Workplace Maths

LEVEL 2	15 TCE CREDIT POINTS
COURSE CODE	MTW215120
COURSE SPAN	2020 — 2022
READING AND WRITING STANDARD	NO
MATHEMATICS STANDARD	YES
COMPUTERS AND INTERNET STANDARD	NO

This course was delivered in 2020. Use A-Z Courses to find the current version (if available).

The Workplace Maths course focuses on enabling learners to use maths effectively, efficiently and critically to make informed decisions in their daily lives

The emphasis of Workplace Maths is to provide learners with the mathematical knowledge, skills and understanding to solve problems in real contexts for a range of workplace, personal, further learning and community settings.

Course Description

This course involves the study of three (3) modules. For each module, suggested examples in context are given that may be investigated to illustrate the mathematics involved. The three modules are:

- measurement
- finance
- statistics.

In the study of each module, students will perform calculations relating to the use of algebra, percentages, rates and ratios. Such ongoing maths skills are grouped in this course's content as:

- numeric calculations
- algebra and proportional reasoning.

Rationale

Mathematics is the study of order, relation and pattern. From its origins in counting and measuring it has evolved in highly sophisticated and elegant ways to become the language now used to describe much of the modern world. Mathematics is also concerned with collecting, analysing, modelling and interpreting data in order to investigate and understand real-world phenomena and solve problems in context. Mathematics provides a framework for thinking and a means of communication that is powerful, logical, concise and precise. It impacts upon the daily life of people everywhere and helps them to understand the world in which they live and work.

Workplace Maths focuses on enabling learners to use maths effectively, efficiently and critically to make informed decisions in their daily lives. The emphasis of *Workplace Maths* is to provide learners with the mathematical knowledge, skills and understanding to solve problems in real contexts for a range of workplace, personal, further learning and community settings. This course provides the opportunity for learners to prepare for post-school options of employment and further training.

Aims

Workplace Maths aims to equip learners with mathematical skills and understanding to apply mathematical calculations to solving real-world problems. This includes using formulas to find unknown quantities, percentages, rates and ratios involving the mathematics of finance, statistics and measurement (including time and motion).

For all content areas, the proficiency strands understanding, fluency, problem solving and reasoning from the Australian F-10 curriculum are very much applicable and should be inherent in students' learning of the subject. Each of these is essential and mutually reinforcing. For all content areas, practice allows learners to develop fluency in these skills.

Providers are encouraged to develop and apply content in contexts that are meaningful and of interest to their learners. By adopting an investigative approach, numeric skills are applied to deriving real world solutions. *Workplace Maths* encourages a variety of approaches used to achieve this purpose.

Learning Outcomes

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

1. communicate their arguments and strategies when solving mathematical problems using appropriate mathematical or statistical language
2. use an investigative approach to collect, represent and analyse data and draw conclusions
3. plan, organise and implement strategies in order to complete negotiated tasks
4. apply reasoning skills to solve practical problems involving measurement, time and motion
5. interpret mathematical and statistical information and ascertain the reasonableness of their solutions to problems
6. apply reasoning skills to solve practical problems involving finance and budgeting.

Access

It is recommended that learners undertaking this course will have previously achieved at least a Grade 10 'D' in *Australian Curriculum: Mathematics*.

Pathways

The successful completion of *Everyday Maths* Level 1 may provide a useful pathway to the study of the *Workplace Maths* Level 2 course. Successful completion of *Workplace Maths* Level 2 can provide a pathway to *General Mathematics Foundation* Level 2 or in some case to *General Mathematics* Level 3.

Course Size And Complexity

This course has a complexity level of 2.

At Level 2, the learner is expected to carry out tasks and activities that involve a range of knowledge and skills, including some basic theoretical and/or technical knowledge and skills. Limited judgement is required, such as making an appropriate selection from a range of given rules, guidelines or procedures. VET competencies at this level are often those characteristic of an AQF Certificate II.

This course has a size value of 15.

Course Delivery

The sequence of delivery for *Workplace Maths'* modules is at the discretion of the provider. While there is no prescribed order of delivery, the course material from each of the three modules will provide the opportunity for assessment of Criteria 1, 2, 3 and 4. Individually each module provides the opportunity for assessment against Criterion 5 (Measurement module), Criterion 6 (Statistics module) and Criterion 7 (Finance module).

A program of study may combine/concurrently deliver aspects of the content in Criterion 5, 6 and/or 7. Such a design can reinforce learning outcomes. While not all Australian Curriculum proficiency strands apply to every part of the course content, they provide a meaningful basis for the development of concepts within mathematics and as such indicate the breadth of mathematical actions that teachers can emphasise to support learning of the prescribed content.

It is suggested that approximately 50 hours of study time is spent on each of the three (3) modules of the course.

Course Content

Module 1: Measurement

Within measurement, learners will use estimation and calculation to make comparisons between measurements including perimeter, area, volume and capacity. They will estimate, calculate and convert between different units of mass, quantities of time, distance and speed. They will read and interpret schedules, maps, scale and timetables when solving problems involving travel.

