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Introduction

Stage 6 Curriculum

NSW Education Standards Authority (NESA) Stage 6 syllabuses have been developed to provide students with opportunities to further develop skills which will assist in the next stage of their lives.

The purpose of Stage 6 syllabuses is to:
- develop a solid foundation of literacy and numeracy
- provide a curriculum structure which encourages students to complete secondary education at their highest possible level
- foster the intellectual, creative, ethical and social development of students, in particular relating to:
  - application of knowledge, skills, understanding, values and attitudes in the fields of study they choose
  - capacity to manage their own learning and to become flexible, independent thinkers, problem-solvers and decision-makers
  - capacity to work collaboratively with others
  - respect for the cultural diversity of Australian society
  - desire to continue learning in formal or informal settings after school
- provide a flexible structure within which students can meet the challenges of and prepare for:
  - further academic study, vocational training and employment
  - changing workplaces, including an increasingly STEM focused (Science, Technology, Engineering and Mathematics) workforce
  - full and active participation as global citizens
- provide formal assessment and certification of students' achievements
- promote the development of students' values, identity and self-respect.

The Stage 6 syllabuses reflect the principles of the NESA K–10 Curriculum Framework and Statement of Equity Principles, the reforms of the NSW Government Stronger HSC Standards (2016), and nationally agreed educational goals. These syllabuses build on the continuum of learning developed in the K–10 syllabuses.

The syllabuses provide a set of broad learning outcomes that summarise the knowledge, understanding, skills, values and attitudes important for students to succeed in and beyond their schooling. In particular, the attainment of skills in literacy and numeracy needed for further study, employment and active participation in society are provided in the syllabuses in alignment with the Australian Core Skills Framework (ACSF).

The Stage 6 syllabuses include the content of the Australian curriculum and additional descriptions that clarify the scope and depth of learning in each subject.

NESA syllabuses support a standards-referenced approach to assessment by detailing the important knowledge, understanding, skills, values and attitudes students will develop and outlining clear standards of what students are expected to know and be able to do. The syllabuses take into account the diverse needs of all students and provide structures and processes by which teachers can provide continuity of study for all students.
Diversity of Learners

NSW Stage 6 syllabuses are inclusive of the learning needs of all students. Syllabuses accommodate teaching approaches that support student diversity including students with special education needs, gifted and talented students, and students learning English as an additional language or dialect (EAL/D). Students may have more than one learning need.

Students with Special Education Needs

All students are entitled to participate in and progress through the curriculum. Schools are required to provide additional support or adjustments to teaching, learning and assessment activities for some students with special education needs. Adjustments are measures or actions taken in relation to teaching, learning and assessment that enable a student with special education needs to access syllabus outcomes and content, and demonstrate achievement of outcomes.

Students with special education needs can access the outcomes and content from Stage 6 syllabuses in a range of ways. Students may engage with:
- Stage 6 syllabus outcomes and content with adjustments to teaching, learning and/or assessment activities; or
- selected Stage 6 Life Skills outcomes and content from one or more Stage 6 Life Skills syllabuses.

Decisions regarding curriculum options, including adjustments, should be made in the context of collaborative curriculum planning with the student, parent/carer and other significant individuals to ensure that decisions are appropriate for the learning needs and priorities of individual students.

Further information can be found in support materials for:
- Mathematics Life Skills
- Special education needs
- Life Skills.

Gifted and Talented Students

Gifted students have specific learning needs that may require adjustments to the pace, level and content of the curriculum. Differentiated educational opportunities assist in meeting the needs of gifted students.

Generally, gifted students demonstrate the following characteristics:
- the capacity to learn at faster rates
- the capacity to find and solve problems
- the capacity to make connections and manipulate abstract ideas.

There are different kinds and levels of giftedness. Gifted and talented students may also possess learning difficulties and/or disabilities that should be addressed when planning appropriate teaching, learning and assessment activities.
Curriculum strategies for gifted and talented students may include:

- differentiation: modifying the pace, level and content of teaching, learning and assessment activities
- acceleration: promoting a student to a level of study beyond their age group
- curriculum compacting: assessing a student's current level of learning and addressing aspects of the curriculum that have not yet been mastered.

School decisions about appropriate strategies are generally collaborative and involve teachers, parents and students, with reference to documents and advice available from NESA and the education sectors.

Gifted and talented students may also benefit from individual planning to determine the curriculum options, as well as teaching, learning and assessment strategies, most suited to their needs and abilities.

**Students Learning English as an Additional Language or Dialect (EAL/D)**

Many students in Australian schools are learning English as an additional language or dialect (EAL/D). EAL/D students are those whose first language is a language or dialect other than Standard Australian English and who require additional support to assist them to develop English language proficiency.

EAL/D students come from diverse backgrounds and may include:

- overseas and Australian-born students whose first language is a language other than English, including creoles and related varieties
- Aboriginal and Torres Strait Islander students whose first language is Aboriginal English, including Kriol and related varieties.

EAL/D students enter Australian schools at different ages and stages of schooling and at different stages of English language learning. They have diverse talents and capabilities and a range of prior learning experiences and levels of literacy in their first language and in English. EAL/D students represent a significant and growing percentage of learners in NSW schools. For some, school is the only place they use Standard Australian English.

EAL/D students are simultaneously learning a new language and the knowledge, understanding and skills of the *Mathematics Life Skills Stage 6 Syllabus* through that new language. They may require additional support, along with informed teaching that explicitly addresses their language needs.

The *ESL Scales* and the *English as an Additional Language or Dialect: Teacher Resource* provide information about the English language development phases of EAL/D students. These materials and other resources can be used to support the specific needs of English language learners and to assist students to access syllabus outcomes and content.
Mathematics Life Skills Key

The following codes and icons are used in the *Mathematics Life Skills Stage 6 Syllabus*.

**Outcome Coding**

Syllabus outcomes have been coded in a consistent way. The code identifies the subject, Year and outcome number. For example:

<table>
<thead>
<tr>
<th>Outcome code</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALS6-6</td>
<td>Mathematics Life Skills, Stage 6 – Outcome number 6</td>
</tr>
<tr>
<td>MS11-1</td>
<td>Mathematics Standard, Year 11 – Outcome number 1</td>
</tr>
<tr>
<td>MS1-12-4</td>
<td>Mathematics Standard 1, Year 12 – Outcome number 4</td>
</tr>
<tr>
<td>MS2-12-5</td>
<td>Mathematics Standard 2, Year 12 – Outcome number 5</td>
</tr>
</tbody>
</table>
Learning Across the Curriculum Icons

Learning across the curriculum content, including cross-curriculum priorities, general capabilities and other areas identified as important learning for all students, is incorporated and identified by icons in the syllabus.

Cross-curriculum priorities
- 🌍 Aboriginal and Torres Strait Islander histories and cultures
- 🌍 Asia and Australia's engagement with Asia
- 🌍 Sustainability

General capabilities
- 🎯 Critical and creative thinking
- 🏛 Ethical understanding
- 📏 Information and communication technology capability
- 🌍 Intercultural understanding
- 📚 Literacy
- 📈 Numeracy
- 🌐 Personal and social capability

Other learning across the curriculum areas
- 🗻 Civics and citizenship
- 🌿 Difference and diversity
- 🌿 Work and enterprise
Mathematics Life Skills Stage 6

The Mathematics Life Skills Stage 6 Syllabus aligns with the rationale, aim, objectives and outcomes of the Mathematics Standard Stage 6 Syllabus. The Life Skills content has been developed from the Mathematics Standard syllabus to provide opportunities for integrated course delivery.

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 based on the needs, strengths, goals, interests and prior learning 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 Life Skills
● Special education needs
● Life Skills.
Rationale

The Mathematics Life Skills Stage 6 Syllabus rationale is consistent with the Mathematics Standard Stage 6 Syllabus rationale. The Mathematics Standard rationale is provided below.

Mathematics is the study of order, relation, pattern, uncertainty and generality and is underpinned by observation, logical reasoning and deduction. From its origin in counting and measuring, its development throughout history has been catalysed by its utility in explaining real-world phenomena and its inherent beauty. It has evolved in sophisticated ways to become the language now used to describe many aspects of the modern world.

Mathematics is an interconnected subject that involves understanding and reasoning about concepts and the relationships between those concepts. It provides a framework for thinking and a means of communication that is powerful, logical, concise and precise.

The Stage 6 Mathematics syllabuses are designed to offer opportunities for students to think mathematically. Mathematical thinking is supported by an atmosphere of questioning, communicating, reasoning and reflecting and is engendered by opportunities to generalise, challenge, find connections and to think critically and creatively.

All Stage 6 Mathematics syllabuses provide opportunities to develop students’ 21st-century knowledge, skills, understanding, values and attitudes. As part of this, in all courses students are encouraged to learn to use appropriate technology as an effective support for mathematical activity.

The Mathematics Life Skills course focuses on developing fundamental mathematics skills for life and applying these effectively in meaningful contexts. Students engage with number to develop number sense and basic numeracy skills, which they can use to solve problems in a range of contexts. The course allows students to further develop and apply their knowledge, skills and understanding in real-life situations, further increasing the relevance of the course for students in everyday and post-school life.

The Mathematics Standard courses are focused on enabling students to use mathematics effectively, efficiently and critically to make informed decisions in their daily lives. They provide students with the opportunities to develop an understanding of, and competence in, further aspects of mathematics through a large variety of real-world applications for a range of concurrent HSC subjects.

Mathematics Standard 1 is designed to help students improve their numeracy by building their confidence and success in making mathematics meaningful. Numeracy is more than being able to operate with numbers. It requires mathematical knowledge and understanding, mathematical problem-solving skills and literacy skills, as well as positive attitudes. When students become numerate they are able to manage a situation or solve a problem in real contexts, such as everyday life, work or further learning. This course offers students the opportunity to prepare for post-school options of employment or further training.

Mathematics Standard 2 is designed for those students who want to extend their mathematical skills beyond Stage 5 but will not benefit from a knowledge of calculus. This course offers students the opportunity to prepare for a wide range of educational and employment aspirations, including continuing their studies at a tertiary level.
### The Place of the Mathematics Life Skills Stage 6 Syllabus in the K–12 Curriculum

**Prior-to-school learning**
Students bring to school a range of knowledge, understanding and skills developed in home and prior-to-school settings. The movement into Early Stage 1 should be seen as a continuum of learning and planned appropriately.

The *Early Years Learning Framework for Australia* describes a range of opportunities for students to develop a foundation for future success in learning.

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**MANDATORY STUDY**

**Early Stage 1 – Stage 3**
Mathematics K–10

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**MANDATORY STUDY**

**Stage 4**
Mathematics K–10
(including Life Skills outcomes and content)

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**ELECTIVE STUDY**

**Stage 6**
(Years 11–12)

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**Mathematics Life Skills**  | **Year 11 Mathematics Standard** | **Year 11 Mathematics Advanced** | **Year 11 Mathematics Extension**
--- | --- | --- | ---
**Mathematics Life Skills**  | **Year 12 Mathematics Standard 1** | **Year 12 Mathematics Standard 2** | **Year 12 Mathematics Advanced** | **Year 12 Mathematics Extension 1** | **Year 12 Mathematics Extension 2**

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Community, other education and learning and workplace pathways
Aim

The Mathematics Life Skills Stage 6 Syllabus aim is consistent with the Mathematics Standard Stage 6 Syllabus aim. The Mathematics Standard aim is provided below.

The study of Mathematics Standard in Stage 6 enables students to develop their knowledge and understanding of what it means to work mathematically, improve their skills to solve problems relating to their present and future needs and aspirations, and improve their understanding of how to communicate in a concise and systematic manner.
Objectives

Knowledge, Understanding and Skills

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
- 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
- develop the ability to use mathematical skills and techniques, aided by appropriate technology, to organise information and interpret practical situations
- develop the ability to interpret and communicate mathematics in a variety of written and verbal forms, including diagrams and graphs.

