DEPARTMENT OF EDUCATION
learners first

Personal futures

Mathematics

Essential Mathematics - Workplace 2

Course document

independent schools tasmania

Catholic Education Tasmania

Years 9-12 Learning

Tasmanian Government

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Essential Mathematics – Workplace, 150 hours – Level 2

Focus area – Personal futures

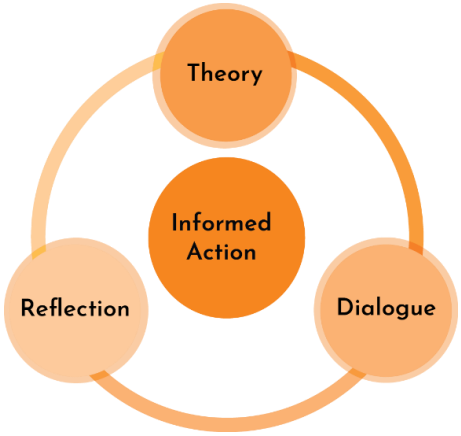
Courses aligned to the Years 9 to 12 Curriculum Framework belong to one of the five focus areas of Discipline-based study, Transdisciplinary projects, Professional studies, Work-based learning and Personal futures.

Essential Mathematics – Workplace Level 2 is a Personal futures course.

Personal futures courses prepare learners to be independent young adults, able to lead healthy, fulfilled and balanced lives. Learning is highly personalised. Learners develop strategies to optimise learning, make decisions, solve problems, set career and life goals, and pursue areas of strong personal interest. Personal Futures supports learners to develop the required knowledge, skills and understandings to make informed choices that enhance their own and others' health and wellbeing. The inclusion of Personal futures as a focus area responds to a range of contemporary research findings highlighting the importance of learners having broad educational goals that include individual and collective wellbeing and opportunities for student agency as they navigate a complex and uncertain world.

Personal futures courses have three key features that guide teaching and learning:

- theory and dialogue
- informed action
- reflection and dialogue.



In this course learners will do this by:

- engaging with theory and concepts to build the theoretical understanding, background knowledge, rules and conventions of mathematics
- interacting and working with other people and engaging in mathematical discourse to explore ideas, reasoning and approaches
- identifying challenges and problems and using problem solving and mathematical reasoning to test and refine ideas, take informed action and compare solutions
- reflecting on their own understanding, integrating prior knowledge and sharing solutions with others.

Rationale

Essential Mathematics – Workplace Level 2 is offered alongside *Essential Mathematics – Personal* Level 2. The two courses provide learners with different topics and together they provide breadth rather than progression of complexity. Consequently, there is no defined order for undertaking these courses and learners may choose to do either one or both according to their personal interests and needs.

In *Essential Mathematics – Workplace* Level 2 learners develop their understanding of concepts and techniques drawn from finance and money management, construction and analysis of graphs, interpretation and measurement of shape, scale and models.

This will assist them in making informed decisions, particularly relating to the workplace. By undertaking this course, learners will develop their ability to identify and solve problems in real contexts, and in a range of workplace, individual, further learning and community settings. Learners will work collaboratively with others to generate ideas and to find innovative approaches to engaging with mathematics. Learners will reflect on their ability to interpret, understand and apply these concepts and techniques.

This course will enable learners to develop their mathematical proficiency to a standard required to enter the workforce and participate effectively. This is a key factor in ensuring Tasmania and Australia's current and emerging needs are met. The nation's ability to compete globally requires a substantial number of proficient workers able to learn, adapt, create, interpret, analyse and apply mathematical information.

The purpose of Years 9 to 12 Education is to enable all learners to achieve their potential through Years 9 to 12 and beyond in further study, training or employment.

Years 9 to 12 Education enables personal empowerment, cultural transmission, preparation for citizenship and preparation for work.

This course is built on the principles of access, agency, excellence, balance, support and achievement as part of a range of programs that enables learners to access a diverse and flexible range of learning opportunities suited to their level of readiness, interests and aspirations.

Learning outcomes

On successful completion of this course, learners will be able to:

1. communicate thinking, strategies and solutions using appropriate mathematical or statistical language
2. plan, organise and manage learning in order to complete tasks and evaluate progress
3. apply numeric techniques and algebraic processes to represent situations and solve problems
4. apply reasoning skills to interpret mathematical and statistical information, and ascertain the reasonableness of solutions to problems
5. act as creative, critical and reflective thinkers to assess ideas and take informed action
6. apply concepts and techniques involving finance and money management
7. apply concepts and techniques involving graphs and representations of data
8. apply concepts and techniques involving measurement, scales, plans and models.

Integration of general capabilities and cross-curriculum priorities

The general capabilities addressed specifically in this course are:

- Critical and creative thinking
- Literacy
- Numeracy
- Personal and social capability

The cross-curriculum priorities enabled through this course are:

- Aboriginal and Torres Strait Islander histories and cultures
- Asia and Australia's engagement with Asia
- Sustainability

Course description

Essential Mathematics – Workplace Level 2 enables learners to develop essential mathematical skills and understanding.

They will study:

- finance and money management
- probability and statistics
- measurement, scales, plans and models.

Learners will solve problems, explain their reasoning and investigate, explore and model situations.

By discussing ideas with others, learners will reflect and extend their own thinking. They will apply their learning to make informed decisions and take on further mathematical challenges.

Pathways

The *Essential Mathematics – Workplace* Level 2 course enables learning continuity from Year 10 Australian Curriculum: Mathematics, for learners who have achieved an "approaching the Standard" rating or higher. Learners who have successfully undertaken the TASC accredited course *Mathematics* Level 1 could progress into this course. Additionally, learners who have completed *Essential Mathematics – Personal* Level 2 and wish to broaden their essential mathematical knowledge and understanding could enrol in this course.

Essential Mathematics – Workplace Level 2 will provide the foundational technical knowledge that may be sufficient for further vocational education and training courses.

Course requirements

Access

This course requires learners to collaborate with others. If they choose, learners may access this course and *Essential Mathematics – Personal* Level 2 in the same year.

Resource requirements

Learners will require access to scientific calculators in this course. On occasion, computers and the internet will be required to enable learners' access to information and data sources.

Course structure and delivery

Structure

This course consists of three 50-hour modules.

Module 1: Finance and money management

Module 2: Interpreting graphs, representing and comparing data

Module 3: Measurement, scale, plans and models

Delivery

There is no specific recommended delivery sequence for the modules.

Course content

Module 1: Finance and money management

This module contains two topics:

- earning and managing money
- interest and depreciation.

'Earning and managing money' involves the application of knowledge, skills and understanding of numbers to calculate earnings through wages, benefits and allowances, and understanding tax.

'Interest and depreciation' enables learners to analyse different financial situations, to calculate the best options for given circumstances, and to solve financial problems.

The study of financial mathematics is important in developing learners' ability to interpret financial records, make informed financial decisions, be aware of the consequences of such decisions, and to manage personal financial resources effectively.

