DEPARTMENT OF EDUCATION
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Work-based Learning

Mathematics

Essential Mathematics 2

COURSE DOCUMENT

DRAFT

PHASE 3 CONSULTATION

Catholic Education Tasmania

INDEPENDENT SCHOOLS TASMANIA

Years 9 to 12 Learning

Tasmanian Government

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Essential Mathematics, 150 hours – Level 2

This course is the Level 2 component of the Essential Mathematics program.

Aims

The purpose of Years 9 to 12 Education is to enable all students 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 supports the principles of Access, Agency, Excellence, Balance, Support and Achievement as part of a range of programs that enables students to access a diverse and highly flexible range of learning opportunities suited to their level of readiness, interests and aspirations.

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 Level 2 is a Work-based Learning course.

Focus Area – Work-based Learning

Work-based Learning enables students to acquire workplace skills either through a TASC accredited course or through nationally recognised training within an industry developed Training Package. Inclusion of Work-based Learning as a focus area is a response to a range of contemporary research findings that highlight the value of work-based learning. Work-based learning, when connected to quality curriculum, equips young people to navigate the changing nature of work, successfully transition to post-school options, and thrive in a complex and changing world.

Work-based Learning courses have three key features that guide teaching and learning:

- prepare for workplace learning
- undertake workplace learning
- reflect and exhibit/present

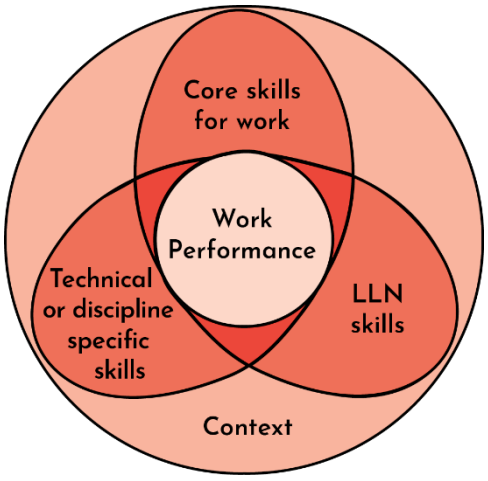


Figure 1: Core skills for work in context (source: https://www.dese.gov.au/uncategorised/resources/core-skills-work-developmental-framework)

In this course learners will develop their mathematical proficiency through participation in workplace learning, engaging with foundational knowledge and core concepts in the strands of number, statistics, measurement and geometry. Learners will actively apply their knowledge through collaborative problem-solving, ideation and testing of mathematical ideas. They will interact and connect with others, plan, organise and make decisions and work innovatively with and without the aid of technology. Learners will reflect on their ability to interpret and describe mathematical ideas and objects in the workplace.

Rationale

The *Essential Mathematics* Level 2 course enables students to develop their understanding of concepts and techniques drawn from strands of number, statistics, measurement and geometry which will assist them in making informed decisions in their daily lives including in workplace contexts. Essential Mathematics Level 2 provides students with the foundational knowledge, skills and understanding required to undertake Essential Mathematics 3. Students will develop their ability to identify and solve problems in real contexts, in a range of workplace, personal, further learning and community settings. Learners will work collaboratively with others to generate ideas, and to find innovative approaches to engaging with mathematics in the workplace. Learners will reflect on their ability to interpret, understand and apply these concepts and techniques in the workplace.

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 as an economy competing globally requires substantial numbers of proficient workers able to learn, adapt, create, interpret, analyse and apply mathematical information.

Integration of General Capabilities and Cross-Curriculum Priorities

The general capabilities addressed specifically in this course are:

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

The cross-curriculum priorities are 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 Level 2 enables students to develop their understanding of concepts and techniques drawn from strands of number, statistics, measurement and geometry which will assist them in making informed decisions in their daily lives including in workplace contexts. Students will develop their ability to identify and solve problems in real contexts, in a range of workplace, personal, further learning and community settings. Learners will work collaboratively with others to generate ideas, and to find innovative approaches to engaging with mathematics in the workplace. Learners will reflect on their ability to interpret, understand and apply these concepts and techniques in the workplace.

Pathways

The *Essential Mathematics* Level 2 course enables learning continuity from Year 9 Australian Curriculum: Mathematics for learners who have achieved a 'C' rating or higher or from Year 10 for students who have achieved a 'D' rating or higher. Additionally, learners who have successfully undertaken the currently accredited TASC course Essential Skills - Maths – MTN210114 or the Level 1 component of the Essential Mathematics suite of courses under development could progress into Level 2 of this course.

Essential Mathematics Level 2 will provide the foundational knowledge for students wishing to pursue further mathematics study in *Essential Mathematics* Level 3 and provides foundational technical knowledge that may be sufficient for further vocational education and training. It is recommended that pathway advice is coupled with ongoing course and career counselling at their provider of education.