Values and Attitudes

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.
Outcomes

Table of Objectives and Outcomes – Continuum of Learning

For students undertaking Mathematics Life Skills:
- 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.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Students:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>● 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</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Life Skills outcomes</th>
<th>A student:</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALS6-1</td>
<td>explores mathematical concepts, reasoning and language to solve problems</td>
</tr>
<tr>
<td>MALS6-2</td>
<td>engages with mathematical symbols, diagrams, graphs and tables to represent information accurately</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objective</th>
<th>Students:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>● 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</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Life Skills outcomes</th>
<th>A student:</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALS6-3</td>
<td>engages with appropriate tools, units and levels of accuracy in measurement</td>
</tr>
<tr>
<td>MALS6-4</td>
<td>explores contexts of everyday measurement</td>
</tr>
<tr>
<td>MALS6-5</td>
<td>demonstrates understanding of money</td>
</tr>
<tr>
<td>MALS6-6</td>
<td>explores money management and financial decision-making</td>
</tr>
<tr>
<td>MALS6-7</td>
<td>demonstrates understanding of number and patterns in a range of contexts</td>
</tr>
<tr>
<td>MALS6-8</td>
<td>solves problems using number and patterns in real-life situations</td>
</tr>
<tr>
<td>MALS6-9</td>
<td>uses data in a range of contexts</td>
</tr>
<tr>
<td>MALS6-10</td>
<td>explores probability in a range of contexts</td>
</tr>
<tr>
<td>MALS6-11</td>
<td>explores plans, maps, networks and timetables</td>
</tr>
<tr>
<td>MALS6-12</td>
<td>engages with plans, maps, networks and timetables effectively in a range of everyday contexts and situations</td>
</tr>
</tbody>
</table>
### 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:
**MALS6-13** engages with mathematical skills and techniques, including technology, to investigate, explain and organise information

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

### Life Skills outcome
A student:
**MALS6-14** communicates mathematical ideas and relationships using a variety of strategies
Mathematics Life Skills Stage 6 and Related Mathematics Standard Stage 6 Syllabus Outcomes

The Mathematics Life Skills Stage 6 outcomes align with the outcomes of the *Mathematics Standard Stage 6 Syllabus* to provide opportunities for integrated delivery.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Related Mathematics Standard outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>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</td>
<td>A student:</td>
</tr>
<tr>
<td>Life Skills outcomes</td>
<td>Related Mathematics Standard outcomes</td>
</tr>
<tr>
<td>A student:</td>
<td>A student:</td>
</tr>
<tr>
<td><strong>MALS6-1</strong> explores mathematical concepts, reasoning and language to solve problems</td>
<td><strong>MS11-1</strong> uses algebraic and graphical techniques to compare alternative solutions to contextual problems</td>
</tr>
<tr>
<td></td>
<td><strong>MS1-12-1</strong> uses algebraic and graphical techniques to evaluate and construct arguments in a range of familiar and unfamiliar contexts</td>
</tr>
<tr>
<td></td>
<td><strong>MS2-12-1</strong> uses detailed algebraic and graphical techniques to critically evaluate and construct arguments in a range of familiar and unfamiliar contexts</td>
</tr>
<tr>
<td><strong>MALS6-2</strong> engages with mathematical symbols, diagrams, graphs and tables to represent information accurately</td>
<td><strong>MS11-2</strong> represents information in symbolic, graphical and tabular form</td>
</tr>
<tr>
<td></td>
<td><strong>MS1-12-2</strong> analyses representations of data in order to make predictions and draw conclusions</td>
</tr>
<tr>
<td></td>
<td><strong>MS2-12-2</strong> analyses representations of data in order to make inferences, predictions and draw conclusions</td>
</tr>
</tbody>
</table>
**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

<table>
<thead>
<tr>
<th>Life Skills outcomes</th>
<th>Related Mathematics Standard outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A student:</strong></td>
<td><strong>A student:</strong></td>
</tr>
<tr>
<td><strong>MALS6-3</strong> engages with appropriate tools, units and levels of accuracy in measurement</td>
<td><strong>MS11-3</strong> solves problems involving quantity measurement, including accuracy and the choice of relevant units</td>
</tr>
<tr>
<td></td>
<td><strong>MS1-12-3</strong> interprets the results of measurements and calculations and makes judgements about their reasonableness</td>
</tr>
<tr>
<td></td>
<td><strong>MS2-12-3</strong> interprets the results of measurements and calculations and makes judgements about their reasonableness, including the degree of accuracy and the conversion of units where appropriate</td>
</tr>
<tr>
<td><strong>MALS6-4</strong> explores contexts of everyday measurement</td>
<td><strong>MS11-4</strong> performs calculations in relation to two-dimensional figures</td>
</tr>
<tr>
<td></td>
<td><strong>MS1-12-4</strong> analyses simple two-dimensional models to solve practical problems</td>
</tr>
<tr>
<td></td>
<td><strong>MS2-12-4</strong> analyses two-dimensional and three-dimensional models to solve practical problems</td>
</tr>
<tr>
<td><strong>MALS6-5</strong> demonstrates understanding of money</td>
<td><strong>MS11-5</strong> models relevant financial situations using appropriate tools</td>
</tr>
<tr>
<td><strong>MALS6-6</strong> explores money management and financial decision-making</td>
<td><strong>MS1-12-5</strong> makes informed decisions about financial situations likely to be encountered post-school</td>
</tr>
<tr>
<td></td>
<td><strong>MS2-12-5</strong> makes informed decisions about financial situations, including annuities and loan repayments</td>
</tr>
</tbody>
</table>
**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

<table>
<thead>
<tr>
<th>Life Skills outcomes</th>
<th>Related Mathematics Standard outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A student:</strong></td>
<td><strong>A student:</strong></td>
</tr>
<tr>
<td>MALS6-7 demonstrates understanding of number and patterns in a range of contexts</td>
<td>MS11-6 makes predictions about everyday situations based on simple mathematical models</td>
</tr>
<tr>
<td>MALS6-8 solves problems using number and patterns in real-life situations</td>
<td>MS1-12-6 represents the relationships between changing quantities in algebraic and graphical forms</td>
</tr>
<tr>
<td>MALS6-9 uses data in a range of contexts</td>
<td>MS2-12-6 solves problems by representing the relationships between changing quantities in algebraic and graphical forms</td>
</tr>
<tr>
<td>MALS6-10 explores probability in a range of contexts</td>
<td>MS11-7 develops and carries out simple statistical processes to answer questions posed</td>
</tr>
<tr>
<td>MALS6-11 explores plans, maps, networks and timetables</td>
<td>MS1-12-7 solves problems requiring statistical processes</td>
</tr>
<tr>
<td>MALS6-12 engages with plans, maps, networks and timetables effectively in a range of everyday contexts and situations</td>
<td>MS2-12-7 solves problems requiring statistical processes, including the use of the normal distribution and the correlation of bivariate data</td>
</tr>
<tr>
<td></td>
<td>MS11-8 solves probability problems involving multi-stage events</td>
</tr>
<tr>
<td></td>
<td>MS1-12-8 applies network techniques to solve network problems</td>
</tr>
<tr>
<td></td>
<td>MS2-12-8 solves problems using networks to model decision-making in practical problems</td>
</tr>
</tbody>
</table>
### Objectives
Students:
- develop the ability to use mathematical skills and techniques, aided by appropriate technology, to organise information and interpret practical situations

<table>
<thead>
<tr>
<th>Life Skills outcome</th>
<th>Related Mathematics Standard outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A student:</td>
<td>A student:</td>
</tr>
<tr>
<td>MALS6-13 engages with mathematical skills and techniques, including technology, to investigate, explain and organise information</td>
<td>MS11-9 uses appropriate technology to investigate, organise and interpret information in a range of contexts</td>
</tr>
<tr>
<td></td>
<td>MS1-12-9 chooses and uses appropriate technology effectively and recognises appropriate times for such use</td>
</tr>
<tr>
<td></td>
<td>MS2-12-9 chooses and uses appropriate technology effectively in a range of contexts, and applies critical thinking to recognise appropriate times and methods for such use</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Life Skills outcome</th>
<th>Related Mathematics Standard outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A student:</td>
<td>A student:</td>
</tr>
<tr>
<td>MALS6-14 communicates mathematical ideas and relationships using a variety of strategies</td>
<td>MS11-10 justifies a response to a given problem using appropriate mathematical terminology and/or calculations</td>
</tr>
<tr>
<td></td>
<td>MS1-12-10 uses mathematical argument and reasoning to evaluate conclusions, communicating a position clearly to others</td>
</tr>
<tr>
<td></td>
<td>MS2-12-10 uses mathematical argument and reasoning to evaluate conclusions, communicating a position clearly to others and justifying a response</td>
</tr>
</tbody>
</table>
# Course Structure

The course is organised in topics, with the topics divided into subtopics.

<table>
<thead>
<tr>
<th>Year 11 (120 hours)</th>
<th>Mathematics Life Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Topics</td>
</tr>
<tr>
<td></td>
<td>Number and Modelling (Algebra)</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td>Measurement</td>
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<td></td>
<td>Financial Mathematics</td>
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</tr>
<tr>
<td></td>
<td>Statistics and Probability (Statistical Analysis)</td>
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<tr>
<td></td>
<td>Plans, Maps and Networks (Networks)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 12 (120 hours)</th>
<th>Mathematics Life Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Topics</td>
</tr>
<tr>
<td></td>
<td>Financial Mathematics</td>
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<td></td>
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<tr>
<td></td>
<td>Statistics and Probability (Statistical Analysis)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plans, Maps and Networks (Networks)</td>
</tr>
</tbody>
</table>

For Mathematics Life Skills:
- Students are not required to address or achieve all of the Mathematics Life Skills outcomes.
- Students are not required to complete all of the content to demonstrate achievement of an outcome.
- Outcomes and content should be selected to meet the particular needs of individual students.
- The topics provide possible frameworks for addressing the Mathematics Life Skills outcomes and content, and are suggestions only. Each topic provides possible subtopics for study of the content. Teachers have the flexibility to develop subtopics that will meet the needs, strengths, goals, interests and prior learning of their students.
- Examples provided under content points are suggestions only. Teachers may use the examples provided or develop other examples to meet the particular needs of individual students.
Assessment and Reporting

A student undertaking Mathematics Life Skills will study selected outcomes and content, as identified through the collaborative curriculum planning process. The syllabus outcomes and content form the basis of learning opportunities for students.

Assessment should provide opportunities for students to demonstrate achievement in relation to the outcomes and to apply their knowledge, understanding and skills to a range of situations or environments, including the school and the wider community.

Evidence of student achievement of Life Skills outcomes can be based on a range of assessment for learning opportunities. There is no requirement for formal assessment of Life Skills outcomes. Schools are not required to report achievement using the Preliminary Common Grade Scale or assessment marks.

This information should be read in conjunction with requirements on the Assessment Certification Examination (ACE) website.

Additional advice is available in the Principles of Assessment for Stage 6.
Content

Content in Stage 6 Life Skills syllabuses is suggested. Content describes the intended learning for students as they work towards achieving one or more syllabus outcomes. It provides the foundations for students to progress to the next stage of schooling or post-school opportunities.

Teachers will make decisions about the choice of outcomes and selection of content regarding the sequence, emphasis and any adjustments required based on the needs, strengths, goals, interests and prior learning of students.

Organisation of Content

The following diagram provides an illustrative representation of elements of the course and their relationship.
Working Mathematically

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

Working Mathematically is integral to the learning process in mathematics. Where appropriate, students should be provided with opportunities to develop the components of Working Mathematically by participating in a range of learning experiences.
Learning Across the Curriculum

Learning across the curriculum content, including the cross-curriculum priorities and general capabilities, assists students to achieve the broad learning outcomes defined in the NESA Statement of Equity Principles, the Melbourne Declaration on Educational Goals for Young Australians (December 2008) and in the Australian Government’s Core Skills for Work Developmental Framework (2013).

Cross-curriculum priorities enable students to develop understanding about and address the contemporary issues they face.

The cross-curriculum priorities are:
● Aboriginal and Torres Strait Islander histories and cultures
● Asia and Australia’s engagement with Asia
● Sustainability

General capabilities encompass the knowledge, skills, attitudes and behaviours to assist students to live and work successfully in the 21st century.

The general capabilities are:
● Critical and creative thinking
● Ethical understanding
● Information and communication technology capability
● Intercultural understanding
● Literacy
● Numeracy
● Personal and social capability

NESA syllabuses include other areas identified as important learning for all students:
● Civics and citizenship
● Difference and diversity
● Work and enterprise

Learning across the curriculum content is incorporated, and identified by icons, in the content of the Mathematics Life Skills Stage 6 Syllabus in the following ways.
Aboriginal and Torres Strait Islander Histories and Cultures

Across the topics of the syllabus, students can experience the significance of mathematics in Aboriginal and Torres Strait Islander histories and cultures. Opportunities are provided to connect mathematics with Aboriginal and Torres Strait Islander Peoples’ cultural, linguistic and historical experiences. The development of mathematics and its integration with cultural development can be explored in the context of some topics.

When planning and programming content relating to Aboriginal and Torres Strait Islander histories and cultures teachers are encouraged to:

- involve local Aboriginal communities and/or appropriate knowledge holders in determining suitable resources, or to use Aboriginal or Torres Strait Islander authored or endorsed publications
- read the Principles and Protocols relating to teaching and learning about Aboriginal and Torres Strait Islander histories and cultures and the involvement of local Aboriginal communities.

Asia and Australia’s Engagement with Asia

Students have the opportunity to learn about the understandings and application of mathematics in Asia and the way mathematicians from Asia continue to contribute to the ongoing development of mathematics. By drawing on knowledge of and examples from the Asia region, such as calculation, money, art, architecture, design and travel, students can develop mathematical understanding in fields such as number, patterns, measurement, symmetry, statistics and networks.

Sustainability

Mathematics provides a foundation for the exploration of issues of sustainability. Students have the opportunity to learn about the mathematics underlying topics in sustainability, such as energy use and how to reduce it. Students engage in activities to reflect on the effect of their actions on energy use, as well as the effect of household appliances. Investigating energy use, students can consider sustainability changes over time and develop a deeper appreciation of the world around them.

Critical and Creative Thinking

Critical and creative thinking are key to the development of mathematical understanding. Students are encouraged to be critical thinkers by thinking about and justifying their choice of a calculation strategy or identifying relevant questions during an investigation. They are encouraged to look for alternative ways to approach mathematical problems, for example identifying when a problem is similar to a previous one, drawing diagrams or modelling a situation using hands-on resources. Students are encouraged to be creative in their approach to solving new problems, by combining the skills and knowledge they have acquired in their study of a number of different topics, within a new context.