Learners will:

- use an accurate interpretation of measuring instruments in practical investigations of measurement including:
    - simple and familiar measuring tools, such as a measuring tape, electronic bathroom scales, compass (analog/digital), trundle wheel and stopwatch
    - where possible, workplace specific measuring tools, such as a radar, electronic scales, temperature gauge, pressure gauge

- use metric units of length, their abbreviations, conversions between them, and demonstrate appropriate levels of accuracy and choice of units
- estimate lengths
- convert between metric units of length and other length units as appropriate
    - calculate perimeters of familiar shapes, including: triangles, squares, rectangles, circles and composites of these
    - review Pythagoras' Theorem and apply to solve practical problems in two dimensions
- use metric units of area, their abbreviations, conversions between them and appropriate choices of units
- estimate areas of different shapes
- convert between hectares and acres
- use formulas to calculate areas of rectangles, triangles and circles
- use metric units of mass, their abbreviations, conversions between them and demonstrate appropriate choices of units
- estimate mass of different objects
- use metric units of volume, their abbreviations, conversions between them and appropriate choices of units
- understand the relationship between volume and capacity, recognising that 1 cm3 = 1 mL, and 1 m3 = 1 kL
- estimate volume and capacity of various objects
- use formulas to find the volume and capacity of regular objects; cubes, rectangular and triangular prisms, cylinders and spheres
- use units of time, conversions between units, fractional, digital and decimal representations
- represent time using 12 hour and 24 hour clocks
- calculate time intervals, such as: time between, time ahead, time behind
- interpret rosters, schedules, timetables and charts, such as: work rosters and schedules, tide charts, sunrise charts and moon phases
- read and interpret maps, including understanding compass directions, using keys/legends and using scales to find distances on maps and plans, such as: road maps, street maps, bushwalking maps,model plans and site plans
- optimise distances through trial and error and systematic methods, such as: shortest path, routes to visit all towns and routes to use all roads
- solve practical problems using bearings
- identify the appropriate units for different activities, such as: walking, running, swimming and flying
- calculate speed, distance or time using the formula speed = distance/time
- calculate the time for a journey from distances estimated from maps
- interpret distance versus time graphs
- calculate and interpret the average speed (e.g. a 4 hour trip covering 250 km).

Examples in context:

- *determining the dimensions/measurements of food packaging*
- *determining the length of the lines on a sporting field to find the cost of marking it*
- *in a practical situation, verify the square of a corner using Pythagoras' Theorem*
- *investigate the relationship between a person's footprint size and their height in the context of crime scene investigations*
- *determining the area of the walls of a room for the purpose of painting*
- *comparing the area of different house blocks of the same perimeter*
- *comparing and discussing the components of different food types for the components of packaged food expressed as grams*
- *finding the volume of water collected from a roof under different conditions*
- *finding the volume of various packaging*
- *calculating and interpreting dosages for children and adults from dosage panels on medicines given age or weight*
- *calculating reaction times through experiments*
- *using several timetables and electronic technologies to plan the most time efficient routes*
- *comparing time travelled by car with other modes of transport*
- *calculating distances travelled to school and the time taken to get from home to school considering different average speeds*
- *using a car GPS navigation system*
- *orienteering exercises*
- *using scales to find distances on maps, such as road maps, street maps, bushwalking maps, online maps and Cadastral (land survey) Maps*
- *using scales to identify measurements on plans, such as model plans, building plans, and site plans*
- *calculating stopping distances for different speeds through use of formula for different conditions, such as road type, tyre conditions, types of vehicle.*

Module 2: Finance

Within finance, learners will use estimation and calculation to create and compare budgets and transactional records. They will calculate prices after applying percentage discounts or mark-ups. They will calculate unit prices (e.g. price per kilogram) and use unit prices in real-life situations such as

menu costing or creating a shopping budget. They will investigate simple interest and tax rates and apply to real-life situations.

Learners will:

- express a calculated amount to the nearest cent (e.g. 13.5489 = $13.55)
- apply rounding of a total to the nearest 5 cents
- increase or decrease an amount by a given percentage e.g. discounts, GST, etc.
- perform calculations involving the management of money in real-life situations, including keeping financial records and budgeting
- using money in relation to measurement (e.g. price per kilogram)
- calculate simple interest
- calculate tax payment (e.g. using an online calculator)
- calculate costs involved with credit (e.g. interest free purchases) or contract (e.g. mobile phone plan) situations.

Examples in context:

- *practical experience in cash handling including mental reconciliation skills and counting back change after a transaction*
- *determining best value when the same item is offered in two sizes at different prices*
- *using tables to record transactions showing income and expenditure*
- *using tables to complete a basic single entry profit and loss statement*
- *using, where possible, technology associated with handling transactions such as a cash register, EFTPOS machine, and computer*
- *investigating different ways of transacting business such as cash, electronic funds transfer, debit cards, credit cards, order form and charge accounts*
- *using a hardware store price list to prepare a budget for a project like adding a timber deck to a home*
- *investigating different modes of financial record keeping e.g. pay slips, invoices, bank statements, credit card statements, cash books*
- *investigating and compiling a glossary to define terms and jargon associated with handling money in work-based environments*
- *calculating simple interest for repayment of items over time*
- *investigating methods of getting paid: salary, wage, piece rate, commission*
- *investigating exchange rates between currencies*
- *calculating tax payment and terms for workers according to their circumstances*
- *completing a tax form for a given scenario*
- *discussing advantages/disadvantages of 'Do-It-Yourself' projects*
- *preparing a poster or presentation detailing tips for purchasing a car*
- *researching the costs involved in running a car*
- *investigating budgets using 'Essi Money' (a web-based scenario that puts learners in a real-life budget management situation)*
- *preparing a weekly or monthly budget for the living away from home situation*
- *investigating costs involved in paying for goods using an 'interest free period' contract*
- *investigating costs involved in paying for a house using a mortgage loan and the effect upon total cost and duration of the loan of paying extra repayments.*