Course Requirements

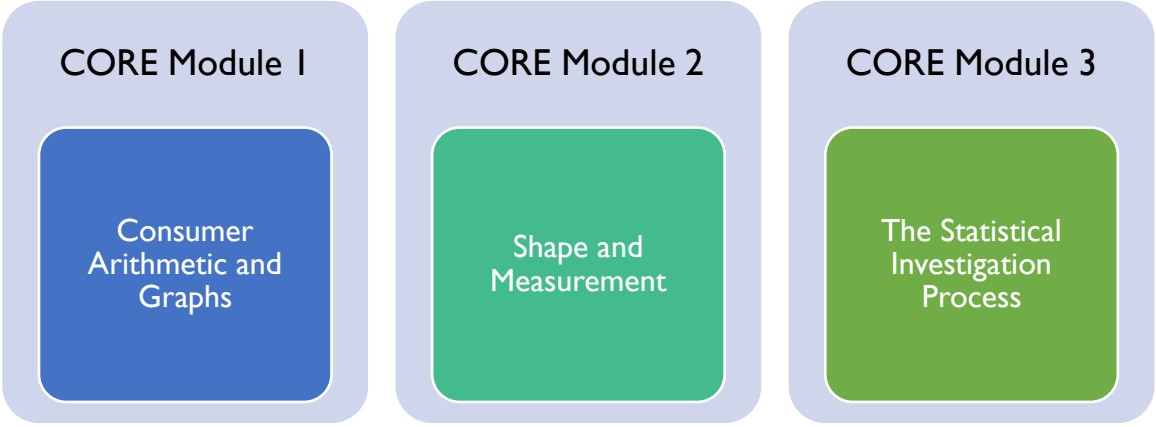
- Resources – Students will require access to Scientific calculators.
- Learning environment – Students will require opportunities to engage in real or simulated workplace environments during at a minimum, two out of the three modules.

Course Structure, Delivery and Progression

Structure

This course consists of three 50-hour modules.

Modules Available
Core Module 1: Consumer arithmetic and graphs
Core Module 2: Shape and measurement
Core Module 3: The statistical investigation process



Delivery

There is no specific recommended delivery sequence for the modules

Developmental Progression

At both the module and course level the learner is introduced to and builds upon key ideas, concepts, skills, knowledge and understanding leading to performance of understanding reflected in the work requirements.

Individual modules have a developmental progression that introduces, builds upon and culminates in a performance of understanding in the work requirements. Between modules there is also a developmental progression that leads to a culminating performance of understanding in the final work requirements.

Module 1 - Consumer arithmetic and graphs

This module contains two topics:

- Representing and interpreting information in graphs
- Consumer arithmetic

'Representing and interpreting information in graphs' will enables students to develop their ability to construct and interpret categorical and numerical statistical information contained in two-way tables, and different graph types. They will discuss and validate information portrayed in the media and routine texts.

'Consumer arithmetic' will enable learners to engage with the potential financial implications of many aspects of adult life including the costs involved with purchasing and running a car, the charges and costs of household bills, preparing a personal budget and managing income. Additionally, learners will apply knowledge of percentages and rates to apply these to personally contextual situations including finance and health.

Module 1 Learning Outcomes

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

1. Define and explain key knowledge and concepts and apply a range of related mathematical techniques and procedures to solve practical problems.
2. Interpret and engage with mathematical objects and information in workplace contexts.
3. Manage self, connect and collaborate with others and reflect on learning including in workplace contexts.
4. Identify problems that can be modelled and solved mathematically, select and apply problem solving processes and review outcomes including in workplace contexts.

Module 1 Content

Representing and interpreting information in graphs

Key knowledge and skills:

- interpret information presented in graphs, such as conversion graphs, line graphs, step graphs, column graphs and picture graphs (ACMEM037)
- interpret information presented in two-way tables (ACMEM038)
- discuss and interpret graphs found in the media and in factual texts. (ACMEM039)
- determine which type of graph is best used to display a dataset (ACMEM040)
- use spreadsheets to tabulate and graph data (ACMEM041)

- draw a line graph to represent any data that demonstrate a continuous change, such as hourly temperature. (ACMEM042)

Consumer arithmetic:

This topic has two subtopics:

- Applications of number, percentages and rates
- Budgeting and spreadsheets

Applications of number, percentages and rates:

Key knowledge and skills:

- solve practical problems requiring basic number operations (ACMEM001)
- apply arithmetic operations according to their correct order (ACMEM002)
- ascertain the reasonableness of answers to arithmetic calculations (ACMEM003)
- use leading-digit approximation to obtain estimates of calculations (ACMEM004)
- use a calculator for multi-step calculations (ACMEM005)
- check results of calculations for accuracy (ACMEM006)
- recognise the significance of place value after the decimal point (ACMEM007)
- evaluate decimal fractions to the required number of decimal places (ACMEM008)
- round up or round down numbers to the required number of decimal places (ACMEM009)
- apply approximation strategies for calculations. (ACMEM010)
- calculate a percentage of a given amount (ACMEM011)
- determine one amount expressed as a percentage of another (ACMEM012)
- apply percentage increases and decreases in situations; for example, mark-ups, discounts and GST. (ACMEM013)
- identify common usage of rates; for example, km/h as a rate to describe speed, beats/minute as a rate to describe pulse (ACMEM014)
- convert units of rates occurring in practical situations to solve problems (ACMEM015)
- use rates to make comparisons; for example, using unit prices to compare best buys, comparing heart rates after exercise. (ACMEM016)
- determine the overall change in a quantity following repeated percentage changes; for example, an increase of 10% followed by a decrease of 10% (ACMEM063)
- calculate simple interest for different rates and periods. (ACMEM064)

Budgeting and spreadsheets

Key knowledge and skills:

- interpret and use information about a household's electricity, water or gas usage and related charges and costs from household bills
- plan for the purchase of a car
  - investigate on-road costs for new and used vehicles, including sale price (or loan repayments), registration, insurance and stamp duty at current rates
  - consider sustainability when choosing a vehicle to purchase, e.g. fuel consumption rates
  - calculate and compare the cost of purchasing different vehicles using a spreadsheet
- plan for the running and maintenance of a car
  - describe the different types of insurance available, including compulsory and non-compulsory third-party insurance, and comprehensive insurance

- investigate other running costs associated with ownership of a vehicle, e.g. cost of servicing, repairs and tyres
- calculate and compare the cost of running different vehicles using a spreadsheet

- prepare a personal budget for a given income, taking into account fixed and discretionary spending (ACMGM004)

Module 1 Work Requirements

The work requirements of a course are processes, products or performances that provide a significant demonstration of achievement that is measurable against the course's standards. Work requirements need not be the sole form of assessment for a module.

This module includes 3-4 short responses in a reflective journal and an extended response / inquiry as work requirements.

See Appendix 3 for summary of Work Requirement specifications for this course.

Module 1 Assessment

This module will assess criteria 1, 2, 3, 4.

Module 2 - Shape and measurement

This module consists of two topics:

- Measurement of energy, mass, time and motion
- Mensuration, Pythagoras' theorem and trigonometry

'Measurement of energy, mass, time and motion' enables learners to use units of measure to describe, compare and calculate energy, mass, time, speed and distance and to interpret information in practical situations including these measurements. They will use appropriate units, convert between units and investigate or compare alternative possibilities and discuss implications of human error involved in measurements.

'Mensuration, Pythagoras' theorem and trigonometry' will enable learners to apply measurement and calculation of length and angle to practical problems involving perimeter, area, volume and capacity of 2-Dimensional shapes and 3-Dimensional objects. Learners will solve problems involving angles of elevation and depression and bearings.

Module 2 Learning Outcomes

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

1. Define and explain key knowledge and concepts and apply a range of related mathematical techniques and procedures to solve practical problems.
2. Interpret and engage with mathematical objects and information in workplace contexts.
3. Manage self, connect and collaborate with others and reflect on learning including in workplace contexts.
5. Apply mathematical reasoning and creative thinking to generate, test and apply ideas in a mathematical inquiry and evaluate their impact including in workplace contexts

Measurement of energy, mass, time and motion

This topic has three subtopics:

- General substitution
- Units of energy and mass
- Time and motion

General substitution:

Key knowledge and skills:

- substitute numerical values into algebraic expressions; for example, substitute different values of x to evaluate the expressions (ACMEM035)
- substitute given values for the other pronumerals in a mathematical formula to find the value of the subject of the formula. (ACMEM036)
- transpose mathematical formulae to change the subject of the formula

Units of energy and mass:

Key knowledge and skills:

- use units of energy to describe consumption of electricity, such as kilowatt hours (ACMEM031)
- use units of energy used for foods, including calories (ACMEM032)
- use units of energy to describe the amount of energy in activity, such as kilojoules (ACMEM033)
- convert from one unit of energy to another. (ACMEM034)
- use metric units of mass, their abbreviations, conversions between them, and appropriate choices of units (ACMEM025)
- estimate and measure the mass of different objects. (ACMEM026)
- identify appropriate degree of accuracy in work-based practical situations and discuss implications of human error

Time and motion:

Key knowledge and skills:

- use units of time, conversions between units, fractional, digital and decimal representations (ACMEM076)
- represent time using 12-hour and 24-hour clocks (ACMEM077)
- calculate time intervals, such as time between, time ahead, time behind (ACMEM078)
- interpret timetables, such as bus, train and ferry timetables (ACMEM079)
- use several timetables and electronic technologies to plan the most time-efficient routes (ACMEM080)
- interpret complex timetables, such as tide charts, sunrise charts and moon phases (ACMEM081)
- compare the time taken to travel a specific distance with various modes of transport (ACMEM082)
- use scales to find distances, such as on maps; for example, road maps, street maps, bushwalking maps, online maps and cadastral maps (ACMEM083)