Ethical Understanding

Students have opportunities to explore, develop and apply ethical understanding to mathematics in a range of contexts. Examples include collecting, displaying and interpreting data, as well as examining the selective use of data and bias in the reporting of information.
Information and Communication Technology Capability

Mathematics provides opportunities for students to develop their ICT capacity when they investigate; create and communicate mathematical ideas and concepts using fast, automated, interactive and multimodal technologies. Students can use their ICT capability to perform calculations; draw graphs; collect, manage, analyse and interpret data; share and exchange information and ideas; and investigate and model relationships. Digital technologies, such as calculators, spreadsheets, dynamic geometry software, graphing software and computer algebra software, can engage students and promote understanding of key concepts.

Intercultural Understanding

Students have opportunities to understand that mathematical expressions use universal symbols, while mathematical knowledge has its origin in many cultures. Students may recognise that proficiencies such as understanding, fluency, reasoning and problem-solving are not culture- or language-specific, but that mathematical reasoning and understanding can find different expression in different cultures and languages. The curriculum provides contexts for exploring mathematical problems from a range of cultural perspectives and within diverse cultural contexts. Students can apply mathematical thinking to identify and resolve issues related to living with diversity.

Literacy

Literacy is used throughout mathematics to understand and interpret word problems and instructions containing the particular language featured in mathematics. Students have opportunities to learn the vocabulary associated with mathematics, including synonyms, technical terminology, passive voice and common words with specific meanings in a mathematical context. Literacy is used to pose and answer questions, engage in mathematical problem-solving and to discuss, produce and explain solutions. There are opportunities for students to develop the ability to create and interpret a range of media typical of mathematics, ranging from calendars and maps to data displays.

Numeracy

Numeracy is embedded throughout the Stage 6 Mathematics syllabuses. It relates to a high proportion of the content descriptions across Years 11 and 12. Consequently, this particular general capability is not tagged in this syllabus.

Numeracy involves drawing on knowledge of particular contexts and circumstances in deciding when to use mathematics, choosing the mathematics to use and evaluating its use. To be numerate is to use mathematics effectively to meet the general demands of life at home and at work, and for participation in community and civic life. It is therefore important that the mathematics curriculum provides the opportunity to apply mathematical understanding and skills in context, in other learning areas and in real-world scenarios.

Personal and Social Capability

Students develop personal and social competence as they learn to understand and manage themselves, their relationships and their lives more effectively. Mathematics enhances the development of students’ personal and social capabilities by providing opportunities for initiative taking, decision-making, communicating their processes and findings, and working independently and collaboratively in the mathematics classroom. Students have the opportunity to apply mathematical skills in a range of personal and social contexts. This may be through activities that relate learning to their own lives and communities, such as time management, budgeting and financial management, understanding statistics and engaging with plans, maps and networks in everyday contexts.
Civics and Citizenship

Mathematics has an important role in civics and citizenship education because it has the potential to help us understand our society and our role in shaping it. The role of mathematics in society has expanded significantly in recent decades as almost all aspects of modern-day life are now quantified. Through modelling reality using mathematics and then manipulating the mathematics to help understand and/or predict reality, students have the opportunity to learn mathematical knowledge, skills and understanding that are essential for active participation in the world in which we live.

Difference and Diversity

Students make sense of and construct mathematical ideas in different ways, drawing upon their own unique experiences in life and prior learning. By valuing students’ diversity of ideas, teachers foster students’ efficacy in learning mathematics.

Work and Enterprise

Students may develop work and enterprise knowledge, understanding and skills through their study of mathematics in a work-related context. Students are encouraged to select and apply appropriate mathematical techniques and problem-solving strategies through work-related experiences in the Financial mathematics topic, the Statistics and probability topic and the Plans, maps and networks topic. This allows them to make informed financial decisions by selecting and analysing relevant information.
# Mathematics Life Skills Course Content

## Course Structure

The course is organised in topics, with the topics divided into subtopics.

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<td>Plans, Maps and Networks (Networks)</td>
<td>MLS-P1 Using Plans, Maps and Networks</td>
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Topic: Number and Modelling (Algebra)

Outcomes

A student:
› explores mathematical concepts, reasoning and language to solve problems MALS6-1
› engages with mathematical symbols, diagrams, graphs and tables to represent information accurately MALS6-2
› demonstrates understanding of number and patterns in a range of contexts MALS6-7
› solves problems using number and patterns in real-life situations MALS6-8
› 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

Related Mathematics Standard outcomes: MS11-1, MS11-2, MS11-6, MS11-9, MS11-10, MS1-12-1, MS1-12-2, MS1-12-6, MS1-12-9, MS1-12-10, MS2-12-1, MS2-12-2, MS2-12-6, MS2-12-9, MS2-12-10

Topic Focus

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

Subtopics

MLS-N1: Review of Number Properties
MLS-N2: Mathematical Modelling
Number and Modelling (Algebra)

MLS-N1 Review of Number Properties

Outcomes

A student:
› explores mathematical concepts, reasoning and language to solve problems MALS6-1
› engages with mathematical symbols, diagrams, graphs and tables to represent information accurately MALS6-2
› demonstrates understanding of number and patterns in a range of contexts MALS6-7
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Subtopic Focus

This subtopic reviews the basics of number and solving number problems. It also helps prepare students for the more advanced subtopic of mathematical modelling. The knowledge, understanding and skills and understanding in this subtopic builds on Life Skills Years 7–10 outcomes and content for Number and Algebra.

Content

N1.1: Basic number skills

Students:
● recognise language related to number, for example:
  – few
  – more
  – none
  – all
  – double
  – third 
● 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' 
● recognise factors and multiples of numbers
**N1.2: Place value**

Students:
- identify which digit is in a given place value for a number, for example:
  - identify how many hundreds there are in 523
- match place value to the digits of an integer
- recognise, read and record numbers and interpret numerical information in various contexts, for example:
  - numbers of a bus route
  - the number of a train platform
- compare and order numbers

**N1.3: Number problems**

Students:
- recognise fractions in everyday contexts, for example:
  - add \( \frac{1}{4} \) cup sugar to the cake mix
- recognise decimals and percentages in everyday contexts, for example:
  - a 30% off sale
  - purchasing 1.5 kg of pumpkin
- use addition, subtraction, multiplication and division in everyday contexts, for example:
  - if I have $10 and want to buy two loaves of bread that each cost $4.50, do I have enough money?
- complete number sentences involving one or more operations by calculating missing values, for example:
  - \( 3 \times ? = 18, \, ? + ? = 10, 5 + ? - 1 = 7 \), and relate to everyday contexts
- choose the best operation to solve a word problem, for example:
  - choose to calculate \( 5 \times 10 \) rather than \( 10+10+10+10+10 \) to answer the question, 'If I buy 5 packs of toilet paper and each pack has 10 toilet rolls in it, how many rolls of toilet paper would 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, for example:
  - how many cans of soft drink will I have if there are 6 cans in a carton and I buy 3 cartons? If I am having a party with 20 people, will there be enough soft drink for everyone to drink 1 can?
- solve number problems and explain the strategies used
Number and Modelling (Algebra)

MLS-N2 Mathematical Modelling

Outcomes

A student:
› explores mathematical concepts, reasoning and language to solve problems MALS6-1
› engages with mathematical symbols, diagrams, graphs and tables to represent information accurately MALS6-2
› demonstrates understanding of number and patterns in a range of contexts MALS6-7
› solves problems using number and patterns in real-life situations MALS6-8
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Related Mathematics Standard outcomes: MS11-1, MS11-2, MS11-6, MS11-9, MS11-10, MS1-12-1, MS1-12-2, MS1-12-6, MS1-12-9, MS1-12-10, MS2-12-1, MS2-12-2, MS2-12-6, MS2-12-9, MS2-12-10

Subtopic Focus

Mathematical modelling is the term used to describe and interpret relationships between quantities. The focus of this subtopic is exploring simple mathematical models of real-life situations and representing them visually. The knowledge, skills and understanding in this subtopic builds on Life Skills Years 7–10 outcomes and content for Number and Algebra.

Content

N2.1: Patterns
Students:
● recognise patterns in the environment, for example:
  – in nature
  – in the home
  – in the classroom
  – in the workplace
  – in pictures
  – online 📺.
● recognise, copy and continue shape and number patterns
● create shape and number patterns 🌞
● describe shape and number patterns informally, for example:
  – ‘the house numbers on this side of the street are all odd and go up by twos’ 🎉
● develop a rule for a given number pattern and express it mathematically, for example:
  – the rule is add three to the previous term
  – multiply the term number by five
  – use the number rule 2 x ? 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 a situation to develop a rule, e.g., the number of chairs needed for a certain number of tables is ‘number of tables x 4’.
- complete tables of values based on a simple rule in the context of a real situation, for example:
  - the number of chairs needed for a certain number of tables is ‘number of tables x 4’.
- read, interpret and draw conclusions from graphs that model real situations, for example:
  - use a graph of blood alcohol content 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, e.g., taller people tend to weigh more, while still recognising that there are individuals who do not fit this trend.
- use digital technology to create graphs from tables of data or tables from graphs.
Topic: Measurement

Outcomes

A student:
› explores mathematical concepts, reasoning and language to solve problems MALS6-1
› engages with mathematical symbols, diagrams, graphs and tables to represent information accurately MALS6-2
› engages with appropriate tools, units and levels of accuracy in measurement MALS6-3
› explores contexts of everyday measurement MALS6-4
› 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

Related Mathematics Standard outcomes: MS11-1, MS11-2, MS11-3, MS11-4, MS11-9, MS11-10, MS1-12-1, MS1-12-2, MS1-12-3, MS1-12-4, MS1-12-10, MS2-12-1, MS2-12-2, MS2-12-3, MS2-12-4, MS2-12-10

Topic Focus

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

Subtopics

MLS-M1: Everyday Measurement
MLS-M2: Measuring Two-Dimensional and Three-Dimensional Shapes
Measurement

MLS-M1 Everyday Measurement

Outcomes

**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

**Related Mathematics Standard 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, MS2-12-10

Subtopic Focus

The focus of this subtopic is developing skills in measuring time, 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 and understanding in this subtopic build on Life Skills Years 7–10 outcomes and content for Measurement and Geometry.

Content

**M1.1: Time**

Students:
- recognise language that relates to time, for example:
  - first
  - before
  - next
  - during
  - after 🕒
- identify names and sequence of days of the week, months of the year and seasons 🌕
- associate activities with times of day or periods of time, for example:
  - eat breakfast in the morning
  - go to the bathroom at lunchtime
  - catch the bus after packing my bag at the end of the lesson
  - doctor's appointment at 4 pm, call friends in the afternoon,
  - shower in the evening
  - complete homework for tomorrow
  - go on an overnight school trip
  - go shopping on the weekend 🛍
- associate events with days of the week, months and seasons, for example:
  - sport training on Friday
  - favourite TV show airing every evening from Monday to Friday
  - no school on the weekend
  - Mum's birthday is in March
  - swim at the beach in summer
  - wear warm clothes in winter 🕒
- follow sequences of events, for example:
  - eat breakfast/wash dishes/brush teeth/travel to school
  - put hat in bag after lunch/go to the toilet/wash hands
- recognise the passage of time, for example:
  - the lunch bell will ring in 5 minutes
  - the bus is running half an hour late
  - my birthday is next Thursday
  - the school dance is in a fortnight
- order units of time, for example:
  - seconds, hours, months, centuries
- describe and compare events using appropriate units and language to represent time, for example:
  - weekly exercise
  - an annual celebration
  - arrive at work 10 minutes earlier than usual
  - the journey takes longer on the train than in the car
  - it is faster to dry my hair with the hairdryer than it is to let it drip-dry
- read and relate times on digital and analog clocks and watches, for example:
  - watching a favourite TV show that airs at 7.00 pm
  - catching the bus that leaves at 3.30 pm
- use calendars and planners to identify and relate times, dates, months and special occasions, for example:
  - I start my new job in 3 weeks
  - I will go on holidays for a fortnight
  - my lunchbreak starts at 12.00 pm and finishes at 1.00 pm
  - Boxing Day is the day after Christmas Day
  - Australia Day is in January
- measure the time taken for various events
- plan personal events or schedules, taking into account the best time to do them and how long they will take, for example:
  - planning a party (sending invitations, buying a present, ordering a cake, buying party supplies)
  - meeting a friend for lunch before going to the movies
  - taking the dog for a walk before preparing dinner
  - submitting a job application, paying bills on time
- estimate time of the day, for example:
  - it is nearly time to go home
  - it is time to feed the cat
  - it will soon be dark outside
  - the shops will be closing soon
- estimate and measure passage of time, for example:
  - how long it takes to get ready to leave the house in the morning, to travel to work, to pack your bag at the end of the day, to travel home from school
- estimate and measure passage of time using a range of devices including stopwatches and personal devices, for example:
  - how long it takes to cook a meal, play a sport, complete a task at work
- use units of time and their abbreviations, for example:
  - hr, min
- calculate elapsed time, for example:
  - getting on the train at 3.00 pm and disembarking at 3.45 pm
  - the number of hours between start and finish work times
  - the number of holiday days between Christmas and New Year
● convert units of time, for example:
  – 60 minutes = 1 hour
  – 90 minutes = 1½ hours
  – 1 day = 24 hours
  – 7 days = 1 week
● read and relate time in different formats, for example:
  – Roman numerals on a clockface
● recognise 24-hour times using four digits (eg 0900, 2315)
● relate 24-hour times to their equivalent am or pm times
● explore conversions between 12-hour and 24-hour times
● explore times in different time zones within and beyond Australia, for example:
  – when is it 11.00 am in Sydney, what time is it in Shanghai?
● demonstrate knowledge of the effect of daylight saving on local time, for example:
  – if I fly from Sydney to Brisbane in summer I will leave at 1.00 pm local time and arrive at 1.00 pm local time
  – if I am in Sydney and telephone Cairns at 5.00 pm, the business may already be closed for the day
● explore simple rates related to time, for example:
  – speeds measured in kilometres per hour
● investigate travel times using digital technology, for example:
  – public transport planning websites or apps
● use and interpret time to plan travel, for example:
  – use calendars to consider travel dates
  – identify the typical features of each season and use this to make decisions about clothing required for travel
● read and interpret timetables in a range of formats and contexts, including timetables that use 24-hour time, for example:
  – everyday timetables, eg school, cinema, local fitness centre, TV guide
  – travel timetables, eg bus, train, ferry, connecting services
  – event timetables, eg a sporting competition, a festival program
● recognise how days of the week (including weekends and public holidays) affect timetables
● solve everyday problems involving time, for example:
  – is there enough time to get to the shops and buy the groceries before they close?
  – identify what time to leave home to arrive somewhere by a given time if using public transport, or calculate how long a bus trip will take