Module 3: Statistics

Within statistics, learners will create, read and interpret tables, graphs and diagrams. They will classify, present, interpret and summarise data collected through investigations and/or researched from secondary sources. They will perform calculations to determine the mean, median and mode of numerical data sources.

Learners will:

- use and interpret information presented in graphs, such as: conversion graphs, line graphs, step graphs, column graphs, pie graphs and picture graphs
- discuss and interpret graphs found in the media and in factual texts
- interpret and use two-way tables in real-life situations, such as rosters, schedules and more complex workplace situations
- recognise and describe trend patterns in tables and graphs
- sketch plan and elevation views of a 3D solid
- determine and use the most appropriate type of graph to best display a data set
- draw graphs from given data to represent practical situations
- use spreadsheets to tabulate and graph data
- use simple (linear) graphs to model real-life situations
- identify examples of categorical data
- identify examples of numerical data
- display categorical data in tables and column graphs
- display numerical data as frequency distributions, scatterplots and histograms
- compare the suitability of different methods of data presentation in real-world contexts
- identify the mode and range
- calculate measures of central tendency; the arithmetic mean and the median
- investigate real-world examples from the media illustrating inappropriate uses, or misuses, of measures of central tendency and spread.

Examples in context:

- *analysing and interpreting a range of graphical information of global weather patterns that affect food growth*
- *analysing and interpreting a range of graphical information given on gas and electricity bills*
- *interpreting graphs showing growth ranges for children (height or weight or head circumference versus age)*
- *interpreting hourly hospital charts showing temperature and pulse*

- *interpreting graphs showing life expectancy with different variables*
- *interpreting a step graph showing rates of taxation*
- *expressing ingredients of particular food types as percentages of the total quantity, or per serving size, or per 100 grams, presenting the information in different formats e.g. column graphs and pie graph*
- *drawing a line graph to represent any data that demonstrates a continuous change e.g. hourly temperature*
- *creating graphs to show the deductions from gross wages such as income tax, medicare levy, superannuation*
- *analysing and interpreting a range of statistical information related to car theft, car accidents and driver behaviour*
- *using statistics and graphs to find the number of people in each blood type given the population percentages of blood types in different countries*
- *using blood usage statistics to predict the amount of blood needed at different times of the year*
- *investigate the relationship between a person's footprint size and their height in the context of crime scene investigations*
- *investigate the relationship between the length of a candle and the time that it has been burning.*

Mathematical Skills : Numeric Calculations

Within *Workplace Maths*, learners will engage in numeric calculations to solve real world problems involving measurement, time and motion, statistics and finance. As such, learners will explore concepts and carry out calculations relating to the use of algebra and proportional reasoning (including percentages, rates and ratios). These concepts will support learners to engage with calculations and explore the concepts of measurement (linear measure, area measure, mass, volume and capacity, distance, time, speed and navigation). Similarly, these concepts will support learners to engage with calculations and explore the concepts of statistics (tables, graphs, diagrams, data) and finance (percentage increases/decreases, financial records and budgeting, price per unit rates, transactions, tax and interest rates).

Within the course content relating to numeric calculations learners will:

- calculate with whole numbers, decimals, fractions and percentages and use these appropriate to context
- use the four basic operations algorithmically (division with single digit divisor)
- recall and use of basic multiplication table facts
- use mental multiplication and division by 10, 100 and 1000
- apply arithmetic operations according to their correct order
- calculate and interpret averages
- solve practical problems requiring basic number operations
- ascertain the reasonableness of answers to arithmetic calculations
- use leading digit approximation to obtain estimates of calculations
- check results of calculations for accuracy
- use a calculator for multi-step calculations, accurately and appropriately including the use of its memory as applicable
- recognise the significance of place value after the decimal point
- recognise and use equivalent fractions, decimals and percentages and the ability to convert from one form to another
- understand the relationship between division and fractions and the use of fractions to represent sharing situations (e.g. 5 metre length of timber divided equally into 8 parts. 5÷8 = 5/8 metre or 0.625 metres each)
- multiply a whole number by a fraction, decimal or percentage in a problem context
- round up or round down numbers to the nearest 10, 100 or 1000 or the required number of decimal places
- use mathematical knowledge to solve problems in a range of contexts.