- optimise distances through trial-and-error and systematic methods; for example, shortest path, routes to visit all towns, and routes to use all roads. (ACMEM084)
- identify the appropriate units for different activities, such as walking, running, swimming and flying (ACMEM085)
- calculate speed, distance or time using the formula speed = distance/time (ACMEM086)
- calculate the time or costs for a journey from distances estimated from maps (ACMEM087)
- interpret distance-versus-time graphs (ACMEM088)
- calculate and interpret average speed; for example, a 4-hour trip covering 250 km. (ACMEM089)

Mensuration, Pythagoras' theorem and trigonometry

This topic has two subtopics:

- Perimeter, area and volume
- Pythagoras' theorem and right-angled trigonometry

Perimeter, area and volume:

Key knowledge and skills:

- use metric units of length, their abbreviations, conversions between them, and appropriate levels of accuracy and choice of units (ACMEM017)
- estimate and measure lengths with and without the aid of technology (ACMEM018)
- convert between metric units of length and other length units (ACMEM019)
- calculate perimeters of familiar shapes, including triangles, squares, rectangles, and composites of these. (ACMEM020)
- use metric units of area, their abbreviations, conversions between them, and appropriate choices of units (ACMEM021)
- estimate and measure the areas of different shapes, with and without the aid of technology (ACMEM022)
- convert between metric units of area and other area units (ACMEM023)
- calculate areas of rectangles and triangles. (ACMEM024)
- use metric units of volume, their abbreviations, conversions between them, and appropriate choices of units (ACMEM027)
- understand the relationship between volume and capacity (ACMEM028)
- estimate and measure volume and capacity of various objects (ACMEM029)
- calculate the volume of objects, such as cubes and rectangular and triangular prisms. (ACMEM030)

Pythagoras' theorem and right-angled trigonometry

Key knowledge and skills:

- apply Pythagoras' Theorem and use it to solve practical problems in two dimensions and for simple applications in three dimensions. (ACMGM017) (ACMEM116)
- apply the tangent ratio to find unknown angles and sides in right-angled triangles (ACMEM117)
- work with the concepts of angle of elevation and angle of depression (ACMEM118)
- apply the cosine and sine ratios to find unknown angles and sides in right-angled triangles (ACMEM119)

- apply trigonometric ratios to solve practical problems in two dimensions and for simple applications in three dimensions
- solve problems involving bearings. (ACMEM120)

Module 2 Work Requirements

The work requirements of a course are processes, products or performances that provide a significant demonstration of achievement that is measurable against the course's standards. Work requirements need not be the sole form of assessment for a module.

This module includes 3-4 short responses in a reflective journal and an extended response / inquiry as work requirements.

See Appendix 3 for summary of Work Requirement specifications for this course.

Module 2 Assessment

This module will assess criteria 1, 2, 3, 5.

Module 3 - The statistical investigation process

This module consists of two topics:

- Data collection
- Data representation and interpretation

'Data collection' will enable learners to investigate, apply and evaluate different data collection methods including census, sampling and surveys. They will identify advantages and disadvantages of different data collection methods and identify misrepresentations of survey information in the media. Learners will design, implement and review a data collection process in a practical work-based context.

'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 3 Learning Outcomes

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

1. Define and explain key knowledge and concepts and apply a range of related mathematical techniques and procedures to solve practical problems.
2. Interpret and engage with mathematical objects and information in workplace contexts.
3. Manage self, connect and collaborate with others and reflect on learning including in workplace contexts.
6. Communicate and represent mathematical information and apply mathematical conventions including in workplace contexts.

Module 3 Content

Data collection

Key knowledge and skills:

- investigate and apply the procedure for conducting a census (ACMEM127)
- investigate the advantages and disadvantages of conducting a census. (ACMEM128)
- understand the purpose of sampling to provide an estimate of population values when a census is not used (ACMEM129)

- investigate and apply different kinds of samples; for example, systematic samples, self-selected samples, simple random samples (ACMEM130)
- investigate the advantages and disadvantages of these kinds of samples; for example, comparing simple random samples with self-selected samples. (ACMEM131)
- identify the target population to be surveyed (ACMEM132)
- investigate questionnaire design principles; for example, simple language, unambiguous questions, consideration of number of choices, issues of privacy and ethics, and freedom from bias. (ACMEM133)
- describe faults or limitations in the collection of data for a given process (ACMEM134)
- describe sources of error in surveys; for example, sampling error and measurement error (ACMEM135)
- investigate the possible misrepresentation of the results of a survey due to misunderstanding the procedure, or misunderstanding the reliability of generalising the survey findings to the entire population (ACMEM136)
- investigate errors and misrepresentation in surveys, including examples of media misrepresentations of surveys. (ACMEM137)
- design, implement and review a data collection process in a practical work-based situation

Data representation and interpretation

Key knowledge and skills:

- identify examples of categorical data (ACMEM043)
- identify examples of numerical data. (ACMEM044)
- display categorical data in tables and column graphs (ACMEM045)
- display numerical data as frequency distributions, dot plots, stem and leaf plots, and histograms (ACMEM046)
- recognise and identify outliers (ACMEM047)
- compare the suitability of different methods of data presentation in real-world contexts. (ACMEM048)
- identify the mode (ACMEM049)
- calculate measures of central tendency, the arithmetic mean and the median (ACMEM050)
- investigate the suitability of measures of central tendency in various real-world contexts (ACMEM051)
- investigate the effect of outliers on the mean and the median (ACMEM052)
- calculate and interpret quartiles, deciles and percentiles (ACMEM053)
- use informal ways of describing spread, such as spread out / dispersed, tightly packed, clusters, gaps, more / less dense regions, outliers (ACMEM054)
- calculate and interpret statistical measures of spread, such as the range, interquartile range and standard deviation (ACMEM055)
- investigate real-world examples from the media illustrating inappropriate uses, or misuses, of measures of central tendency and spread. (ACMEM056)
- compare back-to-back stem plots for different datasets (ACMEM057)
- complete a five-number summary for different datasets (ACMEM058)
- construct box plots using a five-number summary (ACMEM059)
- compare the characteristics of the shape of histograms using symmetry, skewness and bimodality. (ACMEM060)
- describe the patterns and features of bivariate data (ACMEM138)

- describe the association between two numerical variables in terms of direction (positive/negative), form (linear/non-linear) and strength (strong/moderate/weak). (ACMEM139)
- identify the dependent and independent variable in bivariate data sets (ACMEM140)
- find the line of best fit by eye on a scatterplot (ACMEM141)
- use technology to find the line of best fit on a scatterplot (ACMEM142)
- interpret relationships in terms of the variables (ACMEM143)
- use technology to find the correlation coefficient (an indicator of the strength of linear association) (ACMEM144)
- use the line of best fit to make predictions, both by interpolation and extrapolation (ACMEM145)
- recognise the dangers of extrapolation (ACMEM146)
- distinguish between causality and correlation through examples. (ACMEM147)

Module 3 Work Requirements

The work requirements of a course are processes, products or performances that provide a significant demonstration of achievement that is measurable against the course's standards. Work requirements need not be the sole form of assessment for a module.

This module includes 3-4 short responses in a reflective journal and an investigation as work requirements.

See Appendix 3 for summary of Work Requirement specifications for this course.

Module 3 Assessment

This module will assess criteria 1, 2, 3, 6.

Assessment

Criterion-based assessment is a form of outcomes assessment that identifies the extent of learner achievement at an appropriate end-point 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 end-point 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

	Module 1	Module 2	Module 3	Notes
Criteria assessed	1,2,3,4	1,2,3,5	1,2,3,6	Three common in all modules and one focus criterion per module

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

1. Define and explain key knowledge and concepts and apply a range of related mathematical techniques and procedures to solve practical problems
2. Interpret and engage with mathematical objects and information in workplace contexts
3. Manage self, connect and collaborate with others and reflect on learning including in workplace contexts
4. Identify problems that can be modelled and solved mathematically, select and apply problem solving processes and review outcomes including in workplace contexts
5. Apply mathematical reasoning and creative thinking to generate, test and apply ideas in a mathematical inquiry and evaluate their impact including in workplace contexts
6. Communicate and represent mathematical information and apply mathematical conventions including in workplace contexts.

Standards

Criterion 1: Define and explain key knowledge and concepts and apply a range of related mathematical techniques and procedures to solve practical problems.

Rating C	Rating B	Rating A
selects, recalls and uses some mathematical facts, rules and definitions to describe mathematical situations	consistently selects, recalls and uses facts, rules, definitions and procedures correctly to describe mathematical situations	consistently selects, recalls and uses facts, rules, definitions and procedures correctly to describe and explain mathematical situations
comprehends and applies aspects of mathematical concepts and techniques to solve some problems in simple familiar situations	comprehends and applies mathematical concepts and techniques to solve problems in simple familiar and complex familiar situations	comprehends and applies mathematical concepts and techniques to solve problems in simple familiar, complex familiar and complex unfamiliar situations
applies mathematical and statistical models to routine problems	selects and applies mathematical and statistical models to routine and non-routine problems	develops, selects and applies mathematical and statistical models to routine and non-routine problems in a variety of contexts
uses digital technologies to graph, display and organise mathematical and statistical information to solve routine problems.	uses digital technologies appropriately to graph, display and organise mathematical and statistical information to solve a range of routine and non-routine problems.	uses digital technologies effectively to graph, display and organise mathematical and statistical information to solve a range of routine and non-routine problems in a variety of contexts.