M1.2: Length
Students:
● recognise language and comparative language that relates to length, for example:
  – tall
  – short
  – taller
  – shorter
  – longer than
  – height
  – distance
  – ruler
  – tape measure
  – odometer
  – centimetre
● recognise metric units of length, their abbreviations and conversions between them
● recognise appropriate units and devices to measure lengths
● 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

● 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
  – using a piece of string on a map, readings on the car odometer

● investigate ways to measure distances that are not straight or accessible, for example:
  – measure the length of a dining table with a tape measure and a 30-centimetre ruler

● 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

M1.3: Mass
Students:
● recognise language and comparative language that relates to mass, for example:
  – light
  – heavy
  – lighter
  – heavier
  – weight
  – scales
  – gram

● recognise metric units of mass, their abbreviations and conversions between them

● recognise appropriate units and devices to measure mass

● 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

● estimate and compare masses, for example:
  – the mass of different brands of hand luggage

● 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
M1.4: Temperature
Students:

- recognise language and comparative language that relates to temperature, for example:
  - hot
  - boiling
  - lukewarm
  - colder than
  - thermometer
  - degree
  - Celsius
- 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
- 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
- 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?

M1.5: Energy
Students:

- identify units of energy commonly used in relation to human or household energy and their abbreviations, for example:
  - kilojoules, calories, kilowatts
- recognise that kilojoules are used to describe the amount of energy gained when consuming food or drink
- recognise that energy is expended during physical activity
- 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
- solve problems involving energy, for example:
  - finding an energy-efficient refrigerator
Measurement

MLS-M2 Measuring Two-Dimensional and Three-Dimensional Shapes

Outcomes

A student:
› explores mathematical concepts, reasoning and language to solve problems MALS6-1
› engages with mathematical symbols, diagrams, graphs and tables to represent information accurately MALS6-2
› explores contexts of everyday measurement MALS6-4
› 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

Related Mathematics Standard outcomes: MS11-1, MS11-2, MS11-4, MS11-9, MS11-10, MS1-12-1, MS1-12-2, MS1-12-4, MS1-12-9, MS1-12-10, MS2-12-1, MS2-12-2, MS2-12-4, MS2-12-9, MS2-12-10

Subtopic Focus

In this subtopic students explore the properties of two-dimensional (2D) shapes and three-dimensional (3D) shapes and measure perimeters, areas, volumes and capacities. Where appropriate, the skills developed should be applied to relevant real-life situations. The knowledge, skills and understanding in this subtopic builds on Life Skills Years 7–10 outcomes and content for Measurement and Geometry.

Content

M2.1: 2D and 3D shapes

Students:
• recognise, identify, match and sort shapes in the environment, for example:
  – in nature
  – in the home
  – in the classroom
  – in the workplace
  – in pictures
  – online
• recognise attributes, similarities and differences of shapes in the environment and in a range of contexts, for example:
  – putting a round tablecloth on a square table
• identify or describe attributes, similarities and differences of shapes in the environment and in a range of contexts using everyday language, for example:
  – stacked rolls of toilet paper in the cupboard
• make representations of 2D shapes using technology as appropriate, for example:
  – a bedroom plan
  – a transport map
  – a garden
• recognise tessellations, identifying the shapes involved
● continue or create tessellations using different methods, for example:
  – grids, technology or concrete materials
● explore 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 using technology as appropriate, for example:
  – using nets to construct a model of a dog kennel 📝
● solve problems involving 2D and 3D shapes, for example:
  – packing a suitcase
  – stacking objects in the pantry
  – keeping storage containers in the garage/wardrobe ⚫

M2.2: Perimeter
Students:
● recognise language and comparative language that relates to perimeter, for example:
  – longer than
  – shorter than
  – distance
  – ruler
  – tape measure
  – centimetre
  – metre 🏆
● recognise the perimeter of 2D shapes
● recognise metric units of perimeter, their abbreviations and conversions between them
● recognise appropriate units and devices to measure perimeter ⚫
● identify or describe the perimeter of 2D shapes using everyday language 📝
● estimate and compare perimeter, for example:
  – how much tinsel is needed to decorate and hang around the window frame and the doorway?
● estimate and measure perimeter using a variety of strategies, for example:
  – using a tape measure
  – using string and measuring the string ⚫
● 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 ⚫
M2.3: Area and surface area
Students:
- recognise language and comparative language that relates to area, for example:
  - space
  - more
  - less
  - square metre
- recognise metric units of area, their abbreviations and conversions between them
- recognise the area of 2D shapes and surface area of 3D shapes
- describe the area of 2D shapes and surface area of 3D shapes using everyday language
- estimate and compare areas of shapes, for example:
  - bread plates and dinner plates
- identify or make different shapes with the same area
- recognise the relationship between length and width and the number of grid squares in the rows and columns 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 and surface area, for example:
  - putting protective covering on a book
  - having enough wrapping paper to wrap a gift
  - buying a large enough can of paint to cover the area

M2.4: Volume
Students:
- recognise language and comparative language that relates to volume, for example:
  - size
  - space
  - cubic units
- recognise appropriate units and devices to measure volume
- recognise metric units of volume, their abbreviations and conversions between them
- identify or describe the volume of 3D shapes using everyday language
- construct 3D shapes of a given volume using concrete materials, for example:
  - centicubes
  - blocks
- estimate and compare volume
- estimate and measure volume by counting cubes
- 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
- calculate the volume of a range of shapes
- construct 3D shapes of a given volume using concrete materials
- solve problems involving volume, for example:
  - how much soil is needed to fill a garden bed when designing a vegetable garden
M2.5: Measuring capacity

Students:

- recognise language and comparative language that relates to capacity, for example:
  - fullest
  - empty
- recognise metric units of capacity, their abbreviations and conversions between them
- recognise appropriate units and devices to measure capacity
- recognise the concept of capacity and how it relates to volume
- estimate and compare capacities, for example:
  - decide if food in one container will fit into another container with a different shape
  - choose which of a set of 3D shapes would have the greatest capacity
- estimate and measure capacity using a range of devices including measuring jugs, medicine droppers, cups and spoons as appropriate, for example:
  - measure 1½ cups of milk for a pancake recipe and 1 teaspoon of vanilla essence
- measure capacity with a requested degree of accuracy, for example:
  - measuring cough syrup to the nearest millilitre
- convert between metric units of capacity
- investigate the relationship between volume, mass and capacity, for example:
  - experiment with volume, mass and capacity of 3D containers
  - discover and use the fact that 1 L of water weighs 1 kg
  - discover and use the fact that 1 mL of water is equivalent to 1 cm³
  - large objects can be very light, while smaller objects can be heavy
- solve problems involving capacity, for example:
  - using 200 mL of orange juice for an orange muffin recipe and only having a 50 mL measuring cup
Topic: Financial Mathematics

Outcomes

A student:
› explores mathematical concepts, reasoning and language to solve problems MALS6-1
› demonstrates understanding of money MALS6-5
› explores money management and financial decision-making MALS6-6
› 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

Related Mathematics Standard outcomes: MS11-1, MS11-5, MS11-9, MS11-10, MS1-12-1, MS1-12-5, MS1-12-9, MS1-12-10, MS2-12-1, MS2-12-5, MS2-12-9, MS2-12-10

Topic Focus

The topic Financial Mathematics 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.

Subtopics

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:
› explores mathematical concepts, reasoning and language to solve problems MALS6-1
› demonstrates understanding of money MALS6-5
› explores money management and financial decision-making MALS6-6
› 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

Related Mathematics Standard outcomes: MS11-1, MS11-5, MS11-9, MS11-10, MS1-12-1, MS1-12-5, MS1-12-9, MS1-12-10, MS2-12-1, MS2-12-5, MS2-12-9, MS2-12-10

Subtopic Focus

The focus of this subtopic is carrying out simple money calculations using decimals and percentages and using these to calculate interest. The knowledge, skills and understanding in this subtopic builds on Life Skills Years 7–10 outcomes and content for Number and Algebra.

Content

F1.1: Decimals and money
Students:
• read, write, order and compare decimal numbers 🗄
• recognise, match, sort, order and use Australian currency to purchase items 🏢🌟
• read and write money amounts in numerals and words 🗄
• recognise that other countries use different currencies 🗺
• add and subtract decimals correct to two decimal places using a variety of strategies, including mental, written and calculator techniques as appropriate 🗄
• 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, including mental, written and calculator techniques as appropriate 🗄
• estimate costs and change on purchases, for example:
  – select appropriate coins and notes to tender after estimating costs
  – use rounding to estimate the amount of change due, eg to the whole dollar or 50c
  – recognise whether they have been given the correct change during a purchase 🏢
• calculate change due on purchases using a range of strategies, including concrete materials, mental, written and calculator techniques as appropriate 🗄🌟
• 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 🗄
• explore conversions between Australian dollars and foreign currencies, for example:
  – Japanese ¥ 🗺🌟
F1.2: Percentages and money

Students:

- 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:
  - what is meant by '25% off' in a sale, or an '80% goal-kicking success rate'
- 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 the percentage of an amount using whole number percentages, for example:
  - in a 10% off sale, there is a jumper with a full price of $100. How much will the jumper cost on sale?
- calculate percentage decreases and increases using a calculator in the context of money problems, for example:
  - discounts
  - GST
Financial Mathematics

MLS-F2 Earning Money

Outcomes

A student:
› explores mathematical concepts, reasoning and language to solve problems MALS6-1
› demonstrates understanding of money MALS6-5
› explores money management and financial decision-making MALS6-6
› 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

Related Mathematics Standard outcomes: MS11-1, MS11-5, MS11-9, MS11-10, MS1-12-1, MS1-12-5, MS1-12-9, MS1-12-10, MS2-12-1, MS2-12-5, MS2-12-9, MS2-12-10

Subtopic Focus

This subtopic explores the different ways you can earn money and looks into related issues, such as taxation and solving income-related problems. The knowledge, skills and understanding in this subtopic builds on Life Skills Years 7–10 outcomes and content for Number and Algebra.

Content

F2.1: Types of income and work

Students:
● identify and describe a range of types of employment, for example:
  – full-time
  – part-time
  – casual
  – self-employed
  – volunteer
● identify and describe a range of types of work-related income, for example:
  – wages
  – salary
  – commission
  – piecework
● identify and describe forms of income other than work-related 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, eg 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:
- 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, for example:
  - 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, eg 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 and understand the documentation needed if a worker wants to claim these deductions in their tax return, for example:
  - tools for a tradesperson
  - uniform laundering
Financial Mathematics

MLS-F3 Spending Money

Outcomes

A student:

› explores mathematical concepts, reasoning and language to solve problems MALS6-1
› demonstrates understanding of money MALS6-5
› explores money management and financial decision-making MALS6-6
› 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

Related Mathematics Standard outcomes: MS11-1, MS11-5, MS11-9, MS11-10, MS1-12-1, MS1-12-5, MS1-12-9, MS1-12-10, MS2-12-1, MS2-12-5, MS2-12-9, MS2-12-10

Subtopic Focus

The focus of this subtopic is understanding and using the mathematics needed for spending money and calculating the costs of everyday living. The knowledge, skills and understanding in this subtopic builds on Life Skills Years 7–10 outcomes and content for Number and Algebra.