Examples in context:

- *creating a budget for living at home and for living independently*
- *calculating various costs per day, week, month using tables, spreadsheets, and estimation e.g. food, clothing, transport, utility costs*
- *creating and evaluating daily menus to meet the minimum daily nutritional and energy needs*
- *creating a travel log for a journey involving different modes of travel at varied speeds.*
- *calculating the average time taken to travel to school according to distance and transport type.*
- *recording aspects of maths encountered in VET programs, part-time jobs or over the course of a day.*

Mathematical Skills: Algebra and Proportional Reasoning

Within the course content relating to the use of algebra and proportional reasoning (percentages, rates and ratios) learners will:

- understand the notion of directed numbers
- substitute numerical values into algebraic expressions, to find the value of an unknown
- calculate a percentage of a given amount
- determine one amount expressed as a percentage of another
- demonstrate an understanding of the elementary ideas and notation of ratio
- understand the relationship between fractions and ratio
- express a ratio in simplest form
- find the ratio of two quantities
- divide a quantity in a given ratio
- use ratio to describe simple scales
- use rates to make comparisons
- convert between different units e.g. units of measure, exchange rates etc.
- identify common usage such as: litres/second as a rate of flow,, km/h as a rate to describe speed or beats/minute as a rate describing pulse rate

Examples in context:

- *the use of substitution in formulas related to Measurement and Finance*
- *rearranging formulas to solve for the unknown in formulas related to Measurement, Statistics and Finance*
- *calculating and comparing monthly and weekly amounts available for accommodation with varying income levels using percentages*
- *using percentages to compare the different components of personal expenditure*
- *expressing ingredients of packaged food as percentages of the total quantity, or per serving size, or per 100 grams*
- *comparing body ratios such as hip height versus stride length, foot length versus height, body mass index*
- *comparing ratios such as those found in recipes*
- *using rates to compare and evaluate nutritional information e.g. quantity per serve and quantity per 100g*
- *using unit prices (price per kilogram, per litre, etc.) to determine 'best' buys*
- *using rates to find fuel consumption for different vehicles in different driving conditions*
- *completing calculations with rates, including solving problems involving direct proportion in terms of rate e.g. if a person works for 3 weeks at a rate of $300 per week, how much do they earn?*
- *using percentages of maximum heart rate, compare the speed or distance travelled in a fitness test e.g. on a rowing machine or treadmill*
- *discuss various ratios used in machines. For example: gear ratios, power to weight ratios*
- *calculating the ratio of ingredients from a recipe or ratio of macronutrients from a meal plan / food diary*
- *analysing rates from data sources e.g. increase in parts per million (ppm) of CO2 over time*
- *using rates to find fuel consumption for different vehicles in different driving conditions*
- *calculating heart rates as beats per minute given the number of beats and different time periods*
- *applying rates to calculate the energy used in various activities over different time periods*
- *completing calculations with rates, including solving problems involving direct proportion in terms of rate e.g. if a car travels for 3 hours at a constant speed of 80km/hr, how far does it travel?*
- *completing calculations with rates involving inverse proportion. For example calculating the time taken to travel a set distance at a constant speed.*

Work Requirements

Through the course design, providers must provide learners the opportunity to:

- communicate mathematical ideas and information (Criterion 1)
- use an investigative approach to collect data, analyse it and draw conclusions (Criterion 2)
- plan, organise and implement strategies in order to complete negotiated tasks and reflect upon performance (Criterion 3)
- interpret, select and apply numeric calculations to solve problems in real-world situations (Criterion 4)

Over the duration of the course, learnerswill provide evidence by completing a minimum of three (3) major and three (3) minor assessments. These minimum requirements should be scheduled so that each of the three (3) modules include at least one (1) major and one (1) minor assessment.

A major assessment will include assessment against a minimum of three (3) criteria from the set of Criterion 1,2,3 and 4 outlined above, and with Criterion 5, and/or 6, and/or 7 depending upon the content the assessment is addressing.

A minor assessment will include assessment against a minimum of two (2) of the criteria from the set of Criterion 1,2,3 and 4 outlined above, along with Criterion 5, and/or 6, and/or 7 depending upon the content the assessment is addressing.

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.

Providers offering this course must participate in quality assurance processes specified by TASC to ensure provider validity and comparability of standards across all awards.
Internal assessment of all criteria will be made by the provider. Providers will report the learner's rating for each criterion to TASC.

Quality Assurance Process

The following process will be facilitated by TASC to ensure there is:

- a match between the standards of achievement specified in the course and the skills and knowledge demonstrated by learners
- community confidence in the integrity and meaning of the qualification.

Process – TASC will verify that the provider's course delivery and assessment standards meet the course requirements and community expectations for fairness, integrity and validity of qualifications TASC issues. This will involve checking:

- learner attendance records; and
- course delivery plans (the sequence of course delivery/tasks and when assessments take place):
    - assessment instruments and rubrics (the 'rules' or marking guide used to judge achievement)
    - class records of assessment
    - examples of learner work that demonstrate the use of the marking guide
    - samples of current learner's work, including that related to any work requirements articulated in the course document
    - archived samples of individual learner's work sufficient to illustrate the borderline between that judged as 'Satisfactory Achievement and 'Preliminary Achievement'.

This process may also include interviews with past and present learners.It will be scheduled by TASC using a risk-based approach.

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

Each body of learner work that providers submit to the meeting will include sufficient and appropriate material for judgements to be made about the learner's standard of maths skills.

The review meeting will give advice about the provider's assessment standards. 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 when finalising learners' results. The nature and scope of this requirement will be risk-based.

