6 LIFE SKILLS



for your information

The Mathematics Life Skills Stage 6 outcomes and content are developed from the objectives of the Mathematics General Stage 6 Syllabus.

Before deciding that a student should undertake a course based on Life Skills outcomes and content, consideration should be given to other ways of assisting the student to engage with the regular course outcomes. This assistance may include a range of adjustments to the teaching, learning and assessment activities of the Mathematics Stage 6 curriculum.

If the adjustments do not provide a student with sufficient access to some or all of the Stage 6 outcomes, a decision can be explored for the student to undertake Life Skills outcomes and content. This decision should be made through the collaborative curriculum planning process involving the student and parent/carer and other significant individuals. School principals are responsible for the management of the collaborative curriculum planning process.

The following points need to be taken into consideration:

- students are not required to complete all Life Skills outcomes
- specific Life Skills outcomes should be selected on the basis that they meet the learning needs, strengths, goals and interests of each student
- outcomes may be demonstrated independently or with support.

Further information in relation to planning, implementing and assessing Life Skills outcomes and content can be found in support materials for:

- Mathematics
- Special education needs
- Life Skills.

## STAGE 6 LIFE SKILLS OBJECTIVES AND OUTCOMES



for your information

For students undertaking a course based on Life Skills outcomes and content:

- students are not required to complete all Life Skills outcomes
- specific Life Skills outcomes should be selected on the basis that they meet the learning needs, strengths, goals and interests of each student
- outcomes may be demonstrated independently or with support.



consult

### Objective

Students:

- develop the ability to apply reasoning, and the use of appropriate language, in the evaluation and construction of arguments and the interpretation and use of models based on mathematical concepts

### Life Skills outcomes

A student:

**MA6LS-1** uses mathematical techniques, reasoning and language to solve problems

**MA6LS-2** uses mathematical symbols, diagrams, graphs and tables to represent information accurately

### Objective

Students:

- develop the ability to use concepts and apply techniques to the solution of problems in algebra and modelling, measurement, financial mathematics, data and statistics, probability and networks

### Life Skills outcomes

A student:

**MA6LS-3** estimates and measures using appropriate tools, units and level of accuracy

**MA6LS-4** measures and calculates in relation to two-dimensional and three-dimensional shapes

**MA6LS-5** calculates with and manages money to effectively deal with financial issues

**MA6LS-6** uses number properties and patterns to model and solve problems

**MA6LS-7** uses data in a range of formats to ask and answer questions

**MA6LS-8** describes the probability of an event

**MA6LS-9** uses plans, maps, networks and timetables effectively in a range of everyday contexts and situations

**Objective**

Students:

- develop the ability to interpret and communicate mathematics in a variety of written and verbal forms, including diagrams and statistical graphs

**Life Skills outcome**

A student:

**MA6LS-10** uses a variety of strategies to communicate mathematical ideas and relationships

**Objective**

Students:

- develop the ability to use mathematical skills and techniques, aided by appropriate technology, to organise information and interpret practical situations

**Life Skills outcome**

A student:

**MA6LS-11** applies appropriate skills and techniques, including technology, to investigate, explain and organise information

## VALUES AND ATTITUDES OBJECTIVES

Students will value and appreciate:

- mathematics as an essential and relevant part of life, recognising that its development and use has been largely in response to human needs by societies all around the globe
- the importance of resilience in undertaking mathematical challenges, taking responsibility for their own learning and evaluating their mathematical development

## STAGE 6 LIFE SKILLS AND RELATED SYLLABUS OUTCOMES

<p><b>Objective</b> Students:</p> <ul style="list-style-type: none"> <li>develop the ability to apply reasoning, and the use of appropriate language, in the evaluation and construction of arguments and the interpretation and use of models based on mathematical concepts</li> </ul>	
<p><b>Life Skills outcomes</b> A student:</p>	<p><b>Related Year 11/12 outcomes</b> A student:</p>
<p><b>MA6LS-1</b> uses mathematical techniques, reasoning and language to solve problems</p>	<p><b>MG11-1</b> uses algebraic and graphical techniques to compare alternative solutions to contextual problems</p> <p><b>MG1-12-1</b> uses algebraic and graphical techniques to evaluate and construct arguments in a range of familiar and unfamiliar contexts</p> <p><b>MG2-12-1</b> uses detailed algebraic and graphical techniques to critically evaluate and construct arguments in a range of familiar and unfamiliar contexts</p>
<p><b>MA6LS-2</b> uses mathematical symbols, diagrams, graphs and tables to represent information accurately</p>	<p><b>MG11-2</b> represents information in symbolic, graphical and tabular form</p> <p><b>MG1-12-2</b> analyses representations of data in order to make predictions and draw conclusions</p> <p><b>MG2-12-2</b> analyses representations of data in order to make inferences, predictions and draw conclusions</p>

<p><b>Objective</b> Students:</p> <ul style="list-style-type: none"> <li>develop the ability to use concepts and apply techniques to the solution of problems in algebra and modelling, measurement, financial mathematics, data and statistics, probability and networks</li> </ul>	
<p><b>Life Skills outcomes</b> A student:</p>	<p><b>Related Year 11/12 outcomes</b> A student:</p>
<p><b>MA6LS-3</b> estimates and measures using appropriate tools, units and level of accuracy</p>	<p><b>MG11-3</b> solves problems involving quantity measurement, including accuracy and the choice of relevant units</p> <p><b>MG1-12-3</b> interprets the results of measurements and calculations and makes judgements about the reasonableness, including the conversion to appropriate units</p> <p><b>MG2-12-3</b> interprets the results of measurements and calculations and makes judgements about reasonableness, including the degree of accuracy of measurements and calculations, and the conversion to appropriate units</p>
<p><b>MA6LS-4</b> measures and calculates in relation to two-dimensional and three-dimensional shapes</p>	<p><b>MG11-4</b> performs calculations in relation to two-dimensional and three-dimensional figures</p> <p><b>MG1-12-4</b> analyses simple two-dimensional and three-dimensional models to solve practical problems</p> <p><b>MG2-12-4</b> analyses two-dimensional and three-dimensional models to solve practical problems, including those involving non-right-angled triangles</p>
<p><b>MA6LS-5</b> uses, calculates with and manages money to effectively deal with financial issues</p>	<p><b>MG11-5</b> models relevant financial situations using appropriate tools</p> <p><b>MG1-12-5</b> makes informed decisions about financial situations likely to be encountered post-school</p> <p><b>MG2-12-5</b> makes informed decisions about financial situation, including annuities and loan repayments</p>

<p><b>MA6LS-6</b> uses number properties and patterns to model and solve problems</p>	<p><b>MG11-6</b> represents the relationships between changing quantities in algebraic and graphical form</p> <p><b>MG1-12-6</b> makes predictions about everyday situations based on simple mathematical models</p> <p><b>MG2-12-6</b> makes predictions about situations based on mathematical models, including those involving functions</p>
<p><b>MA6LS-7</b> uses data in a range of formats to ask and answer questions</p>	<p><b>MG11-7</b> determines appropriate forms of organisation and representation of collected data</p> <p><b>MG1-12-7</b> develops and carries out simple statistical processes to answer questions posed</p> <p><b>MG2-12-7</b> solves problems requiring statistical processes, including the use of the normal distribution, and the correlation of bivariate data</p>
<p><b>MA6LS-8</b> describes the probability of an event</p>	<p><b>MG11-8</b> solves probability problems involving counting techniques, multistage events and expectation</p>
<p><b>MA6LS-9</b> uses plans, maps, networks and timetables effectively in a range of everyday contexts and situations</p>	<p><b>MG1-12-8</b> applies network techniques to solve network problems</p> <p><b>MG2-12-8</b> solves problems using networks to model decision-making in practical problems</p>



