PROGRAMME OUTLINE
MATHEMATICS ESSENTIALS – YEAR 12: 2022
UNIT 3 AND UNIT 4

Term		Topic and Key Teaching Points	Syllabus Content	Assessments
Throughout the unit, students apply the Mathematical Thinking Process to real-world problems • interpret the task and gather the key information • identify the mathematics which could help to complete the task • analyse information and data from a variety of sources • apply existing mathematical knowledge and strategies to obtain a solution • verify the reasonableness of the solution • communicate findings in a systematic and concise manner.				
1	1.2-1.4 (3 h)	**Linear measure** The perimeter of polygons and circles and composites of familiar shapes. Solve practical problems involving perimeter.	3.1.1 extend the calculation of perimeters to include polygons, circles and composites of familiar shapes	
1	2.1 -3.1 (5 h)	**Cartesian plane** Interpret and plot points on a two-dimensional Cartesian plane. Generate tables and graph co-ordinates for linear functions form practical situations. **Using Graphs** Interpret, use, and draw graphs from practical situations, including travel graphs, time series and conversion graphs.	3.3.1 demonstrate familiarity with Cartesian co-ordinates in two dimensions by plotting points on the Cartesian plane 3.3.2 generate tables of values for linear functions drawn from practical contexts 3.3.3 graph linear functions drawn from practical contexts with pencil and paper and with graphing software 3.3.4 interpret and use graphs in practical situations, including travel graphs, time series and conversion graphs 3.3.5 draw graphs from given data to represent practical situations 3.3.6 describe trend as increasing or decreasing for time series data	

PROGRAMME OUTLINE
MATHEMATICS ESSENTIALS – YEAR 12: 2022
UNIT 3 AND UNIT 4

Term		Topic and Key Teaching Points	Syllabus Content	Assessments
		Describe trends in time series data.		
1	3.2-4.2 (4 h)	**Using graphs in practical situations** Examples in context: 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	3.3.7 identify the rate of change of the dependent variable, relating it to the difference pattern in a table and the slope of an associated line drawn from practical contexts 3.3.8 determine and describe the significance of the vertical intercept in practical situations 3.3.9 use the rate of change and the initial value to determine the linear relationship in practical situations 3.3.10 interpret the point of intersection and other important features of given graphs of two linear functions drawn from practical contexts; for example, the 'break-even' point	
1	4.2-5.1 (4 h)	Mathematical Thinking Process: Students can… Interpret the task and gather the key information Identify the mathematics which could help to complete the task Analyse information and data from a variety of sources	**Mathematical Thinking process** investigation to be completed as a class over 4 hours using content from Collecting and Interpreting Data.	Term 1 Week 4 Task 1 Test 1 **Linear Relationships**

Term		Topic and Key Teaching Points	Syllabus Content	Assessments
		Apply existing mathematical knowledge and strategies to obtain a solution Verify the reasonableness of the solution communicate findings in a systematic and concise manner.		
1	5.2-7.1 (8 h)	**Data collection**	3.4.1 investigate the procedure for conducting a census 3.4.2 investigate the advantages and disadvantages of conducting a census 3.4.3 understand the purpose of sampling to provide an estimate of population values when a census is not used 3.4.4 investigate the different kinds of samples, for example, systematic samples, self-selected samples, simple random samples 3.4.5 recognise the advantages and disadvantages of these kinds of samples; for example, comparing simple random samples with self-selected samples 3.4.6 identify the target population to be surveyed 3.4.7 investigate questionnaire design principles; for example, simple language, unambiguous questions, consideration of number of choices, issues of privacy and ethics, freedom from bias	

PROGRAMME OUTLINE
MATHEMATICS ESSENTIALS – YEAR 12: 2022
UNIT 3 AND UNIT 4

Term		Topic and Key Teaching Points	Syllabus Content	Assessments
			3.4.8 describe the faults in the collection of data process 3.4.9 describe sources of error in surveys; for example, sampling error and measurement error 3.4.10 describe possible misrepresentation of the results of a survey due to the unreliability of generalising the survey findings to the entire population, for example, because of limited sample size or chance variation between samples 3.4.11 describe errors and misrepresentation of the results of a survey, including examples of media misrepresentations of surveys and the manipulation of data to serve different purposes	
1	7.2-9.1 (8 h)	**Bivariate scatterplots** Examples in context: Analysing data obtained from medical sources, including bivariate data. Analysing and interpreting tables and graphs that compare body ratios, such as hip height versus stride length, foot length versus height	3.4.12 describe the patterns and features of bivariate data 3.4.13 describe the association between two numerical variables in terms of direction (positive/negative), form (linear/non-linear) and strength (strong/moderate/weak) 3.4.14 identify the dependent and independent variable 3.4.15 fit a trend line by eye 3.4.16 interpret relationships in terms of the variables, for example, describe trend as increasing or decreasing 3.4.17 use the trend line to make predictions, both by interpolation and extrapolation 3.4.18 recognise the dangers of extrapolation 3.4.19 distinguish between causality and association through examples	Term 1 Week 9 Task 2 Statistical Investigation 1 **Data Collection, Process and Bivariate Data**
2			EST Review Topics and Catch up on missed content Consolidation of EST Content	