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
● order costs using terminology, for example:
  – cheapest, less expensive, dearer
● calculate to make comparisons, for example:
  – multiply the cost of a 1 kg bag of rice by 5 to compare it to the cost of a 5 kg bag of rice
● 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, for example:
  – unit price
  – quantity
  – value
  – quality
● justify a choice between two or more items based on cost or other reasons, for example:
  – quality
  – personal preference
  – requirements
● investigate consumer rights with regard to refunds and exchanges, warranties, and terms and conditions of sale/service

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● identify a range of ways to pay when making purchases, for example:
  – cash
  – debit or credit cards
  – online purchasing
  – direct deposit

● discuss issues related to security when making purchases using cards or online methods

● explore the concept of saving money, for example:
  – identify and compare options for saving money, including a range of financial products and institutions
  – discuss the advantages of saving money
  – use online loan calculators to calculate interest earned on savings for different periods and rates

● investigate the concepts of borrowing money and interest, for example:
  – recognise the requirement to repay borrowed money
  – identify and compare different types of borrowing, eg credit cards, loans, lay-by
  – discuss the advantages and disadvantages of borrowing money
  – 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

F3.2: Budgeting
Students:
● 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 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
● explore the costs of running a home and/or car, for example:
  – list the associated costs of running a home or car, eg home and contents insurance, council rates, fuel and maintenance for a car, registration, insurances and ongoing costs
  – obtain estimates of these costs from a variety of sources, eg asking parents, online research
  – plan for purchasing a car or living independently, eg can they afford a car or to live independently at this point in their life
● read and interpret bills, for example:
  – read an electricity bill or a car registration payment notice to identify due dates and payment amounts
  – read and interpret a range of bank statements, recognising common terms and types of transactions
• 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
  – 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
  – 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:
  – plan how much phone or internet data is needed
  – compare and contrast different plans for pay TV
  – calculate quantities related to service plans, eg 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 meet their own needs
Topic: Statistics and Probability (Statistical Analysis)

Outcomes

A student:
› explores mathematical concepts, reasoning and language to solve problems MALS6-1
› engages with mathematical symbols, diagrams, graphs and tables to represent information accurately MALS6-2
› uses data in a range of contexts MALS6-9
› explores probability in a range of contexts MALS6-10
› 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

Related Mathematics Standard outcomes: MS1-1, MS1-2, MS1-7, MS1-8, MS1-9, MS1-10, MS1-12-1, MS1-12-2, MS1-12-7, MS1-12-9, MS1-12-10, MS2-12-1, MS2-12-2, MS2-12-7, MS2-12-9, MS2-12-10

Topic Focus

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

Subtopics

MLS-S1 Statistics
MLS-S2 Probability
Statistics and Probability (Statistical Analysis)

MLS-S1 Statistics

Outcomes

A student:
› explores mathematical concepts, reasoning and language to solve problems MALS6-1
› engages with mathematical symbols, diagrams, graphs and tables to represent information accurately MALS6-2
› uses data in a range of contexts MALS6-9
› 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

Related Mathematics Standard outcomes: MS11-1, MS11-2, MS11-7, MS11-9, MS11-10, MS11-12-1, MS11-12-2, MS11-12-7, MS11-12-9, MS11-12-10, MS12-1, MS12-2, MS12-7, MS12-9, MS2-12-10, MS2-12-7

Subtopic Focus

In this subtopic students develop the skills related to all steps in the data process, gathering, organising, displaying, analysing and interpreting data. The knowledge, skills and understanding in this subtopic builds on Life Skills Years 7–10 outcomes and content for Statistics and Probability.

Content

S1.1: Gather data
Students:
● recognise information in a variety of tables and graphs
● recognise features of tables and graphs
● recognise examples of data observable in their everyday life
● identify the purpose of collecting a set of data, for example:
  – identify why the owner of the local shop may want to know the most popular flavour of drink purchased
● 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 datasets related to a range of cross-curricular focus areas, for example:
  – data on the environment
  – data related to Australia’s neighbouring regions and cultures
  – 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:
  - tally marks
  - concrete materials
  - symbols
  - digital technologies
- order and sort numbers using terms, for example:
  - 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 and labels, and locate these on graphs
- assess the accuracy and fairness of a graph, for example:
  - check if it has all necessary key features
  - check if it is free of bias or misleading information
- choose the most appropriate display for a dataset, for example:
  - picture graphs
  - column graphs
  - line graphs
- construct a line, picture or column graph
- construct a line, picture or column graph with increasing accuracy, for example:
  - use correct graphing techniques, eg 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 dataset and discuss its meaning
- calculate mean, median and mode for a simple dataset 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 cinema (mode)
  - calculate the age range in a family group
- compare means and medians in a range of contexts, for example:
  - compare and 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
  - compare mean (or median) incomes for females and males
- interpret graphs, tables and datasets from a variety of common sources, for example:
  - newspapers
  - television
  - internet
• interpret information about a dataset 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

• recognise and describe trends in data, for example:
  – recognise that the average income in a profession is increasing over a number of years

• use information to extrapolate or make predictions from data, for example:
  – 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 formats and technologies
Statistics and Probability (Statistical Analysis)

MLS-S2 Probability

Outcomes

A student:
› explores mathematical concepts, reasoning and language to solve problems MALS6-1
› engages with mathematical symbols, diagrams, graphs and tables to represent information accurately MALS6-2
› explores probability in a range of contexts MALS6-10
› 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

Related Mathematics Standard outcomes: MS11-1, MS11-2, MS11-8, MS11-9, MS11-10, MS1-12-1, MS1-12-2, MS1-12-9, MS1-12-10, MS2-12-1, MS2-12-2, MS2-12-9, MS2-12-10

Subtopic Focus

The focus of this subtopic 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. The knowledge, skills and understanding in this subtopic builds on Life Skills Years 7–10 outcomes and content for Statistics and Probability.

Content

S2.1: Fraction concepts and calculations
Students:
● recognise language related to fractions, for example:
  – equal parts
  – share
  – divide
  – whole
  – quarter
● recognise that a fraction represents a number of equal parts out of a whole
● recognise 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
● recognise basic fractions, for example:
  – halves
  – quarters
  – thirds
● recognise how many parts are needed to make a whole or 100%, for example:
  – four quarters = one whole
● represent fractions using a variety of strategies, including concrete materials, diagrams and numerals as appropriate
● represent fractions for given situations, for example:
  – write the fraction \( \frac{1}{4} \) when they eat a quarter of an apple
  – express 50c as \( \frac{1}{2} \) of a dollar
Life Skills

- compare fractions, for example:
  - recognise that half of something is more than a quarter of it
- identify fractions in everyday contexts, for example:
  - walking a third of the way up the street
  - going to a half-price sale
  - buying half a dozen eggs
- divide diagrams, objects, groups of objects or numbers into fractional parts, for example:
  - divide a group of objects into thirds
  - cut a cake in half
  - 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:
- recognise language related to chance and probability, for example:
  - certain
  - likely
  - probably
  - unlikely
  - 50:50
- recognise the elements of chance in everyday events
- recognise that some events are entirely related to chance, for example:
  - whether the bus will be late or on time
- recognise that the range of probabilities is from 0 to 1, or from 0 to 100% in percentage terms
- recognise equally likely events, for example:
  - getting heads or tails on a coin
- recognise non-equally likely events, for example:
  - randomly selecting your favourite candy from a bag with unequal numbers of a variety of flavours
- order events based on their probability
- understand the term 'random' as applied to probability, for example:
  - 'a person is selected at random'
- describe the likelihood of familiar events
- identify possible causes of bias or inaccuracy in probability experiments
- represent probabilities using a range of notations, for example:
  - words
  - fractions
  - ratios
  - percentages
- compare the likelihood of events based on their frequency, for example:
  - selecting a heart (13 hearts) from a pack of cards is less likely than selecting a black card (26 black cards)
- compare the likelihood of events based on their numerical probability, for example:
  - rolling a six on a dice (one out of six) is less likely than rolling an odd number (one out of two)
Life Skills

- engage with simple theoretical probabilities for events, for example:
  - recognise that rolling a dice 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 dice 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
- 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
Topic: Plans, Maps and Networks (Networks)

Outcomes

A student:
› explores mathematical concepts, reasoning and language to solve problems MALS6-1
› engages with mathematical symbols, diagrams, graphs and tables to represent information accurately MALS6-2
› engages with appropriate tools, units and levels of accuracy in measurement MALS6-3
› explores plans, maps, networks and timetables MALS6-11
› engages with plans, maps, networks and timetables effectively in a range of everyday contexts and situations MALS6-12
› 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

Related Mathematics Standard outcomes: MS11-1, MS11-2, MS11-3, MS11-9, MS11-10, MS11-12-1, MS11-12-2, MS11-12-3, MS11-12-8, MS11-12-9, MS11-12-10, MS12-1-1, MS12-1-2, MS12-1-3, MS12-8, MS12-9, MS12-10, MS12-2-1, MS12-2-2, MS12-2-3, MS12-2-8, MS2-12-9, MS2-12-10

Topic 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.

Subtopics

MLS-P1 Using Plans, Maps and Networks
Plans, Maps and Networks (Networks)

MLS-P1 Using Plans, Maps and Networks (Networks)

Outcomes

A student:
› explores mathematical concepts, reasoning and language to solve problems MALS6-1
› engages with mathematical symbols, diagrams, graphs and tables to represent information accurately MALS6-2
› engages with appropriate tools, units and levels of accuracy in measurement MALS6-3
› explores plans, maps, networks and timetables MALS6-11
› engages with plans, maps, networks and timetables effectively in a range of everyday contexts and situations MALS6-12
› 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

Related Mathematics Standard outcomes: MS11-1, MS11-2, MS11-3, MS11-9, MS11-10, MS11-12, MS11-12-2, MS11-12-3, MS11-12-8, MS11-12-9, MS11-12-10, MS2-12-1, MS2-12-2, MS2-12-3, MS2-12-8, MS2-12-9, MS2-12-10

Subtopic Focus

This subtopic is about interpreting and using plans, maps and simple networks in everyday situations. The knowledge, skills and understanding in this subtopic builds on Life Skills Years 7–10 outcomes and content for Measurement and Geometry.

Content

P1.1: Plans
Students:
• recognise and respond to the language of position, for example:
  – behind
  – inside
  – above
  – left
  – opposite
• recognise the purpose and functions of plans
• recognise that plans represent real things, for example:
  – buildings
• identify typical features that are represented on a plan, for example:
  – identify doors on a building plan
• use plans to locate positions or gather information, for example:
  – interpret a plan of their school
  – use a plan of a theatre to locate their allocated seat
  – use the floorplan of a shopping centre to find their favourite shop
• use the language of position
• recognise different elevation views of a building and match elevation drawings to aspects of a building
• construct simple plans, for example:
  – complete a floor plan of their bedroom or home using models or drawings
Life Skills

- 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 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
- interpret the key (legend) on a plan

P1.2: Maps

Students:
- recognise and respond to the language of maps, for example:
  - scale
  - direction
  - north
- recognise the purpose and functions of maps
- recognise that maps represent real things, for example:
  - regions
- use maps to locate positions or gather information, for example:
  - in their local area
- use the language of maps
- recognise a variety of maps, for example:
  - historical maps
  - topological maps
  - maps from different cultural traditions
  - maps that use digital technology
- identify typical features of a map, for example:
  - key, scale, grid, compass rose
- identify directions on a map in a variety of ways, for example:
  - using compass directions and their abbreviations
  - using common terms, eg left and right
- develop skills in using maps, for example:
  - locate something or describe the location of something on a map using grid references
  - read and use a map key (legend)
  - read distances directly from the map or from a related table of distances
  - use scale to determine distances between places
  - give and follow directions using a map
- recognise that the shortest or fastest route is not always the best route and discuss why
- create simple maps, for example:
  - sketch a map showing the way from one place in the school to another
- 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 time frame
P1.3: Networks

Students:
- recognise and respond to the language of networks, for example:
  - via
  - detour
  - connect
- recognise the purpose and functions of networks
- recognise that networks represent real things, for example:
  - transport systems
- use networks to gather information, for example:
  - the journey the bus takes between its first and last stop
- use the language of networks
- 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
- recognise the differences 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
  - plot a route to walk from one place to another without getting wet on a rainy day
- investigate and solve problems in given networks, for example:
  - how to visit each point in a network without retracing any paths (eg the Königsberg Bridge Problem)
  - 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 the route for a walking tour to visit the major landmarks in a city without retracing paths
  - use airline, train, bus or road network diagrams to identify the best route, eg ‘which train line should I take if I want to get from A to B’
Glossary

This glossary is intended to be a guide to the meanings of mathematical terms used within this syllabus. The glossary provides simple and brief explanations. Not all cases and scenarios have been explained in detail. Where feasible, both a formal mathematical definition has been given as well as how the term is commonly thought of or described. Some terms from the Mathematics K–10 glossary have also been included.