<p><b>Objective</b> Students:</p> <ul style="list-style-type: none"> <li>develop the ability to interpret and communicate mathematics in a variety of written and verbal forms, including diagrams and statistical graphs</li> </ul>	
<p><b>Life Skills outcome</b> A student:</p>	<p><b>Related Year 11/12 outcome</b> A student:</p>
<p><b>MA6LS-10</b> uses a variety of strategies to communicate mathematical ideas and relationships</p>	<p><b>MG11-10</b> justifies a response to a given problem using appropriate mathematical terminology and/or calculations</p> <p><b>MG1-12-10</b> uses mathematical argument and reasoning to evaluate conclusions, communicating a position clearly to others</p> <p><b>MG2-12-10</b> uses mathematical argument and reasoning to evaluate conclusions, communicating a position clearly to others and justifying a response</p>

<p><b>Objectives</b> Students:</p> <ul style="list-style-type: none"> <li>develop the ability to use mathematical skills and techniques, aided by appropriate technology, to organise information and interpret practical situations</li> </ul>	
<p><b>Life Skills outcome</b> A student:</p>	<p><b>Related Year 11/12 outcomes</b> A student:</p>
<p><b>MA6LS-11</b> applies appropriate skills and techniques, including technology, to investigate, explain and organise information</p>	<p><b>MG11-9</b> uses appropriate technology to investigate, organise and interpret information in a range of contexts</p> <p><b>MG1-12-9</b> chooses and uses appropriate technology effectively and recognises appropriate times for such use</p> <p><b>MG2-12-9</b> chooses and uses appropriate technology effectively in a range of contexts, and applies critical thinking to recognise appropriate times and methods for such use</p>

## STAGE 6 LIFE SKILLS CONTENT



for your information

The Mathematics Life Skills Stage 6 course has an indicative time allocation of 120 hours in both Year 11 and Year 12 courses. It is not necessary for students to address or achieve all of the Mathematics Life Skills outcomes. The choice of strands, topics, outcomes and content within each course, and the time spent on the content, provides the flexibility to develop rigorous, meaningful and age-appropriate programs that can address individual learning needs, strengths, interests and aspirations, and support students transitioning into post-school contexts.

Teachers may choose the most relevant aspects of the content to meet the particular needs of individual students and identify the most appropriate contexts for the student to engage with the outcomes, for example school, community or workplace. Students will not be required to complete all of the content to demonstrate achievement of an outcome. Any examples provided under the content points are suggestions only. Teachers may use the examples provided or develop other examples to meet the particular needs of individual students.

The following strands provide possible frameworks for addressing the Mathematics Life Skills outcomes and content, and are suggestions only. Each strand provides possible topics for study of the content. Teachers have the flexibility to design topics that will meet the needs and interests of their students.



consult

Strand	Strand Focus
Measurement	Measurement is an important skill for life and in this strand students focus on measurement skills, terminology and strategies and apply these to meaningful contexts.
Algebra	Algebra focuses on the use of number properties and patterns to understand mathematics and its application to meaningful contexts.
Financial mathematics	The financial mathematics strand involves the development of students' basic number and calculation skills and the application of these to problems of earning, spending, saving and borrowing money in real-life situations.
Statistical Analysis	A knowledge of statistical analysis helps students recognise and describe aspects of their world. With a working understanding of this strand, students develop their ability to predict and draw conclusions from what is happening around them.
Networks	Plans, maps and networks are tools that assist us to understand, model and operate effectively in our world. Developing the skills to use these helps students to work and travel efficiently and independently.

## WORKING MATHEMATICALLY

Working Mathematically provides students with the opportunity to engage in genuine mathematical activities and to develop and use their knowledge and understanding as well as problem-solving, reasoning, communication and justification skills across the range of strands, objectives and outcomes.

Working Mathematically is integral to the learning process in mathematics. Where appropriate, students should have the opportunity to develop the components of Working Mathematically by participating in a range of learning experiences.

## STRAND: MEASUREMENT

### OUTCOMES

**A student:**

- > uses mathematical techniques, reasoning and language to solve problems MA6LS-1
- > uses mathematical symbols, diagrams, graphs and tables to represent information accurately MA6LS-2
- > estimates and measures using appropriate tools, units and level of accuracy MA6LS-3
- > measures and calculates in relation to two-dimensional and three-dimensional shapes MA6LS-4
- > uses a variety of strategies to communicate mathematical ideas and relationships MA6LS-10
- > applies appropriate skills and techniques, including technology, to investigate, explain and organise information MA6LS-11

**Related Year 11/12 outcomes:** MG11-1, MG11-2, MG11-3, MG11-4, MG11-9, MG11-10, MG1-12-1, MG1-12-2, MG1-12-3, MG1-12-4, MG1-12-10, MG2-12-1, MG2-12-2, MG2-12-3, MG2-12-4, MG2-12-10

### STRAND FOCUS

Measurement is an important skill for life and in this strand students focus on measurement skills, terminology and strategies and apply these to meaningful contexts.

### TOPICS

MLS-M1: Everyday measurement

MLS-M2: Measuring two-dimensional and three-dimensional shapes

# MEASUREMENT

## MLS-M1 EVERYDAY MEASUREMENT

### OUTCOMES

#### A student:

- > uses mathematical techniques, reasoning and language to solve problems MA6LS-1
- > estimates and measures using appropriate tools, units and level of accuracy MA6LS-3
- > uses a variety of strategies to communicate mathematical ideas and relationships MA6LS-10
- > applies appropriate skills and techniques, including technology, to investigate, explain and organise information MA6LS-11

**Related Year 11/12 outcomes:** MG11-1, MG11-3, MG11-9, MG11-10, MG1-12-1, MG1-12-3, MG1-12-9, MG1-12-10, MG2-12-1, MG2-12-3, MG2-12-9, MG2-12-10

### TOPIC FOCUS

The focus of this topic is developing skills in measuring time, length, mass, temperature and energy using appropriate measuring devices, levels of accuracy and metric units. The skills developed should then be applied to relevant real-life situations.