Criteria

The assessment for *Workplace Maths* will be based on the degree to which the learner can:

1. communicate mathematical ideas and information
2. use an investigative approach to collect data, analyse it and draw conclusions
3. plan, organise and implement strategies in order to complete negotiated tasks and reflect upon performance
4. interpret, select and apply numeric calculations to solve problems in real-world situations
5. interpret concepts and perform calculations to solve problems involving measurement, time and motion in real-world situations
6. interpret concepts and perform calculations to solve problems involving the use of tables, graphs, diagrams and data in real-world situations
7. interpret concepts and perform calculations to solve problems involving finance in real-world situations

Standards

Criterion 1: communicate mathematical ideas and information

Rating A	Rating B	Rating C
presents work that conveys a logical line of reasoning that has been followed between question and answer	presents work that conveys a line of reasoning that has been followed between question and answer	presents work that shows some of the mathematical processes that have been followed between question and answer
uses mathematical symbols correctly and follows mathematical conventions with precision to convey meaning	uses mathematical symbols and follows mathematical conventions	uses mathematical symbols and follows key mathematical conventions. There may be some errors or omissions in doing so
presents work with the final answer clearly identified, and articulated in terms of the question as required	presents work with the final answer clearly identified	presents work with the final answer apparent
presents work with correct use of units to convey mathematical information.	presents final answer with correct use of units as required.	uses correct units and when prompted - includes - them in an answer.

Criterion 2: use an investigative approach to collect data, analyse it and draw conclusions

Rating A	Rating B	Rating C
follows instructions to complete an investigation choosing appropriate mathematical analysis tools	follows instructions to complete an investigation using suggested mathematical analysis tools	follows instructions to conduct an investigation using suggested mathematical analysis tools
selects from a range of given approaches and uses them to analyse data	uses given approaches for analysing data	uses simple, given approaches for analysing data
recognises and explains possible reasons when an investigation is producing anomalous data	recognises when an investigation is producing anomalous data	
draws a detailed conclusion, that relates to gathered data, as required	draws a conclusion that relates to gathered data as required	uses a template approach to draw conclusions
poses relevant extensions to an investigation		
relates experimental findings to real-world phenomena and describes differences between the findings and what happens in the real world	describes relationships between experimental findings and real-world phenomena	identifies relationships between experimental findings and real-world phenomena
assesses the reliability and validity of conclusions and suggests causes of error	assesses the reliability and validity of conclusions	undertakes simple assessments of the reliability and validity of conclusions
sources relevant research data and accurately cites the sources of information.	sources relevant research data and cites the sources of information.	when given specific location directions, sources relevant research data and cites the sources of information.

Criterion 3: plan, organise and implement strategies in order to complete negotiated tasks and reflect upon performance

Rating A	Rating B	Rating C
successfully solves complex problems in familiar and unfamiliar contexts	successfully solves problems in familiar contexts	successfully solves simple and straightforward problems in familiar contexts
monitors and refines goals which are measureable, achievable, specific, time-referenced and realistic relating to completion of negotiated tasks	sets goals which are measureable, achievable, specific, time-referenced and realistic relating to completion of negotiated tasks	sets short-term, medium term and long term goals relating to completion of negotiated tasks

selects appropriate strategies and formulae to successfully complete routine and complex problems	selects from a given range of strategies and formulae to successfully complete routine and complex problems	selects from a given range of strategies and formulae to successfully complete routine problems
monitors and analyses progress towards meeting goals and timelines, and plans future actions	monitors progress towards meeting goals and timelines	monitors progress towards meeting goals and timelines, as directed
assists others (when appropriate) to maintain a task-focused approach, and works cooperatively when undertaking group project work	maintains a task-focused approach, and works cooperatively when undertaking group project work	works cooperatively when undertaking group project work
exercises flexibility and adaptability to meet changing conditions in order to complete negotiated tasks.	identifies and chooses different approaches when problems arise in order to complete negotiated tasks.	identifies different approaches when problems arise in completing negotiated tasks.

Criterion 4: interpret, select and apply numeric calculations to solve problems in real-world situations

Rating A	Rating B	Rating C
uses standard algorithms for the four basic number operations correctly, and consistently maintains a high level of operational accuracy when working with both whole numbers and decimals	uses standard algorithms for the four basic number operations correctly, and demonstrates a high level of operational accuracy when working with both whole numbers and decimals	uses standard algorithms for the four basic number operations correctly, and demonstrates a high level of operational accuracy when working with whole numbers
describes the notions of, and relationships between, fractions, decimals, percentages and ratios, and performs worded problems with them, with a high level of accuracy	describes the notions of, and relationships between, fractions, decimals, percentages and ratios, and uses them in worded problems, with some accuracy	recognises fractions, decimals, percentages and ratios, and the relationships between them, and uses them accurately in simple calculations
describes the notion of ratios and correctly applies them to practical situations involving complex conversions of units	describes the notion of ratios and correctly applies them to practical situations involving some conversion of units	recognises ratios and their application to practical situations
solves complex problems that involve some discernment of the approach to be used and frames them into mathematical symbols	solves straightforward contextual problems that involve some discernment of the approach to be used and frames them into mathematical symbols	solves contextual problems that involve some discernment of the approach to be used and frames them into mathematical symbols
accurately substitutes variables into an equation then completes simple manipulations to find an unknown that is not the subject of the equation	accurately substitutes variables into a complex equation to find an unknown that is the subject of the equation	accurately substitutes variables into a simple equation to find an unknown that is the subject of the equation
competently uses a calculator and performs calculations that involve the order of operations	competently uses a calculator and performs calculations that involve the order of operations	competently uses a calculator for straightforward calculations
applies a theoretical knowledge of calculation to a practical situation, identifying and allowing for differences between theory and real life.	applies a theoretical knowledge of calculation to a practical situation, identifying differences between theory and real life.	applies a theoretical knowledge of calculation to a practical situation.