<table>
<thead>
<tr>
<th>Glossary term</th>
<th>Elaboration</th>
</tr>
</thead>
</table>
| Aboriginal and Torres Strait Islander Peoples | Aboriginal Peoples are the first peoples of Australia and are represented by over 250 language groups each associated with a particular Country or territory. Torres Strait Islander Peoples whose island territories to the north east of Australia were annexed by Queensland in 1879 are also Indigenous Australians and are represented by five cultural groups.  
An Aboriginal and/or Torres Strait Islander person is someone who:  
• is of Aboriginal and/or Torres Strait Islander descent  
• identifies as an Aboriginal person and/or Torres Strait Islander person, and  
• is accepted as such by the Aboriginal and/or Torres Strait Islander community in which they live. |
| absolute error                       | The absolute error of a measurement is half of the smallest unit on the measuring device. The smallest unit is called the precision of the device.  
<pre><code>                             | Absolute error = ± \frac{1}{2} \times Precision |
</code></pre>
<p>| allowable tax deductions             | Allowable tax deductions are expenses incurred that are related to your job and profession and can be deducted from your salary to obtain your taxable income. These form part of an individual's or company's tax return. |
| ambiguous case                       | The ambiguous case refers to using the sine rule to calculate the size of an angle in a triangle where there are two possibilities for the angle, one obtuse and one acute, leading to two possible non-congruent triangles. |</p>
<table>
<thead>
<tr>
<th>Glossary term</th>
<th>Elaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>angles of elevation and depression</td>
<td>When an observer looks at an object that is lower than ‘the eye of the observer’, the angle between the line of sight and the horizontal is called the angle of depression.</td>
</tr>
<tr>
<td></td>
<td><img src="image1.png" alt="Diagram of angle of depression" /></td>
</tr>
<tr>
<td></td>
<td>When an observer looks at an object that is higher than ‘the eye of the observer’, the angle between the line of sight and the horizontal is called the angle of elevation.</td>
</tr>
<tr>
<td></td>
<td><img src="image2.png" alt="Diagram of angle of elevation" /></td>
</tr>
<tr>
<td>annuity</td>
<td>An annuity is a compound interest investment from which payments are made or received on a regular basis for a fixed period of time.</td>
</tr>
<tr>
<td>appreciated value</td>
<td>Appreciation is an increase in the value of an asset over time. An appreciated value is the value an asset has increased to over that time.</td>
</tr>
<tr>
<td>area of a triangle</td>
<td>The area of any triangle $ABC$ is given by:</td>
</tr>
<tr>
<td></td>
<td>$Area = \frac{1}{2}ab \sin C$ (or alternatively $Area = \frac{1}{2} (base \times height)$)</td>
</tr>
<tr>
<td></td>
<td><img src="image3.png" alt="Diagram of triangle" /></td>
</tr>
<tr>
<td>array</td>
<td>An array is an ordered collection of objects or numbers.</td>
</tr>
<tr>
<td>association</td>
<td>In statistics, association refers to the general relationship between two variables.</td>
</tr>
<tr>
<td>asymptote</td>
<td>An asymptote to a curve is a line that the curve begins to imitate at infinity.</td>
</tr>
<tr>
<td>bearing</td>
<td>A bearing is a direction from one point on the Earth’s surface to another. Two types of bearings may be used: compass bearing and true bearings.</td>
</tr>
<tr>
<td>bias</td>
<td>Bias depends upon the context but may generally refer to a systematic favouring of certain outcomes more than others, due to unfair influence (knowingly or otherwise).</td>
</tr>
<tr>
<td>Glossary term</td>
<td>Elaboration</td>
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</tr>
<tr>
<td>bivariate data</td>
<td>Bivariate data is data relating to two variables that have both been measured on the same set of items or individuals. For example, the arm spans and heights of 16-year-olds, the sex of primary school students and their attitude to playing sport.</td>
</tr>
<tr>
<td>blood alcohol content (BAC)</td>
<td>Blood alcohol content (or BAC) is calculated using the formulae specified in the syllabus. It measures the amount of alcohol present in the bloodstream and may be used for legal purposes.</td>
</tr>
<tr>
<td>blood pressure</td>
<td>Blood pressure is the pressure exerted by circulating blood upon the walls of blood vessels. It is usually measured at a person's upper arm. Blood pressure is expressed in terms of the systolic (maximum) pressure over diastolic (minimum) pressure and is measured in millimetres of mercury (mm Hg).</td>
</tr>
<tr>
<td>box-plot</td>
<td>A box-plot is a graphical display of a five-number summary.</td>
</tr>
<tr>
<td></td>
<td>In a box-plot, the ‘box’ (a rectangle) represents the interquartile range (IQR) with ‘whiskers’ reaching out from each end of the box towards maximum and minimum values in the dataset. A line in the box is used to indicate the location of the median. Also known as a box-and-whisker plot.</td>
</tr>
<tr>
<td>break-even point</td>
<td>The break-even point is the point at which income equals the cost of production for a business.</td>
</tr>
<tr>
<td>budget</td>
<td>A budget compares estimates of income and expenditure for a certain period of time.</td>
</tr>
<tr>
<td>calorie</td>
<td>Calories are units of energy found in food and drink.</td>
</tr>
<tr>
<td>categorical data</td>
<td>Data associated with a categorical variable is called categorical data. Also known as qualitative data.</td>
</tr>
<tr>
<td>categorical variable</td>
<td>A categorical variable is a variable whose values are categories.</td>
</tr>
<tr>
<td></td>
<td>Examples include major blood type (A, B, AB or O) or principal construction type (brick, concrete, timber, steel, other).</td>
</tr>
<tr>
<td></td>
<td>Categories may have numerical labels, for example the numbers worn by players in a sporting team, but these labels have no numerical significance, they merely serve as labels.</td>
</tr>
<tr>
<td>Clark’s formula</td>
<td>The formula for medication dosages for children over 2 years:</td>
</tr>
<tr>
<td></td>
<td>[ Dosage = \frac{weight\ in\ kg \times\ adult\ dosage}{70} ]</td>
</tr>
<tr>
<td>commission</td>
<td>Commission is a payment for sales made and is calculated using a percentage of the value of goods sold.</td>
</tr>
<tr>
<td>compass bearing</td>
<td>Compass bearings are specified as angles either side of north or south. For example, a compass bearing of N50° E is found by facing north and moving through an angle of 50° to the east.</td>
</tr>
<tr>
<td>Glossary term</td>
<td>Elaboration</td>
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</tr>
<tr>
<td>complement</td>
<td>The complement of an event refers to when the event does not occur. For example, if ( A ) is the event of throwing a 5 on a dice, then the complement of ( A ), denoted by ( \overline{A} ) or ( A^c ), is not throwing a 5 on a dice.</td>
</tr>
</tbody>
</table>
| compound interest (and formula) | The interest earned by investing a sum of money (the principal) is called compound interest when each successive interest payment is added to the principal (or current balance) before calculating the next interest payment.  
If the principal \( P \) earns compound interest at the rate of \( r \) per period as a decimal, then after \( n \) periods the principal plus interest (\( A \)) is given by the compound interest formula \( A = P(1 + r)^n \) |
| constant of variation    | Also known as the constant of proportionality. See direct or inverse variation.                                                                                                                           |
| continuous data          | Continuous data is data associated with continuous variables and is a type of numerical data.                                                                                                           |
| continuous variable      | A continuous variable is a numerical variable that can take any value that lies along a continuum. In practice, the observed values are subject to the accuracy of the measurement instrument used to obtain these values.  
Examples include height, reaction time to a stimulus and systolic blood pressure.                                        |
<p>| conversion graph         | A conversion graph is a straight-line graph used to convert between two variables, for example two currencies.                                                                                          |
| Coordinated Universal Time (UTC) | Coordinated Universal Time (or UTC) is the standard by which the world regulates regional time and is the time on the Earth’s prime meridian. It was formerly widely known as Greenwich Mean Time (GMT).                           |
| cosine rule              | The cosine rule for any triangle ( ABC ) is given by ( c^2 = a^2 + b^2 - 2ab \cos C ).                                                                                                              |
| critical path            | The critical path is the sequence of network activities which combine to have the longest overall duration so as to determine the shortest possible time needed to complete a project.                        |
| cumulative frequency graph | A cumulative frequency graph or 'ogive' is a curve or series of straight lines representing the cumulative frequency for a given dataset.                                                                         |
| cumulative frequency     | The cumulative frequency is the accumulating total of frequencies within an ordered dataset.                                                                                                           |
| deciles                  | Deciles divide an ordered dataset into ten equal parts. See also quantiles.                                                                                                                            |</p>
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>declining-balance</td>
<td>The declining-balance method of depreciation measures the value of an asset that decreases by the same percentage during each time period. It is calculated using the formula $S = V_0(1 - r)^n$, where $S$ is the salvage value of the asset after $n$ periods, $V_0$ is the initial value of the asset, $r$ is the depreciation rate per period, expressed as a decimal, and $n$ is the number of periods.</td>
</tr>
<tr>
<td>method</td>
<td></td>
</tr>
<tr>
<td>dependent variable</td>
<td>A dependent variable within a statistical model is one whose value depends upon that of another and is represented on the vertical axis of a scatterplot. The dependent variable is also known as the outcome variable or the output of a function.</td>
</tr>
<tr>
<td>depreciation</td>
<td>Depreciation is a decrease in the value of an asset over time.</td>
</tr>
<tr>
<td>diastolic pressure</td>
<td>Diastolic pressure is the blood pressure in the arteries when the heart muscle is relaxed between beats.</td>
</tr>
<tr>
<td>direct variation</td>
<td>Two variables are in direct variation if one is a constant multiple of the other. This can be represented by the equation $y = kx$, where $k$ is the constant of variation (or proportion). Also known as direct proportion, it produces a linear graph through the origin.</td>
</tr>
<tr>
<td>directed networks</td>
<td>A directed network is when the edges of a network have arrows and travel is only possible in the direction of the arrows.</td>
</tr>
<tr>
<td>discrete data</td>
<td>Discrete data is data associated with discrete variables and is a type of numerical data.</td>
</tr>
<tr>
<td>discrete variable</td>
<td>A discrete variable is a numerical variable whose values can be listed. Examples include the number of children in a family, shoe size or the number of days in a month.</td>
</tr>
<tr>
<td>dividend</td>
<td>A dividend of a share is a sum of money paid by a company to its shareholders out of its profits.</td>
</tr>
<tr>
<td>dividend yield</td>
<td>A dividend yield is the dividend expressed as a percentage of the current share price.</td>
</tr>
<tr>
<td>earliest starting</td>
<td>The earliest starting time (EST) is the earliest time that any activity can be started after all prior activities have been completed.</td>
</tr>
<tr>
<td>time (EST)</td>
<td></td>
</tr>
<tr>
<td>edge (in networks)</td>
<td>In a network diagram, an edge refers to a line which joins vertices to each other. Also called an arc.</td>
</tr>
<tr>
<td>elevation views</td>
<td>Elevation views are scale drawings showing what a building looks like from the front, back and sides.</td>
</tr>
<tr>
<td>energy</td>
<td>Energy is the capacity or power to do work. The SI unit of energy is the joule though energy consumption can be measured in kilowatt hours</td>
</tr>
<tr>
<td>error</td>
<td>The error of a measurement is the deviation of the recorded/observed measurement from the actual quantity, due to device limitations, human error, etc.</td>
</tr>
<tr>
<td>event</td>
<td>An event is a set of outcomes for a random experiment.</td>
</tr>
<tr>
<td>Glossary term</td>
<td>Elaboration</td>
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<tr>
<td>-------------------------------</td>
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</tr>
<tr>
<td>expectation/expected frequency</td>
<td>In simple probability, the expectation of a particular event refers to the number of times that event will occur, on average, when the same experiment is repeated a number of times. For example, if the experiment is repeated $n$ times, and on each of those times the probability that the event occurs is $p$, then the expected frequency of the event is $np$. With ten tosses of a coin ($n = 10$), each toss sees the probability of a tail appearing as half ($p = \frac{1}{2}$), so on average we may see 5 ($np$) tails appear in ten tosses, but we may actually see 6, or 8, or 4, or… any number from 0 to 10 inclusive.</td>
</tr>
<tr>
<td>exponential function</td>
<td>An exponential function is a function in which the independent variable occurs as an exponent (or power/index) with a positive base. For example, $y = 2^x$ is an exponential function where $x$ is the independent variable.</td>
</tr>
<tr>
<td>exponential model</td>
<td>Creating an exponential model involves fitting an exponential graph and/or function to a practical situation or set of data.</td>
</tr>
<tr>
<td>extrapolation</td>
<td>Extrapolation occurs when the fitted model is used to make predictions using values that are outside the range of the original data upon which the fitted model was based. Extrapolation far beyond the range of the original data is a dangerous process as it can sometimes lead to quite erroneous predictions.</td>
</tr>
<tr>
<td>five-number summary</td>