### CONTENT

#### M1.1: Time

Students:

- review concepts of time
  - read and relate times on digital and analog clocks and watches
  - use the language of time effectively, for example, describe the order of events using words, such as before, next, during, after 🕒
  - relate events to general times or periods of time, such as in the morning, tomorrow, overnight, weekend, summer 🗓️
  - recall and order units of time, such as units for short periods (eg seconds, hours) through to longer periods (eg months, centuries)
  - describe and compare events using appropriate units and terms to represent time, such as weekly, annually, longer, earlier 🕒
  - use calendars and planners to identify dates and times and calculate the time between events
  - plan personal events or activities, taking into account aspects, such as the best time to do them and how long they will take 🕒 🗓️
- measure and calculate with time
  - estimate times, for example, estimate the time taken to carry out a routine classroom or personal care activity
  - measure times using a range of devices including stopwatches and personal devices, such as phones 🕒
  - use units of time and their abbreviations
  - calculate elapsed times, for example, the number of hours between 2 pm and 4 pm, the number of days from May 3rd to May 5th
  - recognise 24-hour times using four digits (eg 0900, 2315)
  - relate 24-hour times to their equivalent am or pm times
  - convert between 12-hour and 24-hour times

- read, compare and calculate times in different time zones within and beyond Australia, with an emphasis on our neighbouring countries 🌐 🗺️ 🕒
- recognise and use simple rates related to times, for example, speeds measured in kilometres per hour
- use and interpret time to plan and undertake travel
  - investigate travel times using digital technology, such as public transport planning websites or apps 📱
  - solve personal timetabling problems, for example, identify what time they will have to leave home to arrive somewhere by a given time if using public transport, or calculate the time a bus trip will take from the bus timetable ⚙️ 🗺️
  - use calendars to consider travel dates, for example, to identify the dates or count the number of days available for the next school holidays ⚙️ 🗺️
  - identify the typical features of each season and how this affects travel, for example, identify when the seasons fall in different countries so they know what the weather might be like at a particular time of travel 🌐 🗺️
- read and interpret timetables in different formats, such as timetables that use 24-hour times
  - read and interpret travel timetables
  - read and interpret event timetables, such as a school timetable or a festival program
  - recognise how days of the week (including public holidays) affect timetables
- solve problems involving time ⚙️ 🗺️ 🕒

### M1.2: Length

Students:

- review concepts of length
  - recognise language that relates to length, for example, tall, shorter, height, breadth 🗺️
  - recognise metric units of length, their abbreviations and conversions between them
  - choose appropriate units and devices to measure lengths ⚙️
  - estimate and compare lengths/distances
- measure and calculate with length
  - measure lengths using a range of devices
  - compare the accuracy of using different devices, for example, measure the classroom with a tape measure and a metre ruler and discuss which is more accurate
  - measure lengths with a requested degree of accuracy, for example, to the nearest centimetre
  - investigate ways to measure distances that are not straight or accessible, for example, using a piece of string or a map ⚙️
  - convert between metric units of length
- solve problems involving length ⚙️ 🗺️ 🕒

### M1.3: Mass

Students:

- review concepts of mass
  - recognise language that relates to mass (eg heavy, lighter, weight) 🗣️
  - recognise metric units of mass and their abbreviations
  - choose appropriate units and devices to measure masses ⚙️
  - estimate and compare masses
- measure and calculate with mass
  - measure masses using a range of devices in everyday situations
  - measure masses with a requested degree of accuracy, for example, to the nearest gram
  - convert between metric units of mass
- solve problems involving mass ⚙️ 🗣️ 📦

### M1.4: Temperature

Students:

- review concepts of temperature
  - recognise the unit (°C) and device (thermometer) most commonly used
- measure and calculate with temperature
  - recognise alternate units and measuring devices
  - estimate and measure temperatures
- apply knowledge of temperature to make judgements or decisions, for example, realising that a body temperature of 40°C will likely require medical treatment, or a weather prediction of 13°C for the day will mean they should take a jumper to school ⚙️ 🗣️ 📦
- solve problems involving temperature ⚙️ 🗣️ 📦

### M1.5: Energy

Students:

- describe and measure energy
  - identify units of energy commonly used in relation to human or household energy and their abbreviations
  - use kilojoules to describe the amount of energy they consume, considering the mass of the food 🗣️ 📦
  - use kilojoules to describe the amount of energy they expend during an activity, considering the time of the activity 🗣️ 📦
  - use watts and kilowatts to describe and compare the consumption of electricity in their home, for example consider overall energy consumption on electricity bills or compare energy use (eg in kw/h) by different appliances ↕️
  - apply knowledge of energy to solve problems using energy measurements ⚙️ 🗣️ 📦

# MEASUREMENT

## MLS-M2 MEASURING TWO-DIMENSIONAL AND THREE-DIMENSIONAL SHAPES

### OUTCOMES

#### A student:

- > uses mathematical techniques, reasoning and language to solve problems MA6LS-1
- > uses mathematical symbols, diagrams, graphs and tables to represent information accurately MA6LS-2
- > measures and calculates in relation to two-dimensional and three-dimensional shapes MA6LS-4
- > uses a variety of strategies to communicate mathematical ideas and relationships MA6LS-10

**Related Year 11/12 outcomes:** MG11-1, MG11-2, MG11-4, MG11-10, MG1-12-1, MG1-12-2, MG1-12-4, MG1-12-10, MG2-12-1, MG2-12-2, MG2-12-4, MG2-12-10

### TOPIC FOCUS

In this topic students explore the properties of two-dimensional (2D) shapes and three-dimensional (3D) shapes and measure perimeters, areas, volumes and capacities.

### CONTENT

#### M2.1: 2D and 3D shapes

Students:

- identify and name common 2D and 3D shapes
  - distinguish between 2D and 3D shapes and explain the difference 🗣️
  - identify 2D and 3D shapes found naturally in the environment
  - identify 2D and 3D shapes in their home, classroom or workplace ★
  - identify 2D and 3D shapes in diagram form in a range of orientations
- identify the attributes of 2D shapes
  - identify the number of sides and angles, whether the sides are straight or curved, whether the shape will tessellate
  - make representations of 2D shapes by drawing, using technology or using other materials
  - match and sort 2D shapes by attributes, for example, match different types of triangles, sort shapes into groups based on number of sides
  - recognise tessellations, identifying the shapes involved
  - extend or create tessellations using different methods, such as grids, technology or concrete materials
- identify the attributes of 3D shapes
  - identify the number of faces, edges and corners, whether the faces are flat or not, whether the shape can be stacked, packed or rolled
  - make representations of 3D shapes by drawing, using technology or using other materials, such as using nets to construct models of solids
  - match and sort 3D shapes by attributes, for example, select all the pyramids, or sort solids according to whether or not they will roll
  - describe a prism as a 3D shape that has a uniform cross-section (or, the same shape all the way through in simpler terms) 🗣️
  - identify 3D shapes that are prisms



## M2.2: Perimeter

Students:

- review concepts of perimeter
  - describe the perimeter of 2D shapes using everyday language 🗨️
- measure and calculate with perimeter
  - measure perimeters using a variety of strategies, for example using a tape measure, using a string and measuring the string, or using a trundle wheel
  - calculate perimeters by measuring sides and adding them together
  - calculate perimeters by adding given side lengths from diagrammatic representations of shapes
- solve problems involving perimeter, for example, calculate the length of edging needed for a garden bed and cost it given a price per metre 🧮 🗨️ 📦

## M2.3: Area and surface area

Students:

- review concepts of area and surface area
  - describe the area of 2D shapes using everyday language 🗨️
- measure and calculate with area
  - counting squares on a grid to measure area of regular shapes and irregular shapes
  - compare areas of shapes
  - identify or make different shapes with the same area 🧮
  - recognise the relationship between length and width and the number of squares in the row and column of a square or rectangle
  - use the rule 'area = length x width' to calculate areas of squares and rectangles and apply this to real situations
- investigate the concept of surface area through practical activities, for example wrapping a box in paper to determine the surface area of the box 🧮 🗨️ 📦
- calculate the surface area of a 3D shape by adding the areas of the faces
- solve problems involving area 🧮 🗨️ 📦

## M2.4: Volume

Students:

- review concepts of volume
  - describe the volume of 3D shapes using everyday language 🗨️
  - recognise language that relates to volume, for example size, space, cubic units 🗨️
- recognise metric units of volume and their abbreviations (eg cubic centimetres =  $cm^3$ )
- construct 3D shapes of a given volume using concrete materials, for example centicubes or blocks
- measure and calculate with volume
  - measure volume by counting cubes
  - calculate the volume of a range of shapes
  - recognise the relationship between length, width and height and the number of centicubes in a cube, square prism or rectangular prism
  - use the rule 'volume = length x width x height' for a cube, square prism or rectangular prism and apply this to real situations
  - estimate and compare volumes
- solve problems involving volume 🧮 🗨️ 📦

## M2.5: Measuring capacity

Students:

- review concepts of capacity
  - use language of capacity (eg fullest, empty) 🗣️
  - explain the concept of capacity and how it relates to volume in everyday language 🗣️
  - choose appropriate units and devices to measure capacities ⚙️
  - estimate and compare capacities, for example, decide if food in one container will fit into another container with a different shape, or choose which of a set of 3D shapes would have the greatest capacity
- measure and calculate with capacity
  - measure capacity using a range of devices, for example, measuring jugs, medicine droppers, cups and spoons
  - measure capacity with a requested degree of accuracy, for example, to the nearest millilitre
  - convert between metric units of capacity
- investigate the relationship between volume, mass and capacity ⚙️
  - experiment with volume, mass and capacity of 3D containers
  - investigate the relationship between capacity and mass, for example, discover and use the fact that 1 L of water weighs 1 kg ⚙️
  - investigate the relationship between capacity and volume, for example, discover and use the fact that 1 mL of water is equivalent to  $1\text{cm}^3$  ⚙️
  - investigate Archimedes' principle to determine volume for an irregular 3D shape
  - recognise that mass and volume are not necessarily directly related, for example, large objects can be very light while smaller objects can be heavy ⚙️
- solve problems involving capacity ⚙️ 🗣️ 📦

## STRAND: ALGEBRA

### OUTCOMES

**A student:**

- > uses mathematical techniques, reasoning and language to solve problems MA6LS-1
- > uses mathematical symbols, diagrams, graphs and tables to represent information accurately MA6LS-2
- > uses number properties and patterns to model and solve problems MA6LS-6
- > uses a variety of strategies to communicate mathematical ideas and relationships MA6LS-10
- > applies appropriate skills and techniques, including technology, to investigate, explain and organise information MA6LS-11

**Related Year 11/12 outcomes:** MG11-1, MG11-2, MG11-6, MG11-9, MG11-10, MG1-12-1, MG1-12-2, MG1-12-6, MG1-12-9, MG1-12-10, MG2-12-1, MG2-12-2, MG2-12-6, MG2-12-9, MG2-12-10

### STRAND FOCUS

Algebra focuses on the use of number properties and patterns to understand mathematics and its application to meaningful contexts.

### TOPICS

MLS-N1: Review of number properties

MLS-N2: Mathematical modelling

# ALGEBRA

## MLS-N1 REVIEW OF NUMBER PROPERTIES

### OUTCOMES

#### A student:

- > uses mathematical techniques, reasoning and language to solve problems MA6LS-1
- > uses mathematical symbols, diagrams, graphs and tables to represent information accurately MA6LS-2
- > uses number properties and patterns to model and solve problems MA6LS-6
- > uses a variety of strategies to communicate mathematical ideas and relationships MA6LS-10
- > applies appropriate skills and techniques, including technology, to investigate, explain and organise information MA6LS-11

**Related Year 11/12 outcomes:** MG11-1, MG11-2, MG11-6, MG11-9, MG11-10, MG1-12-1, MG1-12-2, MG1-12-6, MG1-12-9, MG1-12-10, MG2-12-1, MG2-12-2, MG2-12-6, MG2-12-9, MG2-12-10

### TOPIC FOCUS

This topic reviews the basics of number and solving number problems. It also helps prepare students for the more advanced topic of mathematical modelling.

### CONTENT

#### N1.1: Basic number skills

Students:

- review skills in counting
  - use language related to number, for example, few, more, none, all
  - count forwards and backwards from a given number
  - count by twos, fives, tens and hundreds forwards and backwards from a given number
  - identify and count with odd and even numbers
  - count in different contexts, for example, count with coins, count time on the clock in five-minute intervals, count down seconds to the start of an event
  - use ordinal terms in everyday contexts, for example, ‘take the third street on the left’
- explain what is meant by the terms double and halve 🗣️
- calculate double or half of a number
- recognise multiples and factors
  - identify the multiples of a number using repeated addition or patterns on a hundreds chart
  - recognise that multiples are the result of multiplication
  - calculate multiples, for example, find the third multiple of 7
  - recognise that factors are the numbers that multiply to give a number
  - identify factors of a number
  - decide if one number is a factor of another and explain their decision 🗣️

### **N1.2: Place value**

Students:

- match place value to the digits of an integer with up to seven digits
- identify which digit is in a given place value for a number, for example, identify how many hundreds there are in 523
- recognise, read and record numbers with up to seven digits
- compare and order numbers with up to seven digits

### **N1.3: Number problems**

Students:

- complete number sentences involving one or more operation by calculating missing values, for example,  $3 \times ? = 18$ ,  $? + ? = 10$ ,  $5 + ? - 1 = 7$ 
  - explain the strategies they used to find the missing value 🗨️
- choose the best operation to solve a word problem, for example, choose to calculate  $5 \times 10$  rather than  $5+5+5+5+5+5+5+5+5+5$  to answer the question 'If I have five bags each containing ten pens, how many pens do I have?' ⚙️
- recognise and use the correct order of operations for a multi-step equation, for example, complete the multiplication first in the equation  $4 + 2 \times 5$
- use a number sentence to solve a given problem ⚙️
- use a calculator to solve number problems 🖨️

# ALGEBRA

## MLS-N2 MATHEMATICAL MODELLING

### OUTCOMES

#### A student:

- > uses mathematical techniques, reasoning and language to solve problems MA6LS-1
- > uses mathematical symbols, diagrams, graphs and tables to represent information accurately MA6LS-2
- > uses number properties and patterns to model and solve problems MA6LS-6
- > uses a variety of strategies to communicate mathematical ideas and relationships MA6LS-10
- > applies appropriate skills and techniques, including technology, to investigate, explain and organise information MA6LS-11

**Related Year 11/12 outcomes:** MG11-1, MG11-2, MG11-6, MG11-9, MG11-10, MG1-12-1, MG1-12-2, MG1-12-6, MG1-12-9, MG1-12-10, MG2-12-1, MG2-12-2, MG2-12-6, MG2-12-9, MG2-12-10

### TOPIC FOCUS

Mathematical modelling is the term used to describe and interpret relationships between quantities. The focus of this topic is exploring simple mathematical models of real-life situations and representing them visually.