Criterion 5: interpret concepts and perform calculations to solve problems involving measurement, time and motion in real-world situations

Rating A	Rating B	Rating C
performs complex calculations that involve measurements (e.g. how many jugs of a particular shape will it take to fill another container of a different shape?)	performs calculations that involve measurements (e.g. area and perimeter of a compound figure – composed of several different shapes)	performs simple calculations that involve measurements (e.g. area and perimeter of a simple figure)
identifies metric measures, performs conversions and makes comparisons between units including measures of area and volume	identifies metric measures and makes comparisons within the systems (e.g. which is larger: 1.5 kg or 1050 g)	identifies metric prefixes and makes simple conversions within the metric system (e.g. 1230 mm = 1.23 m)

applies Pythagoras' theorem to find the third side of a right-angled triangle when presented with a 2D worded practical problem	applies Pythagoras' theorem to find the missing side of a right-angled triangle when presented with a 2D practical problem in diagrammatic form	applies Pythagoras' theorem to find the hypotenuse of a right-angled triangle when presented with a 2D practical problem in diagrammatic form
applies a theoretical knowledge of measurement to a practical situation, identifying and allowing for differences between theory and real life	applies a theoretical knowledge of measurement to a practical situation, identifying differences between theory and real life	applies a theoretical knowledge of measurement to a simple practical situation
makes accurate estimates of length, area, mass, and volume	makes accurate estimates of length and area	makes practical estimates of length, area, mass and volume
applies estimation in complex workplace-based and real-life scenarios (e.g. estimates how much paint should be purchased to paint a given room or the amount of lawn seed required to seed a large plot)	applies estimation in workplace-based and real-life scenarios (e.g. how many stock items will fit on a shelf space?)	applies estimation in simple workplace-based and real-life scenarios (e.g. selecting a piece of wrapping paper to cover a box, or the best plastic container to hold a specified quantity of deli food)
selects, accurately uses and interprets a variety of measurement tools (such as a stopwatch, measuring tape, trundle wheel, compass, thermometer) in work-based applications (such as a workshop, landscaping site, kitchen or project site)	accurately uses and interprets a variety of measurement tools (such as a stopwatch, measuring tape, trundle wheel, compass, thermometer) in work-based applications (such as a workshop, landscaping site, kitchen or project site)	accurately uses and interprets a variety of simple and familiar measurement tools (such as a measuring tape and electronic bathroom scales)
performs simple calculations involving time (including time intervals), distance and speed	follows directions to perform simple calculations involving time (including time intervals), distance and speed	follows directions to perform simple calculations involving time and distance
draws a diagram to solve practical problems using bearings	using a given diagram, solves practical problems involving bearings	
interprets complex rosters, schedules and tables involving time and used in workplace and/or real-life situations	interprets rosters, schedules and tables involving time and used in workplace and/or real-life situations	interprets simple rosters, schedules and tables involving time and used in workplace and/or real-life situations
obtains distance information from a plan or map using a ratio scale (e.g. 1:100)	obtains distance information from a plan or map using a scale (e.g. 1 cm = 1 m)	obtains distance information from a plan or map using a scale
using a range of techniques and/or technologies, plans the most efficient route for a situation involving travel.	plans an efficient route for a situation involving travel.	compares different routes for a situation involving travel.

Criterion 6: interpret concepts and perform calculations to solve problems involving the use of tables, graphs, diagrams and data in real-world situations

Rating A	Rating B	Rating C
accurately interprets information presented in conversion graphs, line graphs, step graphs, column graphs and picture graphs including those containing broken scales	interprets information presented in conversion graphs, line graphs, step graphs, column graphs and picture graphs	interprets information presented in line graphs, column graphs and picture graphs
accurately represents categorical data in tables and column graphs	accurately represents categorical data in tables and column graphs	displays categorical data in tables and column graphs
accurately represents numerical data, choosing and justifying an appropriate representation according to a given context	accurately represents numerical data as frequency distributions, dot plots, stem and leaf plots and histograms	represents numerical data as frequency distributions and stem and leaf plots
identifies and explains when a particular presentation of a graph may be misleading to the reader	identifies and discusses in when a particular presentation of a graph may be misleading to the reader	identifies when a particular presentation of a graph may be misleading to the reader
describes trends and patterns in tables and graphs	explains trends and patterns in tables and graphs	recognises some trends and