Module 1 learning outcomes

The following learning outcomes are a focus of this module:

1. communicate thinking, strategies and solutions using appropriate mathematical or statistical language
2. plan, organise and manage learning in order to complete tasks and evaluate progress
3. apply numeric techniques and algebraic processes to represent situations and solve problems
4. apply reasoning skills to interpret mathematical and statistical information, and ascertain the reasonableness of solutions to problems
5. act as creative, critical and reflective thinkers to assess ideas and take informed action
6. apply concepts and techniques involving finance and money management.

Module 1 content

Key knowledge and skills

Topic 1 – earning and managing money

- calculate monthly, fortnightly, weekly, daily or hourly pay rates from a given salary; wages involving hourly rates and penalty rates, including situations involving overtime and other special allowances; and earnings based on commission, including commission based on a sliding scale, piecework or royalties:
  - calculate annual leave loading
  - calculate payments based on government allowances and pensions
- calculate income tax:
  - identify allowable tax deductions
  - calculate taxable income after allowable tax deductions are taken from gross pay
  - calculate the Medicare levy (basic levy only)
  - calculate the amount of Pay As You Go (PAYG) tax payable per fortnight or per week using current tax scales, and use this to determine if more tax is payable or if a refund is owed after completing a tax return
- calculate net pay following deductions from income
- use technology to perform financial computations; for example, calculating percentage change, calculating tax payable and preparing a wage-sheet.

Topic 2 – interest and depreciation

- review the principles of simple interest
- calculate simple interest for different rates and periods
- use a spreadsheet to calculate and graph compound interest as a recurrence relation involving repeated applications of simple interest
- consider similar problems involving compounding; for example, population growth
- use technology to calculate the future value of a compound interest loan or investment and the total interest paid or earned
- use technology to compare, numerically and graphically, the growth of simple interest and compound interest loans and investments
- use technology to investigate the effect of the interest rate and the number of compounding periods on the future value of a loan or investment
- use technology and a recurrence relation to model a reducing balance loan
- investigate the effect of the interest rate and repayment amount on the time taken to repay a loan
- calculate the depreciation of an asset using the straight-line method as an application of the simple interest formula.

Module 1 work requirements

This module includes the following work requirement:

- connected series of short responses relating to finance and money management.

See Appendix 3 for the full specifications of the work requirements of this course.

Module 1 assessment

This module has a focus on criteria 1, 2, 3, 4, 5 and 6.

Module 2: Interpreting graphs, representing and comparing data

This module contains two topics:

- reading, interpreting and drawing graphs
- data representation and interpretation.

'Reading, interpreting and drawing graphs' will enable learners to develop their ability to read and interpret information contained in two-way tables and different graph types, and to draw graphs. They will discuss and validate information portrayed in the media and routine texts.

'Data representation and interpretation' will enable learners to identify and display numerical and categorical statistical information, and to identify and compare the suitability of different data representations according to the context. They will calculate and compare averages, investigate measures of central tendency and use informal language to describe the variation or range of data.

Module 2 learning outcomes

The following learning outcomes are a focus of this module:

1. communicate thinking, strategies and solutions using appropriate mathematical or statistical language
2. plan, organise and manage learning in order to complete tasks and evaluate progress
3. apply numeric techniques and algebraic processes to represent situations and solve problems
4. apply reasoning skills to interpret mathematical and statistical information, and ascertain the reasonableness of solutions to problems
5. act as creative, critical and reflective thinkers to assess ideas and take informed action
7. apply concepts and techniques involving graphs and representations of data.

Module 2 content

Key knowledge and skills

Topic 1 – reading, interpreting and drawing graphs

- interpret information presented in graphs, such as conversion graphs, line graphs, step graphs, column graphs and picture graphs
- interpret information presented in two-way tables
- discuss and interpret graphs found in the media and in factual texts
- determine which type of graph is best used to display a dataset
- use spreadsheets to tabulate and graph data
- draw a line graph to represent any data that demonstrates a continuous change, such as hourly temperature.

Topic 2 – data representation and interpretation

- identify examples of categorical data
- identify examples of numerical data
- display categorical data in tables and column graphs
- display numerical data as frequency distributions, dot plots, stem-and-leaf plots and histograms
- recognise and identify outliers
- compare the suitability of different methods of data presentation in real-world contexts
- identify the mode
- calculate measures of central tendency, the arithmetic mean and the median
- investigate the suitability of measures of central tendency in various real-world contexts
- investigate the effect of outliers on the mean and the median

- calculate and interpret quartiles, deciles and percentiles
- use informal ways of describing spread, such as spread out or dispersed, tightly packed, clusters, gaps, more or less dense regions, outliers
- calculate and interpret statistical measures of spread, such as the range, interquartile range and standard deviation
- investigate real-world examples from the media illustrating inappropriate uses, or misuses, of measures of central tendency and spread
- compare back-to-back stem-and-leaf plots for different datasets
- complete a five-number summary for different datasets
- construct box plots using a five-number summary
- compare the characteristics of the shape of histograms using symmetry, skewness and bimodality.

Module 2 work requirements

This module includes the following work requirement:

- a series of connected short responses related to statistical analysis.

See Appendix 3 for the full specifications of the work requirements of this course.

Module 2 assessment

This module has a focus on criteria 1, 2, 3, 4, 5 and 7.

Module 3: Measurement, scales, plans and models

This module contains two topics:

- measurement and shape
- scales, plans and models.

'Measurement' provides opportunities to conduct measurements in practical situations relating to two-dimensional shapes and three-dimensional objects, including mass and capacity, and to calculate, compare and solve problems relating to these measurements. Learners will also consider implications of factors including estimation, precision and accuracy when using scaled instruments in this topic.

'Scales, plans and models' includes recognising and using the properties, symbols and conventions for representing geometric information relating to two-dimensional shapes and three-dimensional objects. It involves using similarity and scale factor to obtain measurements and to construct and interpret plans and models, which has practical application in many fields, including construction, design, landscaping and photography.

Module 3 learning outcomes

The following learning outcomes are a focus of this module:

1. communicate thinking, strategies and solutions using appropriate mathematical or statistical language
2. plan, organise and manage learning in order to complete tasks and evaluate progress
3. apply numeric techniques and algebraic processes to represent situations and solve problems
4. apply reasoning skills to interpret mathematical and statistical information, and ascertain the reasonableness of solutions to problems
5. act as creative, critical and reflective thinkers to assess ideas and take informed action
8. apply concepts and techniques involving measurement, scales, plans and models.