### CONTENT

#### N2.1: Patterns

Students:





- identify and continue shape and number patterns
- describe shape and number patterns informally, for example, 'it goes up by threes' 📏
- develop a rule for a given number pattern and express it mathematically, for example, the rule is add three to the previous term, or multiply the term number by five, or use the number rule  $2 \times ?$  to get each term of the pattern ⚙️ 📏

#### N2.2: Modelling

Students:

- model real-life problems using concrete materials and/or diagrams, for example, find the number of chairs needed for a certain number of tables in a cafe by actually setting up tables and chairs, or by drawing a diagram ⚙️ ⚙️ ⭐
  - develop rules based on the models created, for example, generalise the above situation to develop a rule that the number of chairs needed for a certain number of tables is 'number of tables  $\times 4$ '
- complete tables of values based on a simple rule in the context of a real situation, for example, if the number of chairs needed for a certain number of tables is 'number of tables  $\times 4$ '; use this to complete the table: ⚙️ ⚙️ ⭐

Number of tables	1	2	3	4
Number of chairs	4			

- read, interpret and draw conclusions from graphs that model real situations, for example, use a graph of blood alcohol concentration levels over time to estimate when a person could safely drive a car after drinking alcohol
- display data from experiments or real-life situations in simple graphs, for example, plot the cost of filling the petrol tank against the number of litres of petrol required on a line graph
- complete a table of values from a graph, for example, tabulate the population of the school over the past five years from a line graph of this data 
- describe trends evident in graphs of data, for example, determine a line of best fit on a height-weight graph and describe trends, such as taller people tend to weigh more whilst still recognising that there are individuals that do not fit this trend  
- use digital technology to create graphs from tables of data or tables from graphs 

## STRAND: FINANCIAL MATHEMATICS

### OUTCOMES

**A student:**

- > uses mathematical techniques, reasoning and language to solve problems MA6LS-1
- > uses, calculates with and manages money to effectively deal with financial issues MA6LS-5
- > uses a variety of strategies to communicate mathematical ideas and relationships MA6LS-10
- > applies appropriate skills and techniques, including technology, to investigate, explain and organise information MA6LS-11

**Related Year 11/12 outcomes:** MG11-1, MG11-5, MG11-9, MG11-10, MG1-12-1, MG1-12-5, MG1-12-9, MG1-12-10, MG2-12-1, MG2-12-5, MG2-12-9, MG2-12-10

### STRAND FOCUS

The financial mathematics strand involves the development of students' basic number and calculation skills and the application of these to problems of earning, spending, saving and borrowing money in real-life situations.

### TOPICS

MLS-F1: Decimals, percentages and money

MLS-F2: Earning money

MLS-F3: Spending money



# FINANCIAL MATHEMATICS

## MLS-F1 DECIMALS, PERCENTAGES AND MONEY

### OUTCOMES

#### A student:

- > uses mathematical techniques, reasoning and language to solve problems MA6LS-1
- > uses, calculates with and manages money to effectively deal with financial issues MA6LS-5
- > uses a variety of strategies to communicate mathematical ideas and relationships MA6LS-10
- > applies appropriate skills and techniques, including technology, to investigate, explain and organise information MA6LS-11

**Related Year 11/12 outcomes:** MG11-1, MG11-5, MG11-9, MG11-10, MG1-12-1, MG1-12-5, MG1-12-9, MG1-12-10, MG2-12-1, MG2-12-5, MG2-12-9, MG2-12-10

### TOPIC FOCUS

The focus of this topic is carrying out simple money calculations using decimals and percentages and using these to calculate interest.

### CONTENT

#### F1.1: Decimals and money

Students:

- review concepts related to decimals and money
  - read, write, order and compare decimal numbers
  - recognise, match, order and use Australian currency to purchase items ★
  - read and write money amounts in numerals and words 🗣️
  - recognise that other countries use different currencies 🌐
- calculate with decimals in the context of money
  - add and subtract decimals correct to two decimal places using a variety of strategies, such as mental, written or calculator techniques
  - multiply and divide money amounts by 10 or 100 by moving the decimal point
  - multiply and divide decimals correct to two decimal places using a variety of strategies, such as mental, written or calculator techniques
- calculate costs and change due on purchases using a range of strategies, such as concrete materials, mental, written or calculator techniques ★
  - estimate costs and select the appropriate coins and notes to tender
  - use rounding to estimate the amount of change due, for example, to the whole dollar or 50c
  - use a calculator to calculate change due, to solve money problems
  - recognise whether they have been given the correct change during a purchase
- interpret calculator displays involving decimal answers in the context of money, for example, understand that 0.5 means \$0.50 or that a calculator answer of 4.567 cannot be recorded as \$4.567
- convert between Australian dollars and foreign currencies, for example, Japanese ¥ 🌐 🌐

## F1.2: Percentages and money

Students:

- review concepts related to percentages
  - recognise, read and write the % symbol as 'per cent' 🗣️
  - recognise and explain the meaning of a percentage as a part of 100
  - interpret the use of percentages in everyday life, for example, explain what is meant by '25% off' in a sale, or an '80% goal kicking success rate' 🏈
- calculate simple percentages of quantities using a calculator
  - calculate the percentage of an amount using whole number percentages
  - recognise that there are alternate methods of using a calculator to calculate percentages of amounts, for example, using a % key or using 'percentage ÷ 100 x amount' or using the decimal equivalent of the percentage
- calculate percentage decreases and increases using a calculator in the context of money problems, for example, discounts, GST 🏪
- explore the concept of saving money
  - discuss the advantages of saving money 🏦 🗣️
  - identify and compare options for saving money including a range of financial products and institutions 🏦
  - use online loan calculators to calculate interest earned on savings for different periods and rates 🖥️
- investigate the concepts of borrowing money and interest
  - recognise the requirement to repay borrowed money 🏦
  - discuss the advantages and disadvantages of borrowing money 🏦 🗣️
  - identify and compare different types of borrowing, eg credit cards, loans, lay-by 🏦
  - use online graphs and/or loan calculators to identify the effect that changing the rate has on repayments 🖥️
  - use online loan calculators to calculate repayments on loans for different periods and rates 🖥️
  - compare interest rates and loans using technology and identify the best loan for a given situation 🏦
  - calculate simple interest using a calculator in relation to saving and borrowing 🖥️
- read and interpret a range of bank statements, recognising common terms and types of transactions 🏦 🗣️

# FINANCIAL MATHEMATICS

## MLS-F2 EARNING MONEY

### OUTCOMES

#### A student:

- > uses mathematical techniques, reasoning and language to solve problems MA6LS-1
- > uses, calculates with and manages money to effectively deal with financial issues MA6LS-5
- > uses a variety of strategies to communicate mathematical ideas and relationships MA6LS-10
- > applies appropriate skills and techniques, including technology, to investigate, explain and organise information MA6LS-11

**Related Year 11/12 outcomes:** MG11-1, MG11-5, MG11-9, MG11-10, MG1-12-1, MG1-12-5, MG1-12-9, MG1-12-10, MG2-12-1, MG2-12-5, MG2-12-9, MG2-12-10

### TOPIC FOCUS

This topic explores the different ways you can earn money and looks into related issues, such as taxation and solving income-related problems.