Criterion 2: Interpret and engage with mathematical objects and information in workplace contexts

Rating C	Rating B	Rating A
explores routine familiar practical problems or scenarios and frames them in mathematical terms	interprets routine familiar and complex familiar practical problems or scenarios and frames them in mathematical terms	interprets complex familiar and non-familiar practical problems or scenarios and frames them in mathematical terms
identifies situations where mathematical information has been used to support decision-making in workplace contexts	analyses various ways that mathematical information has been used to support decision-making processes in workplace contexts	evaluates how mathematical information has been used to support decision-making processes in workplace contexts
accesses and manages information from digital and non-digital sources to develop mathematical ideas	accesses and synthesises information taken from a variety of digital and non-digital sources to develop mathematical ideas	evaluates authenticity, reliability and validity of information taken from a variety of digital and non-digital sources to develop mathematical ideas
identifies and describes how the use of technology can affect outcomes obtained in workplace contexts.	identifies and discusses the inputs and outputs of technology and describes how the use of technology can affect outcomes obtained in workplace contexts.	interprets and evaluates the inputs and outputs of technology, including critically reflecting on and evaluating the technology used and the outcomes obtained in workplace contexts.

Criterion 3: Manage self, connect and collaborate with others and reflect on learning including in workplace contexts

Rating C	Rating B	Rating A
recognises own learning strengths and weaknesses and establishes processes to plan, monitor and assess one's understanding and performance including in workplace contexts	analyses own learning strengths and weaknesses in order to establish processes used to plan, monitor and assess one's understanding and performance including in workplace contexts	critically reflects upon own learning strengths and weaknesses in order to establish processes used to plan, monitor and assess one's understanding and performance including in workplace contexts
sets goals and timelines and monitors progress against them with support	sets goals and timelines and monitors progress and supports others in team situations	recognises different perspectives, sets goals and timelines, monitors progress and supports others in team situations
shows some ability to organise and plan in order to manage resources and complete set tasks	displays organisational, planning and self-management skills and interpersonal skills to manage resources and collaborates with others to complete set tasks	selects and displays organisational, planning and self-management skills and interpersonal skills to manage resources, build rapport with others and consistently complete tasks
is generally positive including in workplace contexts and with support will persevere through challenges.	demonstrates a positive disposition, can adapt to new situations including in workplace contexts and generally displays perseverance and resilience and seeks help as required.	demonstrates optimism, flexibility and resilience when adapting to new situations including in workplace contexts including persevering through challenges and seeking help appropriately as required.

Criterion 4: Identify problems that can be modelled and solved mathematically, select and apply problem solving processes and review outcomes including in workplace contexts

Rating C	Rating B	Rating A
identifies problem elements and makes inferences that may be able to be tested mathematically	identifies and explains problem elements to make informed inferences that can be tested mathematically	explores and links problem elements to make logical inferences that can be tested mathematically
identifies how a given problem can be solved mathematically	identifies and describes how mathematics can be used to model and solve familiar problems in workplace situations and generates a possible mathematical approach	describes and explains how mathematics can be used to model and solve unfamiliar problems in workplace situations and generates possible mathematical approaches
follows mathematical processes to generate solutions to practical problems or investigations	uses mathematical applications and processes to find solutions or results to open-ended practical problems or investigations	selects and applies a range of mathematical applications and processes to find accurate solutions or results to open-ended practical problems or investigations
identifies the mathematical applications and processed used and the outcomes obtained.	describes how the mathematical applications and processes used and the outcomes obtained were suitable for the context.	selects and justifies use of mathematical applications and processes and identifies how the outcomes obtained may impact the dignity and wellbeing of individuals and communities.

Criterion 5: Apply mathematical reasoning and creative thinking to generate, test and apply ideas in a mathematical inquiry and evaluate their impact including in workplace contexts

Rating C	Rating B	Rating A
lists ideas that may be able to be tested mathematically	identifies or adapts ideas that can be tested mathematically	generates or adapts ideas and describes how they can be tested mathematically
tests multiple ideas and select sone to implement based on comparison of results	tests multiple ideas and prioritises implementation based on comparison of results and describes potential limitations of the approach	tests multiple ideas, and justifies selection for implementation based on analysis of the positive and negative implications of the approach
follows a given procedure to implement an idea in a workplace context	follows devised procedure to implement own idea in a workplace context	follows devised procedure to implement own idea, and adapts flexibly and efficiently in a workplace context
describes the impact of implemented ideas in workplace contexts	explains and analyses the impact of implemented ideas in workplace contexts on self and others	analyses and evaluates the impact of implemented ideas in workplace contexts on multiple stakeholders and/or from multiple perspectives

Criterion 6: Communicate and represent mathematical information and apply mathematical conventions including in workplace contexts.