Module 3 content

Key knowledge and skills

Topic 1 – perimeter, area, volume and capacity

- consider the importance of accuracy, describe when estimation is acceptable, make estimations and describe possible implications of error in a variety of practical scenarios
- calculate the absolute error of a reported measurement using:
  $\text{absolute error} = \frac{1}{2} \times \text{precision}$ and state the corresponding limits of accuracy
- find the limits of accuracy as given by:
  $\text{upper bound} = \text{measurement} + \text{absolute error}$
  $\text{lower bound} = \text{measurement} - \text{absolute error}$
- investigate types of errors; for example, human error or device limitations
- calculate the percentage error of a reported measurement using:
  $$\text{percentage error} = \frac{\text{absolute error}}{\text{measurement}} \times 100\%$$
- make conversions between units of length, area and volume
- review and extend how to solve practical problems requiring the calculation of perimeters and areas of triangles, rectangles, parallelograms, trapezia, circles, sectors of circles, arc lengths and composite shapes
- calculate perimeters and areas of irregularly shaped blocks of land by decomposition into regular shapes including triangles and trapezia
- solve problems involving surface area of solids including prisms, cylinders, spheres, pyramids and composite solids
- solve problems involving volume and capacity of solids including prisms, cylinders, spheres, pyramids and composite solids:
  - convert between units of volume and capacity
  - solve a variety of practical problems with and without technology; for example, the volume of water in a swimming pool
- solve practical problems involving taking measurements and calculating perimeters, area, surface area, volumes and capacity in a variety of contexts.

Topic 2 – scales, plans and models

This topic has three subtopics:

- geometric information
- interpreting scale drawings, plans and models
- creating scale drawings.

Geometric information

- recognise the properties of common two-dimensional geometric shapes and three-dimensional solids
- interpret different forms of two-dimensional representations of three-dimensional objects, including nets and perspective diagrams
- use symbols and conventions for the representation of geometric information; for example, point, line, ray, angle, diagonal, edge, curve, face and vertex.

Interpreting scale drawings, plans and models

- review the use of a scale factor to find unknown lengths in similar figures
- obtain measurements from scale drawings, including maps and cultural mappings or models, or building plans to solve problems; for example:
  - interpret commonly used symbols and abbreviations on building plans and elevation view
  - find actual measurements from scale drawings, such as lengths, perimeters and areas
  - calculate the perimeter or area of a section of land, using the trapezoidal rule where appropriate, from a variety of sources, including a site plan, an aerial photograph, radial surveys or maps that include a scale
  - calculate the volume of rainfall over an area, using $V = Ah$, from a variety of sources, including site plans, aerial photographs, radial surveys or maps that include a scale
  - estimate and compare quantities, materials and costs using actual measurements from scale drawings; for example, using measurements for packaging, clothes, painting, bricklaying and landscaping
  - interpret and sketch elevation views of models
  - interpret diagrams of three-dimensional objects.

Creating scale drawings

- understand and apply drawing conventions of scale drawings, such as scales in ratio, clear indications of dimensions, and clear labelling
- construct scale drawings by hand and by using software packages.

Module 3 work requirements

This module includes the following work requirement:

- a connected series of short responses that relate to measurement.

See Appendix 3 for the full specifications of the work requirements of this course.

Module 3 assessment

This module has a focus on criteria 1, 2, 3, 4, 5 and 8.

Assessment

Criterion-based assessment is a form of outcomes assessment that identifies the extent of learner achievement at an appropriate endpoint of study. Although assessment as part of the learning program is continuous, much of it is formative and is done to help learners identify what they need to do to attain the maximum benefit from their study of the course. Therefore, assessment for summative reporting to TASC will focus on what both teacher and learner understand to reflect endpoint achievement.

The standard of achievement each learner attains on each criterion is recorded as a rating 'A', 'B', or 'C', according to the outcomes specified in the standards section of the course.

A 't' notation must be used where a learner demonstrates any achievement against a criterion less than the standard specified for the 'C' rating.

A 'z' notation is to be used where a learner provides no evidence of achievement at all.

Internal assessment of all criteria will be made by the provider. Providers will report the learner's rating for each criterion to TASC.

Criteria

The assessment for *Essential Mathematics – Workplace* Level 2 will be based on the degree to which the learner can:

1. communicate mathematical ideas and information and apply mathematical conventions
2. manage and take responsibility for learning and evaluate mathematical development
3. apply numeric and algebraic techniques and processes to investigate and represent real-world situations and solve problems
4. apply mathematical reasoning to interpret information, justify chosen approaches and explain the reasonableness of solutions
5. create, apply and reflect on mathematical strategies to solve problems, refine personal decisions and take informed action
6. interpret concepts and apply mathematical techniques to solve problems involving finance and money management
7. interpret concepts and apply mathematical techniques to solve problems involving graphs and representations of data
8. interpret concepts and apply mathematical techniques to solve problems involving measurement, scales, plans and models.

	Module 1	Module 2	Module 3
Criteria focus	1,2,3,4,5,6	1,2,3,4,5,7	1,2,3,4,5,8

Standards

Criterion 1: communicate mathematical ideas and information and apply mathematical conventions

Criterion elements	Rating A	Rating B	Rating C
E1 - Communicates observations and judgements	communicates clear and reasoned observations and judgements using appropriate mathematical and statistical terminology and language	communicates clear observations and judgements using appropriate mathematical and statistical terminology and language	communicates observations and judgements using appropriate mathematical and statistical terminology and language
E2 - Uses conventions	uses mathematical conventions, systems and constructs including manipulation and use of symbolic expressions, rules and formal systems accurately and purposefully	uses mathematical conventions, systems and constructs including manipulation and use of symbolic expressions and rules appropriately on most occasions	uses mathematical conventions, systems and constructs based on definitions and rules when prompted
E3 - Uses units and notation	presents work with correct use of units and notation throughout calculations to convey mathematical information	presents the final answer with correct use of units and notation as required	uses correct units and notation when prompted
E4 - Identifies solutions	presents work with the final answer clearly identified and articulated in terms of the questions where necessary.	presents work with the final answer clearly identified.	presents work with the final answer apparent.

Criterion 2: manage and take responsibility for learning and evaluate mathematical development

Criterion elements	Rating A	Rating B	Rating C
E1 - Reflects on performance	analyses learning strengths and weaknesses in order to establish processes to plan, monitor and assess understanding and performance	recognises learning strengths and weaknesses and establishes processes to plan, monitor and assess understanding and performance	identifies own personal traits that promote or inhibit learning performance and understanding
E2 - Manages time	monitors and analyses progress towards meeting own goals and timelines	sets own goals and timelines, and monitors progress	sets goals and timelines, and monitors progress with support
E3 - Plans and organises	selects and applies effective organisational, planning and self-management skills to manage resources and complete all learning tasks	applies organisational, planning and self-management skills to manage resources and consistently complete tasks	uses a limited range of tools to organise and plan to manage resources and complete set tasks with support
E4 - Works independently and collaboratively	performs tasks, demonstrates initiative, and guides others in their contribution to the completion of individual and collaborative activities	performs tasks and demonstrates initiative when contributing to the completion of individual and collaborative activities	performs tasks as directed to contribute to the completion of individual and collaborative activities
E5 - Monitors task contributions	explains own and other learners' contributions to completion of collaborative activities.	describes own contribution to completion of collaborative activities.	identifies own contribution to completion of collaborative activities.