### CONTENT

#### F2.1: Types of income and work

Students:

- identify and describe a range of types of employment, for example, full-time or part-time, casual, self-employed, volunteer 🗨️★
- investigate a range of incomes
  - identify and describe a range of types of work-related income, for example, wages, salary, commission and piecework 🗨️★
  - identify and describe other forms of income, for example, pocket money, social security payments, interest on investments, profits from operating a business
  - recognise the link between a person having sufficient income and being able to buy the things they need and want
  - read and interpret tables related to income, for example, wage tables, tables of payments from Centrelink
- read and interpret pay advice notifications

#### F2.2: Income calculations

Students:

- calculate earnings based on wages or salaries, for example, calculate income given an hourly rate and a number of hours worked or calculate weekly income given an annual salary
  - read and interpret a timesheet to calculate wages for the time period covered on the sheet 🗨️
- describe overtime and calculate simple overtime payments 🗨️★
- calculate earnings based on piecework ★
- calculate earnings based on percentage commission ★
- calculate total income for a given time period, taking into account regular pay, overtime pay and other allowances ★

### F2.3: Tax and other deductions

Students:

- explore the concept of income tax
  - recognise the existence and purpose of income tax 🌟
  - understand that the Pay As You Go (PAYG) system of taxation is applied to most wage and salary earners 🌟
- interpret and calculate tax and other deductions
  - read and interpret weekly tax tables, either online or on paper, to determine the amount of tax that would be withheld from a worker's weekly pay 📄
  - identify other typical deductions that may be taken from earnings, for example superannuation or union fees 🌟
  - calculate net pay given amounts of gross pay, tax and deductions 🌟
- explain the term financial year and identify why it is significant to workers 🎓
- recognise that workers need to submit a tax return annually 🌟
- identify typical allowable tax deductions for different workers (eg tools for a tradesperson, uniform laundering) and understand the documentation needed if a worker wants to claim these deductions in their tax return 📄 🌟

# FINANCIAL MATHEMATICS

## MLS-F3 SPENDING MONEY

### OUTCOMES

#### A student:

- > uses mathematical techniques, reasoning and language to solve problems MA6LS-1
- > uses, calculates with and manages money to effectively deal with financial issues MA6LS-5
- > uses a variety of strategies to communicate mathematical ideas and relationships MA6LS-10
- > applies appropriate skills and techniques, including technology, to investigate, explain and organise information MA6LS-11

**Related Year 11/12 outcomes:** MG11-1, MG11-5, MG11-9, MG11-10, MG1-12-1, MG1-12-5, MG1-12-9, MG1-12-10, MG2-12-1, MG2-12-5, MG2-12-9, MG2-12-10

### TOPIC FOCUS

The focus of this topic is understanding and using the mathematics needed for spending money and calculating the costs of everyday living.

### CONTENT

#### F3.1: Purchasing goods and services

Students:

- distinguish between goods and services
- describe goods and services they need and want 🛒
- recognise that in our society most goods and services have a price attached
- investigate how exchange of goods and services can occur without using money 🤝🌐🌐🌐
- identify costs of goods and services using a variety of techniques, for example, direct observation, reading online catalogues, contacting a tradesperson to get a quote ⭐
- compare costs of similar items
  - order costs using terminology, such as cheapest, dearer, less expensive 🛒
  - calculate to make comparisons, for example, multiply the cost of a 1 kg bag by 5 to compare it to the cost of a 5 kg bag of the same item
  - recognise that comparing costs fairly requires a comparable quantity and quality ⚖️
  - determine the best buy from two or more options, considering a range of aspects, such as unit price, quantity, value and quality ⚙️
  - justify a choice between two or more items based on cost or other reasons, for example, quality, personal preference or requirements ⚖️
- investigate consumer rights with regard to refunds and exchanges, warranties, and terms and conditions of sale/service 🛒
- identify a range of ways to pay when making purchases, such as cash, debit or credit cards, online purchasing, direct deposit 🛒📱
- discuss issues related to security when making purchases using cards or online methods 🛒📱📱

### F3.2: Budgeting

Students:

- develop basic skills in budgeting 📊
  - define the terms 'income' and 'expenditure' 🗣️
  - understand the need to balance income and expenditure
  - describe what is meant by a balanced budget 🗣️
  - calculate total income and expenditure and create a balanced budget for a real situation, for example, create a budget for a class party by adding up students' contributions (income) and costs of food and drinks (expenditure)
  - use tables or digital technologies, such as spreadsheets, to balance income and expenditure 🖨️
  - describe the possible consequences of having insufficient income to meet expenses
  - recognise the need to sometimes save up for an item by putting aside some money
  - calculate the amount needed to reach a savings goal, for example, the amount a person must save each week to buy a new computer at the end of the year
- identify and gather information about the costs of running a home and/or car 📊
  - list the associated costs of running a home or car, for example, home and contents insurance, council rates or other household bills for a home, registration, insurances and ongoing costs, such as fuel and maintenance for a car
  - obtain estimates of these costs from a variety of sources, for example, asking parents, online research
  - plan for purchasing a car or living independently, for example, can they can afford a car or to live independently at this point in their life 🗣️
- interpret common home and/or car bills 📊
  - read and interpret bills, for example, read an electricity bill or a car registration payment notice to identify due dates and payment amounts
  - understand terms commonly used on bills, for example, opening balance, due date 🗣️
  - recognise environmental components of some bills and their purpose, for example, green power charges on an electricity bill or an environmental levy on a car service bill 🗣️
  - identify ways of paying bills, including using online or phone methods
  - discuss advantages and disadvantages of different methods of making payments, for example, paying by credit card is convenient but may incur a surcharge 🗣️
  - calculate in relation to bills, for example, calculate the 10% pay on time discount for an electricity bill, or compare the total annual cost of a car insurance policy if paid monthly and compare this to paying in one lump sum
- investigate available plans for commonly used services, for example, phone, internet or pay TV plans 📊
  - identify personal needs in relation to the service, for example, how much phone data they need 🗣️
  - compare and contrast different plans
  - calculate quantities related to service plans, for example, calculate total annual costs from monthly rates, calculate cost difference between one plan and another
  - choose an appropriate plan for their needs
  - justify their choices or opinions of various plans 🗣️
  - design a personal plan that would exactly meet their own needs 🗣️ 🗣️

## STRAND: STATISTICAL ANALYSIS

### OUTCOMES

**A student:**

- > uses mathematical techniques, reasoning and language to solve problems MA6LS-1
- > uses mathematical symbols, diagrams, graphs and tables to represent information accurately MA6LS-2
- > uses data in a range of formats to ask and answer questions MA6LS-7
- > describes the probability of an event MA6LS-8
- > uses a variety of strategies to communicate mathematical ideas and relationships MA6LS-10
- > applies appropriate skills and techniques, including technology, to investigate, explain and organise information MA6LS-11

**Related Year 11/12 outcomes:** MG11-1, MG11-2, MG11-7, MG11-8, MG11-9, MG11-10, MG1-12-1, MG1-12-2, MG1-12-7, MG1-12-9, MG1-12-10, MG2-12-1, MG2-12-2, MG2-12-7, MG2-12-9, MG2-12-10

### STRAND FOCUS

A knowledge of statistical analysis helps students recognise and describe aspects of their world. With a working understanding of this strand, students develop their ability to predict and draw conclusions from what is happening around them.