Rating C	Rating B	Rating A
communicates mathematical and statistical arguments using appropriate language	communicates reasoned mathematical and statistical judgments and arguments using appropriate language	communicates reasoned mathematical and statistical judgments and arguments using appropriate and concise language
uses mathematical conventions, systems and constructs based on definitions and rules when prompted	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 including manipulation and use of symbolic expressions, rules and formal systems accurately and purposefully
represents and explains mathematical and statistical information in numerical, graphical and symbolic form in routine problems with and without the aid of technology	represents and interprets mathematical and statistical information in numerical, graphical and symbolic form in routine and non-routine problems with and without the aid of technology	represents, models and analyses mathematical and statistical information in numerical, graphical and symbolic form in routine and non-routine problems in a variety of contexts with and without the aid of technology
selects and uses language to express ideas and listens to the perspectives of others.	selects, uses and refines language to respond to multiple perspectives when expressing ideas.	purposefully selects, uses and refines language to effectively connect with address multiple perspectives when expressing ideas.

Quality Assurance

- This will be determined by TASC at time of accreditation.

Qualifications and Award Requirements

The final award will be determined by the Office of Tasmanian Assessment, Standards and Certification from 6 ratings.

The minimum requirements for an award in *Essential Mathematics* Level 2 are as follows:

EXCEPTIONAL ACHIEVEMENT (EA)
5 'A' ratings, 1 'B' rating

HIGH ACHIEVEMENT (HA)
3 'A' ratings, 2 'B' ratings, 1 'C' rating

COMMENDABLE ACHIEVEMENT (CA)
3 'B' ratings, 3 'C' ratings

SATISFACTORY ACHIEVEMENT (SA)
5 'C' ratings

PRELIMINARY ACHIEVEMENT (PA)
3 'C' ratings

A learner who otherwise achieves the ratings for an 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

- This will be confirmed by time of accreditation.

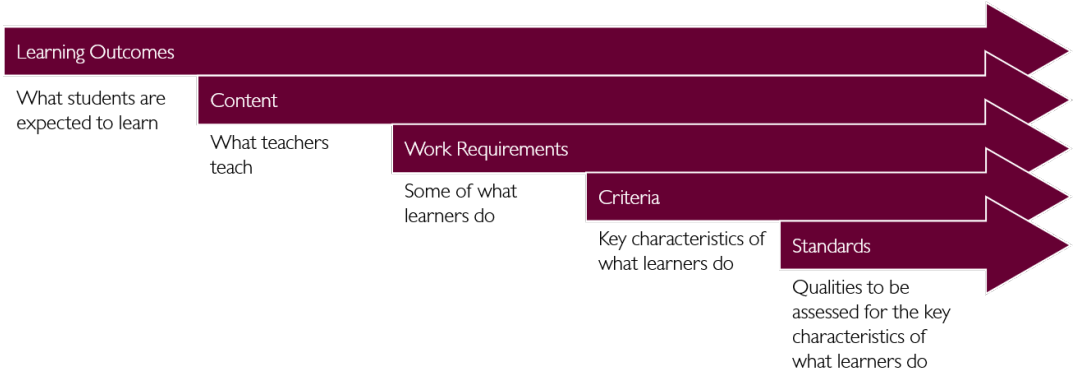
Course Developer

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

Accreditation and Version History

- Details to be determined by TASC at time of accreditation.

Appendix 1 - Line of Sight



Learning Outcomes	Course Content	Work Requirements	Criteria	Standards	General Capabilities (GC)
1. Define and explain key knowledge and concepts and apply a range of related mathematical techniques and procedures to solve practical problems.	Module 1, 2, 3	Module 1, 2, 3	1	E 1, 2, 3, 4	GC:
2. Interpret and engage with mathematical objects and information in workplace contexts.	Module 1, 2, 3	Module 1, 2, 3	C 2	E 1, 2, 3, 4	GC:
3. Manage self, connect and collaborate with others and reflect on learning including in workplace contexts.	Module 1, 2, 3	Module 1, 2, 3	C 3	E 1, 2, 3, 4	GC:
4. Identify problems that can be modelled and solved mathematically, select and apply problem solving processes and review outcomes including in workplace contexts.	Module 1	Module 1	C 4	E 1, 2, 3, 4	GC:

5. Apply mathematical reasoning and creative thinking to generate, test and apply ideas in a mathematical inquiry and evaluate their impact including in workplace contexts.	Module 2	Module 2	C 5	E 1, 2, 3, 4	GC: 
6. Communicate and represent mathematical information and apply mathematical conventions including in workplace contexts.	Module 3	Module 3	C 6	E 1, 2, 3, 4	GC: 

Appendix 2 - Alignment to Curriculum Frameworks

Links to 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 still very much 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.

A vast majority of content in this course is drawn from Unit 3 and Unit 4 of the Australian Curriculum Framework: Essential Mathematics

Unit 3 provides students with the mathematical skills and understanding to solve problems related to measurement, scales, plans and models, drawing and interpreting graphs, and data collection.

Unit 4 provides students with the mathematical skills and understanding to solve problems related to probability, earth geometry and time zones, and loans and compound interest.