Criterion 3: apply numeric and algebraic techniques and processes to represent real-world situations and solve problems

Criterion elements	Rating A	Rating B	Rating C
E1 - Represents real-world situations	interprets complex familiar and non-familiar real-world situations and frames them in mathematical terms	interprets complex familiar real-world situations and frames them in mathematical terms	explores simple familiar real-world situations and frames them in mathematical terms
E2 - Represents numbers and applies numeric techniques	converts flexibly between representations of fractions, decimals, percentages and ratios, and uses them accurately in complex unfamiliar calculations	converts between fractions, decimals, percentages and ratios, and uses them accurately in complex familiar calculations	identifies fractions, decimals, percentages and ratios and the relationships between them, and uses them accurately in simple calculations
E3 - Uses standard algorithms and algebraic techniques to solve problems	applies order of operations, correctly, and accurately substitutes variables into complex familiar equations to find an unknown that is not the subject of the equation by transposition.	applies order of operations, correctly on most occasions, and accurately substitutes variables into complex familiar equations to find an unknown that is the subject of the equation.	uses standard algorithms for the four basic number operations correctly, and accurately substitutes variables into simple familiar equations to find an unknown that is the subject of the equation.

Criterion 4: apply mathematical reasoning to interpret information, justify chosen approaches and explain the reasonableness of solutions

Criterion elements	Rating A	Rating B	Rating C
E1 - Makes inferences	explores and links elements of problems to make logical inferences that can be tested mathematically	identifies and explains elements of problems to make informed inferences that can be tested mathematically	identifies elements of problems and makes inferences
E2 - Analyses results	relates experimental findings to real-world phenomena, describing differences and analysing possible reasons for these differences	relates experimental findings to real-world phenomena, noting differences and identifying possible reasons for these differences	compares experimental findings to expected results in familiar contexts, and identifies possible reasons for differences
E3 - Justifies chosen approaches	justifies why the mathematical applications and processes used were appropriate for the context	describes and explains how the mathematical applications and processes used were appropriate for the context	describes the mathematical applications and processes used to solve problems
E4 - Explains reasonableness of solutions	evaluates and explains the reasonableness of results and solutions to routine and non-routine problems in a variety of contexts.	explains the reasonableness of results and solutions to routine and non-routine problems.	describes the reasonableness of results and solutions to routine problems.

Criterion 5: create, apply and reflect on mathematical strategies to solve problems, refine personal decisions and take informed action

Criterion elements	Rating A	Rating B	Rating C
E1 - Creates mathematical strategies	generates ideas and refines and tests chosen approaches to solve problems	generates ideas and tests chosen approaches to solve problems	generates ideas and approaches to solve problems
E2 - Reflects and builds understanding	uses reflective thinking strategies to assess ideas or opinions and responds to clarifying questions to build understanding about situations	uses reflective thinking strategies to identify other ideas or opinions and asks clarifying questions to build understanding about situations	uses reflective thinking strategies to describe their understanding of a situation in mathematical terms
E3 - Reflects and refines personal thinking	evaluates why their thinking has changed over time	explains how their thinking has changed over time	describes when their thinking has changed
E4 - Plans and takes informed action	plans and takes informed action effectively in given and chosen contexts.	plans and takes informed action in given contexts.	plans and takes informed action in a given context.

Criterion 6: interpret concepts and apply mathematical techniques to solve problems involving finance and money management

Criterion elements	Rating A	Rating B	Rating C
E1 - Interprets financial information	interprets and solves problems involving reconciliation of financial records†	interprets and solves problems involving financial records†	interprets and solves problems involving basic financial records†
E2 - Calculates earnings and associated taxes and levies	calculates and compares pay rates, wages including government allowances or pensions and tax including deductions and levies in complex familiar situations	calculates pay rates, wages and tax including deductions and levies in complex familiar situations	calculates pay rates, wages and tax in simple familiar situations
E3 - Calculates and compares simple and compound interest and depreciation	calculates future value of simple and compound interest loans and compares and describes the growth of different loans over time	calculates compound interest as a recurrence relation involving repeated application of simple interest, and represents graphically	calculates simple interest or depreciation using a given formula, and represents graphically
E4 - Uses technology to model, compare and investigate loans and investments	uses technology to model and compare results of alternative financial decisions and solve complex unfamiliar financial problems.	uses technology to model financial situations and solve complex familiar financial problems.	uses technology to calculate and solve simple familiar financial problems.

† Financial records in this course include those that are basic: pay slips, single component invoices and receipts; and those that are more complex: bank statements, credit card statements, utility bills, multiple component invoices and repayment schedules.

Criterion 7: interpret concepts and apply mathematical techniques to solve problems involving graphs and representations of data

Criterion elements	Rating A	Rating B	Rating C
E1 - Interprets information and graphs	interprets information presented in two-way tables and graphs and justifies which type of graph is best used to display a dataset	interprets information presented in two-way tables and graphs and compares suitability of displays of datasets	identifies and describes information presented in two-way tables and graphs
E2 - Represents statistical information	represents statistical information accurately in tables and detailed plots and charts	represents statistical information accurately in tables, plots and charts	represents statistical information in tables, plots and charts
E3 - Interprets and compares spread or shape of data	calculates and interprets statistical measures of spread and compares the shape of histograms using formal terms across multiple datasets	calculates statistical measures of spread and describes the shape of histograms using formal terms	calculates basic statistical measures and uses informal language to describe spread and identifies outliers
E4 - Justifies interpretation of data	interprets data using measures of central tendency, the arithmetic mean and median and statistical measures of spread, acknowledges the effect of outliers and justifies chosen methods.	investigates the suitability of measures of central tendency and the effect of outliers on the mean and median and compares suitability of approaches.	calculates measures of central tendency, the arithmetic mean and median and statistical measures of spread.

Criterion 8: interpret concepts and apply mathematical techniques to solve problems involving measurement, scales, plans and models

Criterion elements	Rating A	Rating B	Rating C
E1 - Interpret practicalities of measurement	describes possible implications of error in measurements, and explains what level of error is acceptable or not in a given context	investigates types of errors in measurements, calculates errors as a percentage and identifies what percentage error is acceptable in a given context	calculates the absolute error of reported measurements and identifies possible causes of error
E2 - Solves problems involving perimeter, area, surface area, volume and capacity	solves routine and non-routine problems involving perimeter and area of composite two-dimensional shapes, and surface area, volume and capacity of composite three-dimensional objects	solves routine and non-routine problems involving perimeter and area of standard two-dimensional shapes, and surface area, volume and capacity of standard three-dimensional objects	solves routine problems involving perimeter and area of standard two-dimensional shapes, and surface area, volume and capacity of standard three-dimensional objects
E3 - Identifies properties to convert between units	interprets three-dimensional objects by describing properties and creating two-dimensional representations, and converts between units of surface area, volume and capacity	identifies different forms of two-dimensional representations of three-dimensional objects, and converts between units of perimeter and area	recognises the properties of common two-dimensional shapes and three-dimensional solids, and converts between units of length
E4 - Interprets scale drawings, plans and models	interprets scale drawings, plans and models to obtain and calculate measurements, and solves complex familiar problems such as comparison of different quantities, materials and costs.	interprets scale drawings, plans and models to obtain measurements such as lengths, perimeters and areas, and solves familiar problems.	uses scale factor to find unknown lengths in similar figures, and obtains measurements from scale drawings, plans and models.