<td>A five-number summary is a method for summarising a dataset using five statistics: the minimum value, the first quartile, the median, the third quartile and the maximum value.</td>
</tr>
<tr>
<td>float time</td>
<td>Float time is the amount of time that a task in a project network can be delayed without causing a delay to subsequent tasks.</td>
</tr>
<tr>
<td>flow capacity</td>
<td>The flow capacity of a network can be found using the maximum-flow minimum-cut theorem and depends upon the capacity of each edge in the network.</td>
</tr>
<tr>
<td>Fried's formula</td>
<td>The formula for medication dosages for children aged 1–2 years: $\text{Dosage for children 1} – \text{2 years} = \frac{\text{age (in months)}}{150} \times \text{adult dosage}$</td>
</tr>
<tr>
<td>fuel consumption rate</td>
<td>The fuel consumption rate of a vehicle measures of how much fuel it uses and is usually measured in litres per 100 kilometre (L/100km).</td>
</tr>
<tr>
<td>future value</td>
<td>The future value of an investment or annuity is the total value of the investment at the end of the term of the investment, including all contributions and interest earned.</td>
</tr>
<tr>
<td>future value interest factors</td>
<td>Future value interest factors are the values of an investment at a specific date. A table of these factors can be used to calculate the future value of different amounts of money that are invested at a certain interest rate for a specified period of time.</td>
</tr>
<tr>
<td>Glossary term</td>
<td>Elaboration</td>
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</tr>
<tr>
<td><strong>gradient</strong></td>
<td>The gradient $m$ of a line is the steepness or slope of the line and can be measured using any two points on the line/interval. Formally, if $A(x_1, y_1)$ and $B(x_2, y_2)$ are points in the Cartesian plane, where $x_2 - x_1 \neq 0$, the gradient of the line segment (interval) $AB$ is given by $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{vertical change}}{\text{horizontal change}}$.</td>
</tr>
<tr>
<td><strong>gross pay</strong></td>
<td>Gross pay is the total income per pay period (weekly, fortnightly, monthly as appropriate).</td>
</tr>
<tr>
<td><strong>GST</strong></td>
<td>GST is an abbreviation for the Goods and Services Tax which, in Australia, is a flat percentage of tax levied on most goods and services.</td>
</tr>
<tr>
<td><strong>heart rate</strong></td>
<td>Heart rate is the speed of a heartbeat in beats per minute (bpm) and measures the number of contractions of the heart per minute.</td>
</tr>
<tr>
<td><strong>Heron’s formula</strong></td>
<td>Heron’s formula determines the area of a triangle given the lengths of its sides as $a, b, c$. The formula is given by $\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$, where $s = \frac{a+b+c}{2}$.</td>
</tr>
<tr>
<td><strong>income</strong></td>
<td>Income is money earned from completed work or through investments.</td>
</tr>
<tr>
<td><strong>income tax</strong></td>
<td>Income tax is a government tax levied on taxable income.</td>
</tr>
<tr>
<td><strong>independent variable</strong></td>
<td>An independent variable within a statistical model is one whose outcomes are not due to those of another variable and is represented on the horizontal axis of a scatterplot. The independent variable is also referred to as the input of a function.</td>
</tr>
<tr>
<td><strong>inflation</strong></td>
<td>Inflation is the rate at which the general level of prices for goods and services is increasing.</td>
</tr>
<tr>
<td><strong>interest</strong></td>
<td>Interest is the amount of money earned from an investment or the additional amount paid as the result of a loan.</td>
</tr>
<tr>
<td><strong>International Date Line (IDL)</strong></td>
<td>The International Date Line (or IDL) is an imaginary line of navigation on the surface of the Earth that runs from the North Pole to the South Pole. It is the boundary prescribing the change of one calendar day to the next.</td>
</tr>
<tr>
<td><strong>interpolation</strong></td>
<td>Interpolation occurs when a fitted model is used to make predictions using values that lie within the range of the original data.</td>
</tr>
<tr>
<td><strong>interquartile range (IQR)</strong></td>
<td>The interquartile range (IQR) is a measure of the spread within a numerical dataset. It is equal to the upper quartile ($Q_3$) minus the lower quartile ($Q_1$); that is, $IQR = Q_3 - Q_1$.</td>
</tr>
<tr>
<td><strong>inverse variation</strong></td>
<td>Two variables are in inverse variation (or inverse proportion) if one is a constant multiple of the reciprocal of the other. Hence, as one variable increases, the other variable decreases. For example, if $y$ is inversely proportional to $x$, they are connected by the equation $y = \frac{k}{x}$, where $k$ is a constant of variation (or proportion).</td>
</tr>
<tr>
<td>Glossary term</td>
<td>Elaboration</td>
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</tr>
<tr>
<td>Kruskal’s algorithm</td>
<td>Kruskal’s algorithm finds a minimum-spanning tree for a connected weighted network graph.</td>
</tr>
<tr>
<td>Königsberg Bridge problem</td>
<td>The Königsberg Bridge problem asked whether the seven bridges of the old city of Königsberg could all be crossed only once during a single trip that starts and finishes at the same place.</td>
</tr>
<tr>
<td>latest starting time (LST)</td>
<td>The latest starting time (LST) is the latest time an activity may be started after all prior activities have been completed and without delaying the project.</td>
</tr>
<tr>
<td>latitude</td>
<td>Latitude is the angular distance of a point on the Earth’s surface north or south of the Earth’s equator. It is usually expressed in degrees and minutes.</td>
</tr>
<tr>
<td>least-squares regression line</td>
<td>Least-squares regression is a method for finding a straight line that summarises the relationship between two variables, within the range of the dataset. The least-squares regression line is the line that minimises the sum of the squares of the residuals. Also known as the least-squares line of best fit.</td>
</tr>
</tbody>
</table>
| limits of accuracy                | The limits of accuracy for a recorded measurement are the possible upper and lower bounds for the actual measurement as given by  
  \[ \text{Upper bound} = \text{Measurement} + \text{Absolute error} \]  
  \[ \text{Lower bound} = \text{Measurement} - \text{Absolute error} \]  |
<p>| line of best fit                  | A line of best fit is a line drawn through a scatterplot of data points that represents the nature of the relationship between two variables.          |
| linear function/linear relationship| Two variables ( x ) and ( y ) are in a linear relationship, or form a linear function, if they are connected by an equation of the form ( y = mx + c ). Graphically, ( m ) is the gradient and ( c ) is the intercept with the vertical axis of the corresponding linear graph. |
| linear model                      | Creating a linear model involves fitting a linear graph and/or function to a practical situation or set of data.                              |
| longitude                         | Longitude is the angular distance of a point on the Earth’s surface, east or west from the Earth’s prime meridian. It is usually expressed in degrees and minutes. |
| map scale                         | A map scale gives the relationship (or ratio) between a distance on a map and the corresponding distance on the ground.                       |
|                                  | For example, for a map with scale 1:100 000, 1 cm on the map represents 1 km on the ground.                                               |
| mass                             | Mass is the amount of matter that an object is composed of. The SI unit of mass is the kilogram.                                          |
| maximum-flow minimum-cut theorem  | The maximum-flow minimum-cut theorem states that the flow through a network cannot exceed the value of any cut in the network and that the maximum flow equals the value of the minimum cut, ie it identifies the ‘bottle-neck’ in the system. |</p>
<table>
<thead>
<tr>
<th>Glossary term</th>
<th>Elaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean (average)</td>
<td>There are a number of different types of means used in mathematics and statistics. When dealing with a group of numbers, their mean (or arithmetic mean) is defined as the sum of these values divided by the number of values. Also known as their average.</td>
</tr>
<tr>
<td>measures of central tendency</td>
<td>Given a dataset, the measures of central tendency give a measure about which the data lie, or a measure of the centre of the data. Also known as measures of location. The three most common measures of central tendency are the mean, the median, and the mode.</td>
</tr>
<tr>
<td>measures of spread</td>
<td>Given a numerical dataset, its measures of spread describe how spread out the data is. Common measures of spread include the range, quantiles (such as deciles, quartiles, percentiles), the interquartile range and the standard deviation.</td>
</tr>
<tr>
<td>median</td>
<td>The median of an ordered numerical dataset is the value that divides it into two equal parts. When the number of data values is odd, the median is the middle data value. When the number of data values is even, the median is the average of the two middle data values. The median as a measure of central tendency is suitable for both symmetric and skewed distributions as it is relatively unaffected by outliers.</td>
</tr>
<tr>
<td>minimum spanning tree</td>
<td>A minimum spanning tree is a spanning tree of minimum length in a connected, undirected network. It connects all the vertices together with the minimum total weighting for the edges.</td>
</tr>
<tr>
<td>modality</td>
<td>Modality describes the number of modes in a set of data. For example, data can be unimodal (having one mode), bimodal (having two modes) or multimodal (having many modes).</td>
</tr>
<tr>
<td>mode</td>
<td>The mode is the most frequently occurring value in a set of data. There can be more than one mode in a dataset.</td>
</tr>
<tr>
<td>net pay</td>
<td>Net pay is the remaining amount of gross pay after tax and other deductions have been made.</td>
</tr>
<tr>
<td>network</td>
<td>A network is a group or system of interconnecting objects which can be represented as a diagram of connected lines (called edges) and points (called vertices). For example, a rail network.</td>
</tr>
<tr>
<td>network diagram</td>
<td>A network diagram is a representation of a group of objects called vertices that are connected together by lines called edges. Also known as a network graph.</td>
</tr>
<tr>
<td>nominal data</td>
<td>Nominal data is a type of categorical data that has no natural order in which the categories may be placed.</td>
</tr>
<tr>
<td>non-linear</td>
<td>Non-linear refers to functions or graphs which cannot be represented by a straight line or a linear function.</td>
</tr>
<tr>
<td>Glossary term</td>
<td>Elaboration</td>
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</tr>
<tr>
<td>normal distribution</td>
<td>The normal distribution is a type of continuous distribution where the mean, median and mode are equal and the scores are symmetrically arranged either side of the mean. The graph of a normal distribution is often called a ‘bell curve’ due to its shape, as shown below.</td>
</tr>
<tr>
<td></td>
<td><img src="image.png" alt="Normal Distribution Graph" /></td>
</tr>
<tr>
<td></td>
<td>Formally, the normal distribution is defined by the probability density function:</td>
</tr>
<tr>
<td></td>
<td>[ f(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}, \text{ where } \mu \text{ is the mean of the distribution and } \sigma \text{ is the standard deviation} ]</td>
</tr>
<tr>
<td>numerical data</td>
<td>Numerical data is data associated with a numerical variable. Also known as quantitative data.</td>
</tr>
<tr>
<td>numerical variable</td>
<td>Numerical variables are variables whose values are numbers. Numerical variables can be either discrete or continuous.</td>
</tr>
<tr>
<td>ordinal data</td>
<td>Ordinal data is a type of categorical data where the possible categorical responses have a natural order. For example, very unhappy, unhappy, neutral, happy, very happy.</td>
</tr>
<tr>
<td>origin</td>
<td>The origin is the point of intersection of the horizontal and vertical axes on the Cartesian number plane and has coordinates (0, 0).</td>
</tr>
<tr>
<td>outcome</td>
<td>An outcome is a single possible result from an experiment.</td>
</tr>
<tr>
<td>outlier</td>
<td>An outlier in a dataset is a data value that appears to be inconsistent with the remainder of that dataset.</td>
</tr>
<tr>
<td>overtime</td>
<td>Overtime is work performed outside the usual agreed hours. Overtime is usually paid at a higher rate.</td>
</tr>
<tr>
<td>parabola</td>
<td>A parabola is an alternate name for the graph of a quadratic function. The vertex of a parabola is its highest or lowest point (or turning point). The parabola has an axis of symmetry through its vertex.</td>
</tr>
<tr>
<td>Pareto chart</td>
<td>A Pareto chart is a type of chart that contains both bars and a line graph, where individual values are represented in descending order by the bars and the cumulative total is represented by the line graph.</td>
</tr>
<tr>
<td>Glossary term</td>
<td>Elaboration</td>
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</tr>
<tr>
<td>path</td>
<td>A path in a network diagram is a walk in which all of the edges and all the vertices are different. A path that starts and finishes at different vertices is said to be open, while a path that starts and finishes at the same vertex is said to be closed. There may be multiple paths between the same two vertices.</td>
</tr>
<tr>
<td>Pay As You Go (PAYG) tax</td>
<td>Pay As You Go (PAYG) tax is a system for making regular tax instalments which are removed from gross pay towards the expected income tax liability for that financial year.</td>
</tr>
<tr>
<td>Pearson’s correlation coefficient</td>
<td>Pearson’s correlation coefficient is a linear correlation coefficient that measures the strength of the linear relationship between a pair of variables or datasets. Its value lies between -1 and 1 (inclusive). Also known as simply the correlation coefficient. For a sample, it is denoted by $r$.</td>
</tr>
<tr>
<td>percentage error</td>
<td>The percentage error of a measurement is the absolute error expressed as a percentage of the recorded measurement: $\text{percentage error} = \frac{\text{Absolute error}}{\text{Measurement}} \times 100%$</td>
</tr>
<tr>
<td>percentiles</td>
<td>Percentiles divide an ordered dataset into 100 equal parts. See also quantiles. More formally, it is a statistical measure indicating the value below which a given percentage of observations in a group of observations lie. For example, the 20th percentile is the value below which 20% of the observations may be found.</td>