### TOPICS

MLS-S1 Statistics  
MLS-S2 Probability

# STATISTICAL ANALYSIS

## MLS-S1 STATISTICS

### OUTCOMES

#### A student:

- > uses mathematical techniques, reasoning and language to solve problems MA6LS-1
- > uses mathematical symbols, diagrams, graphs and tables to represent information accurately MA6LS-2
- > uses data in a range of formats to ask and answer questions MA6LS-7
- > uses a variety of strategies to communicate mathematical ideas and relationships MA6LS-10
- > applies appropriate skills and techniques, including technology, to investigate, explain and organise information MA6LS-11

**Related Year 11/12 outcomes:** MG11-1, MG11-2, MG11-7, MG11-9, MG11-10, MG1-12-1, MG1-12-2, MG1-12-7, MG1-12-9, MG1-12-10, MG2-12-1, MG2-12-2, MG2-12-7, MG2-12-9, MG2-12-10













### TOPIC FOCUS

In this topic students develop the skills related to all steps in the data process; gathering, organising, displaying, analysing and interpreting data.

### CONTENT

#### S1.1: Gather data

Students:

- explore why data is used in everyday life
  - recognise examples of data observable in their everyday life
  - identify the purpose for collecting a set of data, for example, identify why the school canteen staff may want to know the most popular flavour of drink
  - pose a question that may be answered by a set of data
- identify a range of ways that data can be collected to answer a given question, for example, a verbal or written survey, observations, research on the internet  
  - use digital technology to conduct surveys, for example, online survey tools 
  - select the best method to collect desired data 
  - design an appropriate data collection tool for a given purpose 
- explain the need to avoid bias when collecting data and suggest ways to do so  
- read a range of graphs and tables to gather information
- investigate data sets related to a range of cross-curricular focus areas, such as data on the environment, data related to Australia's neighbouring regions and cultures, and local, state and national census data from the Australian Bureau of Statistics     



### S1.2: Organise and display data

Students:

- record collected data using a variety of means, for example, with tally marks, concrete materials, symbols or digital technologies
- order and sort numbers, using terms such as ascending, descending, 'from 1 to 10 inclusive' 🗃️
- order and sort data into groups, categories or ranges
- complete pre-constructed data tables either on paper or digitally, for example, a spreadsheet
- construct frequency tables and make calculations related to these, for example, calculate total for the frequency column
- identify common features of graphs including heading, scale, key, axes, labels and locate these on graphs
- assess the accuracy and fairness of a graph, for example, check if it has all necessary key features and is free of bias or misleading information ⚙️ 📊
- choose the most appropriate display for a data set, for example, picture graphs, column graphs, line graphs ⚙️
- construct a line, picture or column graph
  - use correct graphing techniques, such as equal (measured) spacing, ruling of lines
  - include all relevant, commonly accepted features of graphs
  - plot points or measure columns accurately as required
  - use graph paper to assist with creating graphs
  - use digital technologies to create a range of graphs 🖨️

### S1.3: Analyse and interpret data

Students:

- ask and answer questions about a set of data in general terms, for example, pose or answer questions based on the information displayed in a graph or table ⚙️
- recognise that the terms 'mean' and 'average' describe the same concept in everyday use 🗃️
- calculate the range for a simple data set and discuss its meaning
- calculate mean, median and mode for a simple data set and discuss each concept
- use statistical calculations to investigate data in work or other everyday situations, for example, calculate the mean pay for the workers at a business, find the most popular day to go to the movies (mode) or calculate the age range in a family group ⚙️
  - compare means and medians in a range of contexts, for example, discuss why the mean house price in a suburb might be much higher than the median house price if there is an unusually expensive sale, or compare mean (or median) incomes for females and males ⚙️ #
- interpret graphs, tables and data sets from a variety of common sources, such as newspapers, television or the internet 🖨️ 📺 🌐
  - recognise and describe trends in data, for example, recognise that the average income in a profession is increasing over a number of years ⚙️ ⚙️
  - interpret information about a data set and use it to draw conclusions, for example, given the average age of the workers at an organisation, discuss what this means and how it might affect the organisation ⚙️ 🗃️ ⚙️
  - use information to extrapolate or make predictions from data, for example, be able to predict what will happen to the population of a certain native Australian species if current trends continue ↴️ ⚙️ 🗃️
- present findings of a statistical investigation using a range of strategies and technologies

# STATISTICAL ANALYSIS

## MLS-S2 PROBABILITY

### OUTCOMES

#### A student:

- > uses mathematical techniques, reasoning and language to solve problems MA6LS-1
- > uses mathematical symbols, diagrams, graphs and tables to represent information accurately MA6LS-2
- > describes the probability of an event MA6LS-8
- > uses a variety of strategies to communicate mathematical ideas and relationships MA6LS-10
- > applies appropriate skills and techniques, including technology, to investigate, explain and organise information MA6LS-11

**Related Year 11/12 outcomes:** MG11-1, MG11-2, MG11-8, MG11-9, MG11-10, MG1-12-1, MG1-12-2, MG1-12-9, MG1-12-10, MG2-12-1, MG2-12-2, MG2-12-9, MG2-12-10


### TOPIC FOCUS

The focus of this topic is on developing an understanding of the language and elements of chance and probability and applying this in real situations. Fraction concepts are reviewed first to help give students the skills to express probabilities mathematically.

### CONTENT

#### S2.1: Fraction concepts and calculations

Students:

- review fraction concepts
  - identify that a fraction represents a number of equal parts out of a whole
  - interpret the numerator as the number of equal fractional parts and the denominator as the number of equal parts the whole has been divided into, for example,  $\frac{3}{4}$  means three out of four equal parts
  - express fractions using a variety of strategies, such as concrete materials, diagrams and numerals
  - represent fractions for given situations, for example, write the fraction  $\frac{1}{4}$  when a quarter of a shape is shaded in or express 50c as  $\frac{1}{2}$  of a dollar
  - compare fractions, for example, recognise that half of something is more than a quarter of it
  - recognise how many parts are needed to make a whole or 100%, for example, four quarters = one whole
- divide diagrams, objects, groups of objects or numbers into fractional parts, for example, divide a group of objects into thirds, shade in half of a circle or calculate a quarter of \$20
- calculate simple fraction additions and subtractions, using concrete materials, diagrams, formal recording methods or calculators 
- represent decimals as fractions of 10, 100 etc., for example,  $0.3 = \frac{3}{10}$
- represent percentages as fractions of 100, for example,  $40\% = \frac{40}{100}$

## S2.2: Probability

Students:

- review the concepts and language of probability
  - understand and use terms such as certain, likely, probably, unlikely 🗨️
  - recognise the elements of chance in everyday events
  - realise that some events are entirely related to chance, for example, tossing a coin, whereas others might have only some elements of chance, for example, winning a card game can be a combination of chance and skill
  - recognise that the range of probabilities is from 0 to 1, or from 0 to 100% in percentage terms
  - order events based on their probability, for example, from least to most likely
  - understand the term random as applied to probability, for example, 'a box is selected at random' 🗨️
  - recognise equally likely events, for example, getting heads or tails on a coin and non-equally likely events, for example, randomly selecting a boy or a girl from a class with unequal numbers of each
- represent probabilities using a range of notations including words, fractions, ratios and percentages 🗨️
- identify simple theoretical probabilities for events, for example, recognise that rolling a die gives a 1 in 6 chance of getting a 5, or there is a 50% chance of getting heads when tossing a coin
  - conduct experiments to determine the experimental probability of an event, for example, roll a die 20 times and record and communicate the result using a suitable strategy (eg graph or table)
  - draw conclusions or make predictions from the results of probability experiments ⚙️
  - compare theoretical probabilities with the results of experiments and discuss why the experimental result and the theoretical result may not match ⚙️
- compare the likelihood of events based on their frequency, for example that selecting a heart from a pack of cards (13 hearts) is less likely than selecting a black card (26 black cards)
- compare the likelihood of events based on their numerical probability, for example that rolling a six on a die (one out of six) is less likely than rolling an odd number (one out of two)
- identify possible causes of bias or inaccuracy in probability experiments ⚙️ 📊
- relate probability to gambling and discuss issues and potential problems related to gambling 🎰
- research the actual probability of winning in common gambling scenarios in Australia using the internet, for example, instant lotteries 🖥️ 🗨️

## STRAND: NETWORKS

### OUTCOMES

**A student:**

- > uses mathematical techniques, reasoning and language to solve problems MA6LS-1
- > uses mathematical symbols, diagrams, graphs and tables to represent information accurately MA6LS-2
- > estimates and measures using appropriate tools, units and level of accuracy MA6LS-3
- > uses plans, maps, networks and timetables effectively in a range of everyday contexts and situations MA6LS-9
- > uses a variety of strategies to communicate mathematical ideas and relationships MA6LS-10
- > applies appropriate skills and techniques, including technology, to investigate, explain and organise information MA6LS-11

**Related Year 11/12 outcomes:** MG11-1, MG11-2, MG11-3, MG11-9, MG11-10, MG1-12-1, MG1-12-2, MG1-12-3, MG1-12-8, MG1-12-9, MG1-12-10, MG2-12-1, MG2-12-2, MG2-12-3, MG2-12-8, MG2-12-9, MG2-12-10

### STRAND FOCUS

Plans, maps and networks are tools that assist us to understand, model and operate effectively in our world. Developing the skills to use these helps students to work and travel efficiently and independently.

### TOPICS

MLS-P1 Using plans, maps and networks

## NETWORKS

### MLS-P1 USING PLANS, MAPS AND NETWORKS

#### OUTCOMES

**A student:**

- > uses mathematical techniques, reasoning and language to solve problems MA6LS-1
- > uses mathematical symbols, diagrams, graphs and tables to represent information accurately MA6LS-2
- > estimates and measures using appropriate tools, units and level of accuracy MA6LS-3
- > uses plans, maps, networks and timetables effectively in a range of everyday contexts and situations MA6LS-9
- > uses a variety of strategies to communicate mathematical ideas and relationships MA6LS-10
- > applies appropriate skills and techniques, including technology, to investigate, explain and organise information MA6LS-11

**Related Year 11/12 outcomes:** MG11-1, MG11-2, MG11-3, MG11-9, MG11-10, MG1-12-1, MG1-12-2, MG1-12-3, MG1-12-8, MG1-12-9, MG1-12-10, MG2-12-1, MG2-12-2, MG2-12-3, MG2-12-8, MG2-12-9, MG2-12-10



#### TOPIC FOCUS

This topic is about interpreting and using plans, maps and simple networks in everyday situations.

#### CONTENT

**P1.1: Plans**

Students:

- use the language of position, such as behind, inside, above, left, opposite 
- recognise that plans, maps and networks represent real things, such as regions, buildings or transport systems
- identify typical features that are represented on a plan, for example, identify doors on a building plan
  - interpret the key (legend) on a plan 
- interpret plans to locate positions or gather information, for example, read a plan of their school to find out how many classrooms are in a block, or use a plan of a theatre to locate their allocated seat
- construct simple plans, for example, complete a floor plan of their classroom using models or drawings
  - construct items by following plans, for example, make a paper plane by copying a template, or put together a flat-pack cupboard by following a construction plan
- recognise different elevation views of a building and match elevation drawings to aspects of a building
- demonstrate an understanding of the concept of a scale drawing
  - recognise the relationship between scaled and actual distances on a plan, for example, recognise that if a plan's scale is '1:100', or '1 cm represents 1 m', then a 3 cm wide room on a building plan is a 3 m wide room in reality

### P1.2: Maps

Students:

- recognise a variety of maps, such as historical maps, topological maps, maps from different cultural traditions, or maps that use digital technology 🗺️📱🌐
- identify typical features of a map, for example, key, scale, grid, compass rose
- develop skills in using maps
  - read and use a map key (legend) 🗺️
  - locate something or describe the location of something on a map using grid references or other techniques, such as reference to known landmarks
  - identify directions on a map in a variety of ways, including using compass directions, for example, north, south-west and their abbreviations, or terms, such as left and right 🗺️
  - read distances directly from the map or from a related table of distances
  - use scales to determine distances between places
  - give and follow directions using a map 🗺️
- create simple maps, such as a sketch map showing the way from one place in the school to another 🗺️📱
- recognise that the shortest or fastest route is not always the best route and discuss why
- solve problems involving maps, for example, identify or calculate distances and travel times between two places and determine if they can get to a given place within a timeframe

### P1.3: Networks

Students:

- recognise what is represented by a diagram of a network, for example, recognise that a diagram of a bus network is showing how the bus routes are linked
  - recognise a range of types of networks, for example, train or bus networks, road networks, social networks
- distinguish between a network diagram and a map
- identify how different parts of a network are linked, either directly or indirectly, for example, identify a road between two towns from a road network, or describe the relationship between two people from a social network 🗺️📱
- identify a number of possible paths to get from one place in a network to another, for example, identify possible travel routes between two places 🗺️
- use personal networks to solve simple problems, for example, using a network diagram of undercover routes between buildings within the school, plot a route to walk from one place to another without getting wet on a rainy day 🗺️📱
- investigate and solve problems in given networks, such as how to visit each point in a network without retracing any paths (eg the Königsberg Bridge Problem), or finding the most efficient route around a paper delivery run 🗺️
- construct a simple network, for example, represent their family network using photos or draw a road network given a map of their area 🗺️📱
- solve problems involving networks, for example, plan an efficient travel route, such as a walking tour to visit the major landmarks in a city without retracing paths, or use airline, train, bus or road network diagrams to identify the route that best meets a set of criteria, such as 'which train line should I take if I want to get from A to B' 🗺️📱