Quality assurance

Each provider will submit bodies of learners' work sufficient to allow an assessment against a nominated range of criteria and the overall award to an annual review meeting organised by TASC. The work, while not necessarily be fully resolved, will be assessed by the provider against the range of nominated assessment criteria and the overall award. TASC will give each provider guidance regarding the selection of learners and the nominated criteria.

Each body of work that providers submit to the meeting will include sufficient and appropriate material for judgements to be made about the learner's standard of numeracy. The review meeting will give advice regarding the provider's interpretation and application of the selected criteria's standards to the evidence of student work. Providers are expected to act on this advice.

TASC may require providers to supply further samples of individual learners' work to determine that standards have been applied appropriately and/or undertake audits. The nature and scope of such requirements will be risk-based.

Qualifications and award requirements

The final award will be determined by the Office of Tasmanian Assessment, Standards and Certification from 8 ratings.

The minimum requirements for an award in this course are as follows:

EXCEPTIONAL ACHIEVEMENT (EA)

6 'A' ratings, 2 'B' ratings

HIGH ACHIEVEMENT (HA)

3 'A' ratings, 4 'B' ratings, 1 'C' rating

COMMENDABLE ACHIEVEMENT (CA)

4 'B' ratings, 3 'C' ratings

SATISFACTORY ACHIEVEMENT (SA)

6 'C' ratings

PRELIMINARY ACHIEVEMENT (PA)

4 'C' ratings

A learner who otherwise achieves the rating for a CA (Commendable Achievement) or SA (Satisfactory Achievement) award but who fails to show any evidence of achievement in one or more criteria ('z' notation) will be issued with a PA (Preliminary Achievement) award.

Course evaluation

Years 9-12 Learning will develop and regularly review and revise the curriculum. Course evaluation is informed by the experience of the course's implementation, delivery and assessment. More information about course evaluation can be found on the Years 11 and 12 website.

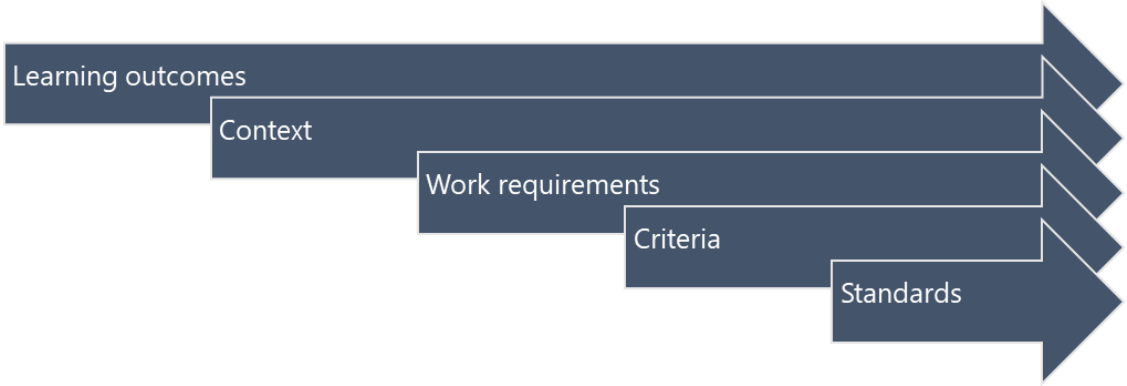
Course developer

This course has been developed by the Department of Education's Years 9-12 Learning Unit in collaboration with Catholic Education Tasmania and Independent Schools Tasmania.

Accreditation and version history

Version 1. Accredited on 14 April 2022 for use from 1 January 2023 to 31 December 2027.

Appendix 1 - Line of sight



Learning outcomes	Course content: module	Work requirements: module	Criterion	Criterion elements	General capabilities
1. communicate thinking, strategies and using appropriate mathematical or statistical language	1, 2, 3	1, 2, 3	1	1, 2, 3, 4	
2. plan, organise and manage learning in order to complete tasks and evaluate progress	1, 2, 3	1, 2, 3	2	1, 2, 3, 4, 5	
3. apply numeric techniques and algebraic processes to represent situations and solve problems	1, 2, 3	1, 2, 3	3	1, 2, 3	
4. apply reasoning skills to interpret mathematical and statistical information, and ascertain the reasonableness of solutions to problems	1, 2, 3	1, 2, 3	4	1, 2, 3, 4	
5. act as creative, critical and reflective thinkers to assess ideas and take informed action	1, 2, 3	1, 2, 3	5	1, 2, 3, 4	
6. apply concepts and techniques involving finance and money management	1	1	6	1, 2, 3, 4	
7. apply concepts and techniques involving graphs and representations of data	2	2	7	1, 2, 3, 4	
8. apply concepts and techniques involving measurement, scales, plans and models	3	3	8	1, 2, 3, 4	

Appendix 2 - Alignment to curriculum frameworks

Links to Australian curriculum Foundation to Year 10

For all content areas of Essential Mathematics, the proficiency strands of understanding, fluency, problem-solving and reasoning from the F–10 curriculum are applicable and should be inherent in students' learning of the subject. Each strand is essential and all are mutually reinforcing. For all content areas, practice allows students to develop fluency in their skills. They will encounter opportunities for problem-solving, such as finding the volume of a solid to enable the amount of liquid that is held in the container to be compared with what is written on the label or finding the interest on an amount in order to be able to compare different types of loans. In Essential Mathematics, reasoning includes critically interpreting and analysing information represented through graphs, tables and other statistical representations to make informed decisions. The ability to transfer mathematical skills between contexts is a vital part of learning in this subject. For example, familiarity with the concept of a rate enables students to solve a wide range of practical problems, such as fuel consumption, travel times, interest payments, taxation and population growth.

Alignment to Australian Curriculum Senior Secondary Framework

Almost all content in this course is drawn from the Australian Curriculum Senior Secondary Framework: Essential Mathematics. The content selected for this course comes from Units 1 to 4 and in most cases content descriptors are used verbatim. The content covered in the subtopic 'Calculations' from Essential Mathematics Unit 1 Topic 1 and 'Algebra' in Essential Mathematics Unit 1 Topic 3 is embedded throughout the course and is assessed across the course content under Criterion 3. The content covered in Essential Mathematics Unit 4 Topic 2 on Earth geometry and time zones is covered in *General Mathematics* Level 3, as it is more contextually appropriate when taught alongside applications of trigonometry.

Additional content on the topic of 'Earning and managing money' has been included as it provides important information on wages, income, benefits, tax and other money management principles that are requisite to financial literacy beyond school. Additional content is also included in the topic 'Interest and depreciation' to provide conceptual understanding of depreciation through repeated application of the simple interest formula using the straight-line method.

Summary of aligned content

Module	Topics	Australian Curriculum Framework Source or otherwise
Module 1	Earning and managing money[1] Interest and depreciation	NESA Mathematics Standard Stage 6 – Year 11 component Essential Mathematics Unit 4 Topic 3
Module 2	Reading, interpreting and drawing graphs Data representation and interpretation	Essential Mathematics Unit 1 Topic 4 Essential Mathematics Unit 2 Topic 1
Module 3	Measurement and shape Scales, plans and models	Essential Mathematics Unit 3 Topic 1 Essential Mathematics Unit 3 Topic 2

[1] This material has been sourced with approval from the NSW Education Standards Authority (NESA) curriculum.