</tr>
<tr>
<td>piecework</td>
<td>Piecework is employment where a worker is paid a fixed rate for each item produced or action performed regardless of the time taken.</td>
</tr>
<tr>
<td>population</td>
<td>The population in statistics is the entire dataset from which a statistical sample may be drawn.</td>
</tr>
<tr>
<td>position coordinates</td>
<td>Position coordinates are an ordered pair of latitude and longitude representing a specific location on the Earth’s surface.</td>
</tr>
<tr>
<td>present value</td>
<td>The present value of an investment or annuity is the single sum of money (or principal) that could be initially invested to produce a future value over a given period of time.</td>
</tr>
<tr>
<td>Prim's algorithm</td>
<td>Prim’s algorithm determines a minimum spanning tree for a connected weighted network.</td>
</tr>
<tr>
<td>pronumeral</td>
<td>A pronumeral is a letter or symbol that is used to represent a number.</td>
</tr>
<tr>
<td>quadratic function</td>
<td>A quadratic function is a function of the form $y = ax^2 + bx + c$ where $a \neq 0$. For example, $y = 3x^2 + 7$</td>
</tr>
<tr>
<td>quadratic model</td>
<td>Creating a quadratic model involves fitting a quadratic graph and/or function to a set of data or creating a model to describe a practical situation.</td>
</tr>
<tr>
<td>Glossary term</td>
<td>Elaboration</td>
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<tr>
<td>quantiles</td>
<td>Quantiles are a set of values that divide an ordered dataset into equal groups. Examples include quartiles, deciles and percentiles.</td>
</tr>
<tr>
<td></td>
<td>Formally in statistics, quantiles are cutpoints dividing the range of a probability distribution into continuous intervals with equal probabilities, or dividing the observations in a sample in the same way.</td>
</tr>
<tr>
<td>quartiles</td>
<td>Quartiles divide an ordered dataset into four equal parts.</td>
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<td></td>
<td>There are three quartiles. The first or lower quartile ($Q_1$), divides off (approximately) the lowest 25% of data values. The second quartile ($Q_2$) is the median. The third or upper quartile ($Q_3$), divides off (approximately) the highest 25% of data values. See also quantiles.</td>
</tr>
<tr>
<td>radial survey</td>
<td>A radial survey can be used to measure the area of an irregular block of land. In a radial survey, a central point is chosen within the block of land and measurements are taken along intervals from this point to each vertex. The angles between these intervals at the central point are also measured and recorded.</td>
</tr>
<tr>
<td>random variable</td>
<td>A random variable is a variable whose possible values are numerical outcomes of a statistical experiment or a random phenomenon.</td>
</tr>
<tr>
<td>range (of data)</td>
<td>The range is the difference between the largest and smallest observations in a dataset. It is sensitive to outliers.</td>
</tr>
<tr>
<td>rate</td>
<td>A rate is a particular kind of ratio in which the two quantities are measured in different units. For example, the ratio of distance to time, known as speed, is a rate because distance and time are measured in different units (such as kilometres and hours). The value of the rate depends on the units in which the quantities are expressed.</td>
</tr>
<tr>
<td>ratio</td>
<td>A ratio is a quotient or proportion of two numbers, magnitudes or algebraic expressions. It is often used as a measure of the relative size of two objects. For example, the ratio of the length of a side of a square to the length of a diagonal is $1: \sqrt{2}$; that is, $\frac{1}{\sqrt{2}}$.</td>
</tr>
<tr>
<td>reciprocal function</td>
<td>A function where the independent variable, $x$, is the denominator in a fraction. Examples of reciprocal functions include those of the form $y = \frac{k}{x}$. See also inverse variation.</td>
</tr>
<tr>
<td>reciprocal model</td>
<td>Creating a reciprocal model involves fitting a reciprocal graph and/or a function to a practical situation or set of data.</td>
</tr>
<tr>
<td>rectangular hyperbola</td>
<td>The graph of a reciprocal function is a type of rectangular hyperbola.</td>
</tr>
<tr>
<td></td>
<td>A rectangular hyperbola is a hyperbola for which the asymptotes are perpendicular.</td>
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<tr>
<td>recurrence relation</td>
<td>A recurrence relation occurs when each successive application uses the resultant value of the previous application to generate the next value. Examples include compound interest and annuities.</td>
</tr>
<tr>
<td>Glossary term</td>
<td>Elaboration</td>
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</tr>
<tr>
<td>reducing balance loan</td>
<td>A reducing balance loan is a compound interest loan where the loan is repaid by making regular payments and the interest paid is calculated on the amount still owing (the reducing balance of the loan) after each payment is made.</td>
</tr>
<tr>
<td>relative frequency</td>
<td>Relative frequency is a measure of the number of times that an event has occurred in a repeated experiment. If an event ( E ) occurs ( r ) times when a chance experiment has been repeated ( n ) times, then the relative frequency of ( E ) is ( \frac{r}{n} ).</td>
</tr>
<tr>
<td>residuals</td>
<td>The residual of an observed value is the difference between the observed value and the estimated value of the quantity of interest.</td>
</tr>
<tr>
<td>salary</td>
<td>A salary is a fixed form of periodic payment from an employer to an employee, which is usually specified in an employment contract.</td>
</tr>
<tr>
<td>sample space</td>
<td>The sample space of an experiment is the set of all possible outcomes for that experiment.</td>
</tr>
<tr>
<td>sampling</td>
<td>Sampling is the selection of a subset of data from a statistical population. Methods of sampling include:</td>
</tr>
<tr>
<td></td>
<td>(a) systematic sampling – sample data is selected from a random starting point and using a fixed periodic interval.</td>
</tr>
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<td></td>
<td>(b) self-selecting sampling – non-probability sampling where individuals volunteer themselves to be part of a sample.</td>
</tr>
<tr>
<td></td>
<td>(c) simple random sampling – sample data is chosen at random where each member has an equal probability of being chosen.</td>
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<tr>
<td></td>
<td>(d) stratified sampling – after dividing the population into separate groups or strata, a random sample is then taken from each group/strata in an equivalent proportion to the size of that group/strata in the population. A sample can be used to estimate the characteristics of the statistical population.</td>
</tr>
<tr>
<td>scale drawing</td>
<td>A drawing that shows a real object with accurate measurements that have been either reduced or enlarged by the same factor (the scale).</td>
</tr>
<tr>
<td>scale factor</td>
<td>A scale factor is a number that scales, or multiplies, some quantity.</td>
</tr>
<tr>
<td></td>
<td>If two or more figures are similar, their sizes can be compared. The scale factor is the ratio of the length of one side on one figure to the length of the corresponding side on the other figure. It is a measure of magnification, the change of size.</td>
</tr>
<tr>
<td>scatterplot</td>
<td>A scatterplot is a two dimensional data plot using Cartesian coordinates to display the values of two variables in a bivariate dataset. Also known as a scatter graph.</td>
</tr>
<tr>
<td>share</td>
<td>A share is one of the equal parts into which a company's capital is divided, entitling the shareholder to a portion of the company’s profits.</td>
</tr>
<tr>
<td>shortest path</td>
<td>The shortest path in a network diagram is the path between two vertices in a network where the sum of the weights of its edges are minimized.</td>
</tr>
<tr>
<td>Glossary term</td>
<td>Elaboration</td>
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</tr>
<tr>
<td>significant figures</td>
<td>A digit in a number is considered to be a significant figure if it is:</td>
</tr>
<tr>
<td></td>
<td>● Non-zero</td>
</tr>
<tr>
<td></td>
<td>● A zero between two non-zero digits</td>
</tr>
<tr>
<td></td>
<td>● A zero on the end of a decimal due to precision of the measurement</td>
</tr>
<tr>
<td></td>
<td>● Zeros in whole numbers that indicate the degree of accuracy</td>
</tr>
<tr>
<td>similarity</td>
<td>Two figures are similar if the enlargement of one figure is congruent to the other. Similar figures have corresponding lengths in the same proportion, are the same shape and have equal corresponding angles.</td>
</tr>
<tr>
<td>simple interest</td>
<td>Simple interest is the interest accumulated when the interest payment in each period is a fixed fraction of the principal (the initial lump sum or investment of money).</td>
</tr>
<tr>
<td>(and formula)</td>
<td>The simple interest formula is given by $I = Prn$ where $I$ is the interest earned, $P$ is the principal value invested, $r$ is the rate of interest and $n$ is the number of time periods over which the interest is applied.</td>
</tr>
<tr>
<td>sine rule</td>
<td>The Sine Rule for any triangle $ABC$ is given by</td>
</tr>
<tr>
<td></td>
<td>$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$</td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Sine Rule Diagram" /></td>
</tr>
<tr>
<td>sketch</td>
<td>A sketch is an approximate representation of a graph, including labelled axes, intercepts and any other important relevant features. Compared to the corresponding graph, a sketch should be recognisably similar but does not need to be exact.</td>
</tr>
<tr>
<td>spanning tree</td>
<td>A spanning tree of an undirected network diagram is a diagram which includes all the vertices of the original network connected together, but not necessarily all the edges of the original network diagram. A network can have many different spanning trees.</td>
</tr>
<tr>
<td>standard deviation</td>
<td>Generally, standard deviation is a measure of the spread of a dataset, giving an indication of how far, on average, individual data values are spread around their mean.</td>
</tr>
<tr>
<td></td>
<td>The calculation of a standard deviation depends on whether the data is dealing with a sample or population as well as discrete or continuous variables.</td>
</tr>
<tr>
<td>standard drink</td>
<td>A drink that contains 10 grams of alcohol.</td>
</tr>
<tr>
<td>standard form</td>
<td>A real number is expressed in standard form when it is written in the form $a \times 10^n$ where $1 \leq a &lt; 10$ and $n$ is an integer. Also known as scientific notation.</td>
</tr>
<tr>
<td>Glossary term</td>
<td>Elaboration</td>
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<tr>
<td>straight-line method</td>
<td>In straight-line method of depreciation, the value of the depreciating asset decreases by the same amount during each time period.</td>
</tr>
<tr>
<td></td>
<td>It is calculated using the linear function $S = V_0 - Dn$, where $S$ is the salvage value of the asset after $n$ periods, $V_0$ is the initial</td>
</tr>
<tr>
<td></td>
<td>value of the asset, $D$ is the amount of depreciation per period, and $n$ is the number of periods. Also known as the ‘Prime Cost method’.</td>
</tr>
<tr>
<td>summary statistics</td>
<td>Summary statistics refers to numbers that summarise a given dataset. For example, a five-number summary.</td>
</tr>
<tr>
<td>systolic pressure</td>
<td>Systolic pressure is the blood pressure in the arteries during contraction of the heart muscle.</td>
</tr>
<tr>
<td>Target Heart Rate</td>
<td>The Target Heart Rate is defined as the minimum number of heartbeats in a given amount of time in order to reach the level of exertion necessary</td>
</tr>
<tr>
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<td>for cardiovascular fitness and is specific to a person's age, gender or physical fitness. An example of a target heart rate is 150bpm to burn</td>
</tr>
<tr>
<td></td>
<td>fat for a woman in her 30s.</td>
</tr>
<tr>
<td>tax return</td>
<td>A tax return is an annual statement of all income, allowable deductions, PAYG tax paid and other personal financial information so as to allow</td>
</tr>
<tr>
<td></td>
<td>the Australian Taxation Office to calculate the amount of income tax an individual should pay for the financial year.</td>
</tr>
<tr>
<td>taxable income</td>
<td>Taxable income is the amount of yearly income that is used to calculate an individual’s or company’s payable income tax.</td>
</tr>
<tr>
<td>Trapezoidal rule</td>
<td>The Trapezoidal rule uses trapezia to approximate the area of an irregular shape, often with a curved boundary. Given a transverse line of</td>
</tr>
<tr>
<td></td>
<td>length $h$ and two perpendicular offset lengths $d_f$ and $d_l$, one application of the Trapezoidal rule is given by: $Area \approx \frac{h}{2}(d_f + d_l)$</td>
</tr>
<tr>
<td>tree (networks)</td>
<td>A tree is an undirected network in which any two vertices are connected by exactly one path.</td>
</tr>
<tr>
<td>tree diagram</td>
<td>A tree diagram is a diagram that can be used to determine the outcomes of a multistep random experiment. A probability tree diagram has the</td>
</tr>
<tr>
<td></td>
<td>probability for each stage written on the branches.</td>
</tr>
<tr>
<td>true bearing</td>
<td>True bearings are measured in degrees clockwise from true north and are written with three digits being used to specify the direction.</td>
</tr>
<tr>
<td></td>
<td>For example, the direction of north is specified 000°, east is specified as 090°, south is specified as 180° and north-west is specified as 315°.</td>
</tr>
<tr>
<td>vertex (in networks)</td>
<td>A vertex is a point in a network diagram at which lines of pathways (called edges) intersect or branch. Also called a node.</td>
</tr>
<tr>
<td>wage</td>
<td>A wage is the money paid to an employee by an employer in exchange for a number of hours of work done.</td>
</tr>
<tr>
<td>Glossary term</td>
<td>Elaboration</td>
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</tr>
<tr>
<td>weighted edge</td>
<td>A weighted edge is the edge of a network diagram that has a number assigned to it which implies some numerical value such as cost, distance or time.</td>
</tr>
<tr>
<td>Young’s formula</td>
<td>This is a formula for medication dosages for children aged 1-12 years: $\text{Dosage for children 1 – 12 years} = \frac{\text{age of child (in years) \times adult dosage}}{\text{age of child (in years) + 12}}$</td>
</tr>
<tr>
<td>z-score</td>
<td>A $z$-score is a statistical measure of how many standard deviations a raw score is above or below the mean. A $z$-score can be positive or negative, indicating whether it is above or below the mean, or zero. Also known as a standardised score.</td>
</tr>
</tbody>
</table>