that model real-life situations	and uses simple linear graphs to model real-life situations	patterns in tables and graphs, and that real-life situations can be modelled in a graph
uses spreadsheets to prepare a chart, extracts a graph from the chart, and devises and enters a formula into a chart	uses spreadsheets to prepare a chart, extracts a graph from the chart, and follows directions to enter a simple formula into a chart	uses spreadsheets to prepare a basic chart
interprets rosters, schedules and tables used in complex workplace situations (e.g. where the table may have to be interpreted in reverse. Given the outcome, find the conditions)	interprets rosters, schedules and tables used in workplace situations (e.g. postal charges that may depend upon both weight in part-there-of units as well as distance carried)	interprets simple rosters, schedules and tables used in workplace situations
identifies the mode and range, and calculates mean and median, for discrete tabulated frequency data	identifies the mode and range, and calculates mean and median, of a simple set of untabulated scores	identifies the mode and range of a simple set of untabulated scores
investigates and discusses the inappropriate uses of the mean and median, and spread.	describes the inappropriate uses of the mean and median, and spread.	identifies the inappropriate uses of the mean and median, and spread.

Criterion 7: interpret concepts and perform calculations to solve problems involving finance in real-world situations

Rating A	Rating B	Rating C
makes a fast and accurate mental estimation of the total price of a number of items and the amount of change to be tendered from a given note	makes an appropriate mental estimation of the total price of a number of items and the amount of change to be tendered from a given note	makes an appropriate mental estimation of the total price of a number of items
completes complex calculations involving percentage (e.g. finding a sales representatives weekly pay that may be based on a retainer, plus a percentage commission on a sliding scale)	completes calculations involving percentage (e.g. find the % mark-up if a $52 item is sold for $76)	completes simple calculations involving percentage presented in numeric form (e.g. increase $56 by 12%)
completes complex calculations involving money that may use several pieces of information and devices (such as tax schedules, commission schedules, or sliding scales and interest tables)	completes calculations involving money that relates to several pieces of information (e.g. completes calculations that involve working out daily pay given the rate per hour and clock on clock off information)	completes simple calculations involving money that relates to measurement (e.g. measures the weight of a bag of fruit then works out its cost given the price per kilo or the preparation of a simple quotation)
interprets complex financial records by making checks on balances, transactions, fees and interest calculations	interprets financial records (e.g. pay slips, invoices, bank statements, credit card statements, cash books)	interprets basic financial records (e.g. pay slips, invoices)
uses the principles of basic financial management in the preparation, and simple analysis of, a detailed budget over an extended time period.	uses the principles of basic financial management in the preparation of a detailed budget over an extended time period.	uses the principles of basic financial management in the preparation of a simple budget.

Relationship With The Australian Core Skills Framework (ACSF)

TASC recommends that providers use the ACSF to guide understanding of the appropriate levels of performance in the 5 core skills of Learning, Reading, Writing, Oral Communication and Numeracy as they relate to the course content.

Those participants aiming for an award that meets TCE standards requirements should be demonstrating the core skills at ACSF level 3 (or above) in reading and writing (to meet the everyday adult reading and writing standard) and/or in numeracy (to meet the everyday adult mathematics standard).

The performance features and sample activities of the ACSF are not in themselves equivalent to the TCE's 'everyday adult' standards. Rather they are illustrative of these standards.

The performance features and sample activities of the ACSF do **not** replace the criteria or standards in this TASC accredited course document.

The performance features and sample activities of ACSF level 3 can be used to help teachers develop and evaluate assessment instruments and can be used to inform final (summative) assessment judgements.

See the Australian Core Skills Framework for further information.

Award Requirements

The final award will be determined by the Office of Tasmanian Assessment, Standards and Certification from the 7 ratings.
The minimum requirements for an award in this course are as follows:

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

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

COMMENDABLE ACHIEVEMENT (CA)
4 'B' ratings, 2 'C' ratings

SATISFACTORY ACHIEVEMENT (SA)
6 'C' ratings

PRELIMINARY ACHIEVEMENT (PA)
4 'C' ratings

A learner who otherwise achieves the ratings 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

The Department of Education's Curriculum Services will develop and regularly revise the curriculum. This evaluation will be informed by the experience of the course's implementation, delivery and assessment.

In addition, stakeholders may request Curriculum Services to review a particular aspect of an accredited course.

Requests for amendments to an accredited course will be forward by Curriculum Services to the Office of TASC for formal consideration.

Such requests for amendment will be considered in terms of the likely improvements to the outcomes for learners, possible consequences for delivery and assessment of the course, and alignment with Australian Curriculum materials.

A course is formally analysed prior to the expiry of its accreditation as part of the process to develop specifications to guide the development of any replacement course.

Course Developer

The Department of Education acknowledges the significant leadership of Joshua Moore in the development of this course.

Expectations Defined By National Standards In Content Statements Developed by ACARA

The statements in this section, taken from documents endorsed by Education Ministers as the agreed and common base for course development, are to be used to define expectations for the meaning (nature, scope and level of demand) of relevant aspects of the sections in this document setting out course requirements, learning outcomes, the course content and standards in the assessment.

Australian Senior Secondary Curriculum: Essential Mathematics

Unit 1 - Topic 1: Calculations, percentages and rates

Calculations:

- 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).
- Percentages:
- calculate a percentage of a given amount (ACMEM011)
- determine one amount expressed as a percentage of another (ACMEM012).