Appendix 3 - Work requirements

Module 1 Work requirements specifications

Work requirement 1 of 1

Title of work requirement: Managing money
Format: series of connected short responses
Description: This series of connected short responses will focus on the interpretation, analysis, examination and evaluation of ideas and information in response to a particular question, situation or stimulus relating to finance and money management.

Learners will take informed action by analysing and calculating earnings, tax and benefits in a given situation and will investigate many possible situations involving interest and depreciation. Learners' responses will include providing recommendations for the given situation, enabling them to demonstrate mathematical reasoning.

Learners should be given opportunities to work collaboratively to generate, refine and test ideas and strategies. They must reflect on how their own thinking has changed after engaging in collaborative discussion. Learners may complete the work requirement in collaborative groups; however, in this situation, they must clearly identify which work is their own.
Size: 6–8 hours of class time
Timing: Dedicated class time should be provided throughout the module at the teachers' discretion.
External agencies: at the teacher's discretion
Relevant criteria:

- Criterion 1: E1, 2, 3,
- Criterion 2: E1, 2, 3, 4, 5
- Criterion 3: E1, 2, 3
- Criterion 4: E1, 3
- Criterion 5: E1, 2, 3, 4
- Criterion 6: E1, 2, 3, 4

Module 2 Work requirements specifications

Work requirement 1 of 1

Title of work requirement: Data representation and interpretation
Format: connected series of short responses
Description: Learners will work individually or in small groups to provide a series of connected short responses to statistical questions about a given or chosen context. The series of responses must enable each learner to demonstrate their ability to represent, compare and analyse situations involving both numerical and categorical data.

Additionally, learners should record reflections on how their thinking was challenged confirmed or extended through collaborative discussion and problem-solving, and in response to their results. This reflection can take any format but must be submitted as part of the work requirement for assessment.
Size: 4–6 hours of class time
Timing: Dedicated class time should be provided throughout the module at the teacher's discretion.
Relevant criteria:

- Criterion 1: E1, 2, 3, 4
- Criterion 2: chosen elements as applicable to the context
- Criterion 3: E1, 2, 3
- Criterion 4: E1, 2, 3, 4
- Criterion 5: E1, 2, 3, 4
- Criterion 7: E1, 2, 3, 4

Module 3 Work requirements specifications

Work requirement 1 of 1

Title of work requirement: Applications of measurement
Format: short responses
Description: Learners will complete a series of connected short responses to investigate, interpret and construct scale drawings, plans and models and obtain the relevant measurements to calculate length, perimeter area and volume. Within the series of responses, learners will use a minimum of eight different formula, including the trapezoidal rule, to calculate and solve problems involving perimeter, area, surface area, volume and capacity, including at least one problem involving spheres and one problem involving composite solids. Learners will perform conversions, including at least one problem involving conversions between mm^3 and L.
Size: 6–8 hours of class time
Timing: Dedicated class time should be provided throughout the module at the teacher's discretion.
External agencies: at teachers' discretion
Relevant criteria:

- Criterion 1: E1, 2, 3, 4
- Criterion 2: E1, 2, 3, 4, 5
- Criterion 3: E1, 2, 3
- Criterion 4: E3, 4
- Criterion 5: E1, 2, 3, 4
- Criterion 8: E1, 2, 3, 4

Appendix 4 – General capabilities and cross-curriculum priorities

Learning across the curriculum content, including the cross-curriculum priorities and general capabilities, assists students to achieve the broad learning outcomes defined in the *Alice Springs (Mparntwe) Education Declaration (December 2019).*

General capabilities:

The general capabilities play a significant role in the Australian curriculum in equipping young Australians to live and work successfully in the twenty-first century.

In the Australian curriculum, capability encompasses knowledge, skills, behaviours and dispositions. Students develop capability when they apply knowledge and skills confidently, effectively and appropriately in complex and changing circumstances, in their learning at school and in their lives outside school.

The general capabilities include:

- Critical and creative thinking
- Ethical understanding
- Information and communication technology capability
- Intercultural understanding
- Literacy
- Numeracy
- Personal and social capability

Cross-curriculum priorities:

Cross-curriculum priorities enable students to develop understanding about and address the

contemporary issues they face, for their own benefit and for the benefit of Australia as a whole. The priorities provide national, regional and global dimensions which will enrich the curriculum through development of considered and focused content that fits naturally within learning areas. Incorporation of the priorities will encourage conversations between students, teachers and the wider community.

The cross-curriculum priorities include:

- Aboriginal and Torres Strait Islander histories and cultures
- Asia and Australia's engagement with Asia
- Sustainability

Appendix 5 – Glossary

Term	Definition	Source acknowledgement
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.	NESA
accuracy	The condition or quality of being true, correct or exact; freedom from error or defect; precision or exactness; correctness; in science, the extent to which a measurement result represents the quantity it purports to measure; an accurate measurement result includes an estimate of the true value and an estimate of the uncertainty.	QCAA
algorithm	A precisely defined routine procedure that can be applied and systematically followed through to a conclusion.	ACARA
association	A general term used to describe the relationship between two or more variables. The term association is often used interchangeably with the term correlation. The latter tends to be used when referring to the strength of a linear relationship between two numerical variables.	ACARA
associative operations	Operations are associative if the order in which operations take place does not affect the result. For example, addition of numbers is associative, since the order in which they are added does not change their sum. The corresponding associative law is: $(a + b) + c = a + (b + c)$ for all numbers a, b and c. Multiplication is also associative, as the product of the numbers does not vary with the order of their multiplication. The corresponding associative law is: $(ab)c = a(bc)$ for all numbers a, b and c. Subtraction and division are not associative, as the order of operations changes the value of the expression.	ACARA
average speed	The total distance travelled divided by the total time taken.	ACARA
array	An ordered collection of objects or numbers.	QCAA

Term	Definition	Source acknowledgement
back-to-back stem-and-leaf plots	A method for comparing two data distributions attaching two sets of 'leaves' to the same 'stem' in a stem and leaf plot.	ACARA
bias	Generally, refers to a systematic favouring of certain outcomes more than others, due to unfair influence, knowingly or otherwise.	NESA
bimodality	A dataset is bimodal if it has two modes; this means that there is not a single data value that occurs with the highest frequency, but two data values have the same and highest frequency.	QCAA
break-even point	The point at which revenue begins to exceed the cost of production.	ACARA
Calculates	Determine or find; for example, a number or answer by using mathematical processes; obtain a numerical answer showing the relevant stages in the working; ascertain or determine from given facts, figures or information.	QCAA
Cartesian plane	Two number lines intersect at right angles at their origins to form the axes of the coordinate system; the plane is divided into four quadrants by these perpendicular axes, called the x-axis, horizontal line, and the y-axis, vertical line; the position of any point in the plane can be represented by an ordered pair of numbers, x, y. These ordered pairs are called the coordinates of the point; this is called the Cartesian coordinate system. The plane is called the Cartesian plane.	QCAA
categorical data	Data associated with a categorical variable is called categorical data.	ACARA
categorical variable	A variable whose values are categories. Examples include blood group, A, B, AB or O, or house construction type, brick, concrete, timber, steel, other. 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.	ACARA