Additionally, the topics 'Applications of trigonometry' and 'Linear equations and their graphs' are taken from the Australian Curriculum Framework: General Mathematics Unit 2. 'Applications of trigonometry' will be extended to require students' to apply their knowledge of trigonometry to solve practical problems involving non-right-angled triangles in both two and three dimensions, including problems involving the use of angles of elevation and depression, and bearings in navigation in workplace contexts. Similarly, 'Linear equations and their graphs' will be extended to require students to express linear equations numerically and graphically and to model and analyse practical situations in workplace contexts such as profit-loss break even points and the relationship between two variables in bivariate data sets.

Appendix 3 - Work Requirements

The work requirements for Module 1 and Module 2 provide agency for providers and learners. When completing these two modules, learners must ensure that they provide evidence against both Criterion 4 and 5 (meaning they must complete one extended response and one inquiry).

Module 1 Work Requirements Specifications

Focus Area: Work-based Learning
Title of Work Requirement: Problem Solving Task
Mode /Format: Extended response
Learning Outcomes: 1,2,3 and 4
Description: Extended response: Formulating and implementing a mathematical process involving problem solving and mathematical modelling of a situation encountered in a real or simulated workplace context including the graphing and interpretation of a linear relationship between two quantities and/or calculating and representing probability and relative frequency of a given event. In

preparation and alongside this task it is likely that shorter practical activities will be engaged. These are designed to support the depth of understanding and engagement in the extended response.
Size: Maximum of 1000 words (and supporting mathematical calculations) – 8 to 10 hours of class time including support tasks.
Timing: No specified timing
External agencies: Involvement at teacher discretion
Relevant Criterion/criteria:

- Criterion 1: all elements
- Criterion 2: all elements
- Criterion 3: 1,3,4 and 2 if work requirement incorporates groupwork
- Criterion 4: all elements

Focus Area: Work-based Learning
Title of Work Requirement: Reflective journal
Mode /Format: Short responses
Learning Outcomes: 2,3
Description: An ongoing journal that provides opportunity for the learner to critically reflect and evaluate their ongoing mathematical development and understanding of the importance of mathematics in the workplace context
Size: 400 words maximum per module
Timing: Throughout the course
External agencies: Involvement at teacher discretion
Relevant Criterion/criteria:

- Criterion 2: all elements
- Criterion 3: all elements

Module 2 Work Requirements Specifications

Focus Area: Work-based Learning
Title of Work Requirement: Inquiry Task
Mode /Format: Inquiry
Learning Outcomes: 1,2,3 and 5
Description: Inquiry: Conducting a mathematical inquiry to implement and evaluate the effectiveness of an idea to explore a scenario in a real or simulated workplace context involving measurement and/or finance.
Size: Maximum of 1000 words (and supporting mathematical calculations) – 8 to 10 hours of class time including support tasks.
Timing: No specified timing
External agencies: Involvement at teacher discretion
Relevant Criterion/criteria:

- Criterion 1: all elements
- Criterion 2: all elements
- Criterion 3: 1,3,4 and 2 if work requirement incorporates groupwork
- Criterion 5: all elements

Focus Area: Work-based Learning
Title of Work Requirement: Reflective journal
Mode /Format: Short responses
Learning Outcomes: 2,3

Description: An ongoing journal that provides opportunity for the learner to critically reflect and evaluate their ongoing mathematical development and understanding of the importance of mathematics in the workplace context
Size: 400 words maximum per module
Timing: Throughout the course
External agencies: Involvement at teacher discretion
Relevant Criterion/criteria:

- Criterion 2: all elements
- Criterion 3: all elements

Module 3 Work Requirements Specifications

Focus Area: Work-based Learning
Title of Work Requirement: Statistical Investigation
Mode /Format: Investigation
Learning Outcomes: 1,2,3,6
Description: Learners will engage in a statistical investigation that applies to a chosen workplace situation incorporating data collection, representation and interpretation. Learners will:

- Identify a problem/context and pose a statistical question
- Define a data collection process
- Collect or obtain data (multiple sets)
- Represent and analyse the data
- Interpret and communicate results
- Justify their results and identify any limitations or constraints

Size: Maximum of 15 hours of class time. Maximum of 1500 words (and supporting mathematical calculations) or 10 minute multimodal presentation
Timing: No specified timing
External agencies: Involvement at teacher discretion
Relevant Criterion/criteria:

- Criterion 1: all elements
- Criterion 2: all elements
- Criterion 3: 1,3,4 and 2 if work requirement incorporates groupwork
- Criterion 6: all elements

Focus Area: Work-based Learning
Title of Work Requirement: Reflective journal
Mode /Format: Short responses
Learning Outcomes: 2,3
Description: An ongoing journal that provides opportunity for the learner to critically reflect and evaluate their ongoing mathematical development and understanding of the importance of mathematics in the workplace context
Size: 400 words maximum per module
Timing: Throughout the course
External agencies: Involvement at teacher discretion
Relevant Criterion/criteria:

- Criterion 2: all elements
- Criterion 3: all elements

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

- A central glossary will be added to the final draft of the course for consultation.