Rates:

- 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).

Unit 1 - Topic 2: Measurement

Linear measure:

- use metric units of length, their abbreviations, conversions between them, and appropriate levels of accuracy and choice of units (ACMEM017)
- estimate lengths (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).

Area measure:

- use metric units of area, their abbreviations, conversions between them, and appropriate choices of units (ACMEM021)
- estimate the areas of different shapes (ACMEM022)
- convert between metric units of area and other area units (ACMEM023)
- calculate areas of rectangles and triangles (ACMEM024).

Mass:

- use metric units of mass, their abbreviations, conversions between them, and appropriate choices of units (ACMEM025)
- estimate the mass of different objects (ACMEM026).

Volume and capacity:

- 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 volume and capacity of various objects (ACMEM029)
- calculate the volume of objects, such as cubes and rectangular and triangular prisms (ACMEM030).

Unit 1 - Topic 3: Algebra

General substitution:

- substitute given values for the other pronumerals in a mathematical formula to find the value of the subject of the formula (ACMEM036).

Unit 1 - Topic 4: Graphs

Reading and interpreting graphs:

- 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).

Drawing graphs:

- 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)

Unit 2 - Topic 1: Representing and comparing data

Classifying data:

- identify examples of categorical data (ACMEM043)
- identify examples of numerical data (ACMEM044).

Data presentation and interpretation:

- display categorical data in tables and column graphs (ACMEM045)
- display numerical data as frequency distributions, dot plots, stem and leaf plots, and histograms (ACMEM046)
- compare the suitability of different methods of data presentation in real-world contexts (ACMEM048).

Summarising and interpreting data:

- 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)
- calculate and interpret statistical measures of spread, such as the range (ACMEM055)
- investigate real-world examples from the media illustrating inappropriate uses, or misuses, of measures of central tendency and spread (ACMEM056).

Unit 2 - Topic 3: Rates and ratios

Ratios:

- demonstrate an understanding of the elementary ideas and notation of ratio (ACMEM065)
- understand the relationship between fractions and ratio (ACMEM066)
- express a ratio in simplest form (ACMEM067)
- find the ratio of two quantities (ACMEM068)
- divide a quantity in a given ratio (ACMEM069)
- use ratio to describe simple scales (ACMEM070).

Unit 2 - Topic 4: Time and motion

Time:

- 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).

Distance:

- 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).

Speed:

- 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).

Unit 3 - Topic 2: Scales, plans and models

Right-angled triangles:

- apply Pythagoras' theorem to solve problems (ACMEM116)
- solve problems involving bearings (ACMEM120).

Accreditation

The accreditation period for this course is from 1 January 2020 until 31 December 2022.

During the accreditation period required amendments can be considered via established processes.

Should outcomes of the Year 9-12 Review process find this course unsuitable for inclusion in the Tasmanian senior secondary curriculum, its accreditation may be cancelled. Any such cancellation would not occur during an academic year.

Version History

Version 1 – Accredited on 1 February 2019 effective from 2 February 2019 until 31 December 2019. This course replaces MTW215114 – *Workplace Maths* that expired on 31st December, 2018.

Version 2 - 8 November 2019: Accreditation renewed for the period 1 January 2020 until 31 December 2021. Minor amendments to Modules 1 and 3 regarding maps and plans.

Version 2.a - Renewal of Accreditation on 14 July 2021 for the period 31 December 2021 until 31 December 2022, without amendments.

Appendix 1

Appendix 1: Line of Sight

Learning Outcomes	Criterion	Content	Standards
communicate their arguments and strategies when solving mathematical problems using appropriate mathematical or statistical language	1. communicate mathematical ideas and information	• Numeric Calculations • Algebra and Proportional Reasoning • Measurement • Statistics • Finance	Criterion 1 – All elements
use an investigative approach to collect, represent and analyse data and draw conclusions	1. use an investigative approach to collect data, analyse it and draw conclusions	• Numeric Calculations • Algebra and Proportional Reasoning • Measurement • Statistics • Finance	Criterion 2 – All elements
plan, organise and implement strategies in order to complete negotiated tasks	1. plan, organise and implement strategies in order to complete negotiated tasks and reflect upon performance	• Numeric Calculations • Algebra and Proportional Reasoning • Measurement • Statistics • Finance	Criterion 3 – All elements
understand the concepts and techniques used in mathematical calculations, involving algebraic substitution, percentages, rates and ratios	1. interpret, select and apply numeric calculations to solve problems in real-world situations	• Numeric Calculations • Algebra and Proportional Reasoning	Criterion 4 – All elements
apply reasoning skills to solve practical problems involving measurement, time and motion	1. interpret concepts and perform calculations to solve problems involving measurement, time and motion in real-world situations	• Measurement	Criterion 5 – All elements
interpret mathematical and statistical information and ascertain the reasonableness of their solutions to problems	1. interpret concepts and perform calculations to solve problems involving the use of tables, graphs, diagrams and data in real-world situations	• Statistics	Criterion 6 – All elements
apply reasoning skills to solve practical problems involving finance and budgeting	1. interpret concepts and perform calculations to solve problems involving finance in real-world situations	• Finance	Criterion 7 – All elements

Tasmanian Government