Term	Definition	Source acknowledgement
census	A population is the complete set of individuals, objects, places etc. that we want information about. A census is an attempt to collect information about the entire population.	ACARA
commutative operations	Operations are commutative if the order in which terms are given does not affect the result. The commutative law for addition is: $a + b = b + a$, for all numbers a and b. For example, 3+5=5+3. The commutative law for multiplication is: $ab = ba$, for all numbers a and b. For example, 4×7=7×4. Subtraction and division are not commutative because; for example, 5-3≠3-5 and 12÷4≠4÷12.	ACARA
conversion	A change in the form or units of an expression.	QCAA
compound interest	The interest earned when each successive interest payment is added to the principal for the purpose of calculating the next interest payment. For example, if the principal (P) earns compound interest (A) at the interest rate (i) expressed as a percentage per period, then after (n) compounding periods the total amount accrued is: $$A = P(1 + i)^n$$ When plotted on a graph, the total amount accrued is shown to grow exponentially.	QCAA
correlation	A measure of the strength of the linear relationship between two variables.	ACARA
correlation coefficient	The correlation coefficient (r) is a measure of the strength of the liner relationship between a pair of variables.	ACARA
decile	Any of the nine values that divide a ranked dataset into ten equal parts.	QCAA

Term	Definition	Source acknowledgement
distributive law	Multiplication of numbers is said to be 'distributive over addition', because the product of one number with the sum of two others equals the sum of the products of the first number with each of the others. For example, the product of 3 with (4+5) gives the same result as the sum of 3×4 and 3×5: 3×(4+5)=3×9=27 and 3×4+3×5=12+15=27 This distributive law is expressed algebraically as follows: $a(b+c) = ab + ac$, for all numbers a, b and c.	ACARA
elevation views	Scale drawings showing what a building looks like from the front, back and sides.	NESA
equivalence	Two expressions are said to be equivalent if they are equal in value.	
extrapolation	In the context of fitting a linear relationship between two variables, extrapolation occurs when the fitted model is used to make predictions using values of the explanatory variable that are outside the range of the original data. Extrapolation is a dangerous process as it can sometimes lead to quite erroneous predictions.	ACARA
Face, shape	Any of the individual flat surfaces of a solid object.	mathsisfun.com
five-number summary	A method of summarising a set of data using the minimum value, the lower or first-quartile (Q_1), the median, the upper or third-quartile (Q_3) and the maximum value. Forms the basis for a boxplot.	ACARA
Goods and Services Tax, GST	A broad sales tax of 10% on most goods and services and other items sold or consumed in Australia.	QCAA
gradient	The gradient of a line describes its steepness, incline or grade. Gradient is normally described by the ratio of the "rise" divided by the "run" between two points on a line.	ACARA

Term	Definition	Source acknowledgement
histogram	A statistical graph for displaying the frequency distribution of continuous data. A histogram is a graphical representation of the information contained in a frequency table. In a histogram, class frequencies are represented by the areas of rectangles centred on each class interval. The class frequency is proportional to the rectangle's height when the class intervals are all of equal width.	ACARA
integer	The integers are the "whole numbers" including those with negative sign ⋯-3, -2, -1, 0, 1, 2, 3⋯. In Latin, the word integer means "whole." The set of integers is usually denoted by Z. Integers are basic building blocks in mathematics.	ACARA
interpolation	In the context of fitting a linear relationship between two variables, interpolation occurs when the fitted model is used to make predictions using values of the explanatory variable that lie within the range of the original data.	ACARA
interquartile range	The interquartile range (IQR) is a measure of the spread within a numerical data set. It is equal to the upper quartile (Q_3) minus the lower quartile (Q_1); that is, $IQR = Q_3 - Q_1$ The IQR is the width of an interval that contains the middle 50%, approximately, of the data values. To be exactly 50%, the sample size must be a multiple of four.	ACARA
kilowatt hour, kWh	A unit of energy equal to 1000 watt hours or 3.6 megajoules. The kilowatt hour is most commonly known as a billing unit for energy delivered to consumers by electric utilities.	ACARA
megajoule, MJ	A joule is the SI unit of work. The megajoule, MJ, is equal to one million joules.	ACARA
mean	The arithmetic mean, $\bar{x}$, of a list of numbers is the sum of the data values divided by the number of values in the list. In everyday language, the arithmetic mean is commonly called the average.	ACARA

Term	Definition	Source acknowledgement
measures of central tendency	The values about which the set of data values for a particular variable are scattered. They are a measure of the centre or location of the data. The two most common measures of central tendency are the mean and the median.	NESA
measures of spread	Describe how similar or varied the set of data values are for a particular variable. Common measures of spread include the range, combinations of quantiles, deciles, quartiles, percentiles, the interquartile range, variance and standard deviation.	NESA
median	The value in a set of ordered set of data values that divides the data into two parts of equal size. When there are an odd number of data values, the median is the middle value. When there is an even number of data values, the median is the arithmetic mean of the two central values.	ACARA
mode	Is the most frequently occurring value is a data set.	ACARA
order of operations	The order of performing mathematical operations: 1. evaluate brackets or grouping symbols first 2. evaluate any powers and roots 3. working left to right, evaluate any multiplication and division 4. working left to right, evaluate any addition or subtraction, may also be known as BODMAS, BIDMAS, BEDMAS, etc.	QCAA
outlier	An outlier in a set of data is an observation that appears to be inconsistent with the remainder ofthat set of data. An outlier is a surprising observation.	ACARA
parallel box plots	Used to visually compare the five-number summaries of two or more datasets.	QCAA

Term	Definition	Source acknowledgement
partitioning	Dividing a quantity into parts. In the early years of schooling, it commonly refers to the ability to think about numbers as made up of two parts, such as, 10 is 8 and 2. In later years it refers to dividing both continuous and discrete quantities into equal parts.	ACARA
percentage error	The percentage error of a measurement is the absolute error expressed as a percentage of the recorded measurement.	NESA
picture graph	A statistical graph for organising and displaying categorical data.	ACARA
piecework	Employment where a worker is paid a fixed rate for each item produced or action performed regardless of the time taken.	NESA
place value	The value of a digit as determined by its position in a number, relative to the ones, or units, place. For integers, the ones place is occupied by the rightmost digit in the number. The value of the next column, the first after the decimal point, represents tenths of ones and this continues with the value of each corresponding digit being representative of a value 10 times smaller than the previous. For example, in the number 2 594.6 the 4 denotes 4 ones, the 9 denotes 90 ones or 9 tens, the 5 denotes 500 ones or 5 hundreds, the 2 denotes 2000 ones or 2 thousands, and the 6 denotes $\frac{6}{10}$ of a one or 6 tenths.	ACARA
precision	ow close the measured values are **to each other**. Precision does not account for how close the measured values are to the actual, expected, value.	mathsisfun.com
probability	The likelihood or chance of something; the relative frequency of the occurrence of an event as measured by the ratio of the number of cases or alternatives favourable to the event to the total number of cases or alternatives.	QCAA
quartile	The quartiles of a ranked set of data values are the three points that divide the dataset into four equal groups.	QCAA

Term	Definition	Source acknowledgement
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.	NESA
range	The difference between the largest and smallest observations in a data set.	ACARA
rate	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.	QCAA
ratio	A comparison of two quantities of the same kind; for example, if a recipe uses 2 cups of milk and 3 cups of flour, the ratio of milk to flour is 2 is to 3. This can also be written with a colon, 2:3, or as a fraction, $\frac{2}{3}$	QCAA
ray	The part of a line that starts at a point and continues in a particular direction to infinity. Rays are usually depicted with an arrowhead, which indicates the direction in which the line continues to infinity.	ACARA
reaction time	The time a person takes to react to a situation. For example: time taken for a person to press the brake when a situation requires them to stop.	ACARA
reasoned argument or conclusion	A reasoned argument or conclusion is logical, sound, considered and well grounded.	ACARA
recurrence relation	An equation that recursively defines a sequence; that is, once one or more initial terms are given, each further term of the sequence is defined as a function of the preceding terms.	NESA
recurring decimal	Non-terminating decimals may be recurring; that is, contain a pattern of digits that repeats indefinitely after a certain number of places.	ACARA

Term	Definition	Source acknowledgement
reducing balance loan	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 loan, after each payment is made.	NESA
reflection	To reflect the point A in an axis of reflection, a line is drawn at right angles to the axis of reflection and the point A' is marked at the same distance from the axis of reflection as A, but on the other side. The point A' is called the reflection image of A. A reflection is a transformation that moves each point to its reflection image.	ACARA
relative frequency	The number of items of a certain type divided by the number of all the items considered.	QCAA
sample	Part of a population; a subset of the population, often randomly selected for the purpose of estimating the value of a characteristic of the population as a whole.	QCAA
sample space	The sample space of a chance experiment is the set of all possible outcomes for that experiment.	NESA
sampling	The selection of a subset of data from a statistical population. Methods of sampling include: 1. systematic sampling - sample data is selected from a random starting point and using a fixed periodic interval 2. self-selecting sampling - non-probability sampling where individuals volunteer themselves to be part of a sample 3. simple random sampling - sample data is chosen at random where each member has an equal probability of being chosen 4. stratified sampling - after dividing the population into separate groups or strata, a random sample is then taken from each group or strata in an equivalent proportion to the size of that group or strata in the population. A sample can be used to estimate the characteristics of the statistical population.	NESA

Term	Definition	Source acknowledgement
scale	A graduated line, as on a map, representing proportionate size.	QCAA
simple interest	The interest, I, accumulated when the interest payment in each period is a fixed fraction of the principal; for example, if the principle P earns simple interest at the rate, R, expressed as a percentage per period, then after, T, periods the accumulated simple interest is: $$I = PRT$$ When plotted on a graph, the total amount accrued is shown to grow linearly.	QCAA
sketch	Execute a drawing or painting in simple form, giving essential features but not necessarily with detail or accuracy; in mathematics, represent by means of a diagram or graph; the sketch should give a general idea of the required shape or relationship and should include features.	QCAA
standard deviation	Is a measure of the variability or spread of a data set. It gives an indication of the degree to which the individual data values are spread around their mean. The standard deviation of n observations $x_1, x_2, \ldots, x_n$ is: $$s = \sqrt{\frac{\Sigma(x_i - \bar{x})^2}{n-1}}$$	QCAA
stopping distances	The distance a car travels before it comes to rest after the driver has applied the brake given speed of the vehicle and conditions of the road which can be found using formulas or tables. Stopping distance = braking distance + reaction time (seconds) × speed	ACARA
straight-line method of depreciation	In the straight-line method of depreciation, the value of the depreciating asset decreases by the same amount during each time period. Also known as the 'Prime Cost method'.	NESA

Term	Definition	Source acknowledgement
symmetry	A plane figure f has line symmetry in a line m, if the image of f under the reflection in m is f itself. The line m is called the axis of symmetry. A plane figure f has rotational symmetry about a point O if there is a rotation such that the image of f under the rotation is f itself.	ACARA
terminating decimal	T decimal that contains a finite number of digits.	
translation	Shifting a figure in the plane without turning it is called translation. To describe a translation in the plane, it is enough to say how far left or right and how far up or down the figure is moved. A translation is a transformation that moves each point to its translation image.	
trapezoidal rule	The trapezoidal rule uses trapezia to approximate the area of an irregular shape, often with a curved boundary. The rule for a single application is: $A \approx \frac{h}{2}(x_1 + x_2)$	NESA
travel graph	Line graphs that are used to describe the motion of objects such as cars, trains, walkers and cyclists. The distance travelled is represented on the vertical axis and the time taken to travel that distance is represented on the horizontal axis.	NESA
tree diagram	A diagram that can be used to determine the outcomes of a multistep random experiment. A probability tree diagram has the probability for each stage written on the branches.	NESA
two-way table	Commonly used for displaying the two-way frequency distribution that arises when a group of individuals or objects are categorised according to two criteria.	QCAA
Vertex, in shape	A point in which edges intersect.	NESA

Appendix 6 – Degree of difficulty of problems

Acknowledgement: The following material has been sourced, with approval, from the Queensland Curriculum and Assessment Authority curriculum.

Within this course, the degree of difficulty of problems a learner can answer correctly is a defining feature of their understanding. Within the criteria and standards, the expected depth of knowledge is described using the following terms.

Simple familiar

Problems of this degree of difficulty require students to demonstrate knowledge and understanding of the subject matter and application of skills in a situation where:

- relationships and interactions are obvious and have few elements, and
- all of the information to solve the problem is identifiable; that is
  - the required procedure is clear from the way the problem is posed, or
  - in a context that has been a focus of prior learning.

Complex familiar

Problems of this degree of difficulty require students to demonstrate knowledge and understanding of the subject matter and application of skills in a situation where:

- relationships and interactions have a number of elements, such that connections are made with subject matter within and/or across the domains of mathematics, and
- all of the information to solve the problem is identifiable; that is
  - the required procedure is clear from the way the problem is posed, or -
  - in a context that has been a focus of prior learning.

Some interpretation, clarification and analysis will be required to develop responses.

Complex unfamiliar

Problems of this degree of difficulty require students to demonstrate knowledge and understanding of the subject matter and application of skills in a situation where:

- relationships and interactions have a number of elements, such that connections are made with subject matter within and/or across the domains of mathematics, and
- all the information to solve the problem is not immediately identifiable; that is
  - the required procedure is not clear from the way the problem is posed, and
  - in a context in which students have had limited prior experience.

Learners interpret, clarify and analyse problems to develop responses.