PROGRAMME OUTLINE
MATHEMATICS ESSENTIALS – YEAR 12: 2022
UNIT 3 AND UNIT 4

Term		Topic and Key Teaching Points	Syllabus Content	Assessments
2	3.1-4.2 (5 h)	**Area measure** Examples in context: calculating surface area of various buildings to compare costs of external painting	3.1.2 calculate areas of parallelograms, trapeziums, circles and semi-circles 3.1.3 determine the area of composite figures by decomposition into familiar shapes 3.1.4 determine the surface area of familiar solids, including, cubes, rectangular and triangular prisms, spheres and cylinders 3.1.5 use addition of the area of the faces of solids to determine the surface area of composite solids	
2	4.3-5.3 (5 h)	**Volume and capacity** Examples in context: Interpreting dosages for children and adults from dosage panels on medicines, given age or weight Calculating and interpreting dosages for children from adults' medication using various formulas (Fried, Young, Clark) in millilitres Comparing the capacity of rainwater tanks	3.1.6 recognise relations between volume and capacity, recognising that 1 cm^3 = 1 mL and 1 m^3 = 1 kL 3.1.7 calculate the volume and capacity of cylinders, pyramids and spheres	
2	5.4-6.2 (3 h)	**Geometry and three-dimensional objects** Examples in context: Drawing scale diagrams of everyday two-dimensional shapes	3.2.1 recognise the properties of common two-dimensional geometric shapes and three-dimensional solids 3.2.2 interpret different forms of two-dimensional representations of three-dimensional objects, including nets and perspective diagrams	Term 2 Week 6 Task 3 Practical Application 1 **Geometry, Three-dimensional objects and Scale Diagrams.**

PROGRAMME OUTLINE
MATHEMATICS ESSENTIALS – YEAR 12: 2022
UNIT 3 AND UNIT 4

Term		Topic and Key Teaching Points	Syllabus Content	Assessments
		Interpreting common symbols and abbreviations used on house plans. Using the scale on a plan to calculate actual external or internal dimensions, the lengths of the house and the dimensions of particular rooms Using technology to translate two-dimensional house plans into three-dimensional building creating landscape designs using technology	3.2.3 use terminology of geometric shapes; for example, point, line, angle, diagonal, edge, curve, face and vertex, parallel and perpendicular 3.2.9 interpret plans and elevation views of models 3.2.10 sketch elevation views of different models 3.2.11 interpret diagrams of three-dimensional objects	
2	**6.3-8.1** (6 h)	**Interpret and create scale drawings**	3.2.4 interpret commonly used symbols and abbreviations in scale drawings 3.2.5 determine actual measurements of angle, perimeters and areas from scale drawings 3.2.6 estimate and compare quantities, materials and costs using actual measurements from scale drawings, for example using measurements for packaging, clothes, painting, bricklaying and landscaping 3.2.7 understand and apply drawing conventions of scale drawings, such as scales in ratio, dimensions and labelling 3.2.8 construct scale drawings by hand and by using appropriate software/technology	

PROGRAMME OUTLINE
MATHEMATICS ESSENTIALS – YEAR 12: 2022
UNIT 3 AND UNIT 4

Term		Topic and Key Teaching Points	Syllabus Content	Assessments
2	8.2-9.3 (6 h)	**Right-angled triangles**	3.2.12 apply Pythagoras' theorem to solve problems in practical two-dimensional views 3.2.13 apply the tangent ratio to determine unknown angles and sides in right-angled triangles 3.2.14 work with the concepts of angle of elevation and angle of depression 3.2.15 apply the cosine and sine ratios to determine unknown angles and sides in right-angle triangles 3.2.16 solve problems involving trigonometric ratios in practical two-dimensional views	
2 3	9.4-end (11 h) 1.1-1.4	**Probability** Examples in context: Using data to calculate the relative frequencies of the different countries of origin of visitors to a particular tourist venue or country Using data to calculate the relative frequencies of the amounts of household expenditure Using data to predict the number of people likely to be infected with a strain of flu or experience side effects with a certain medication	4.1.1 interpret commonly used probability statements, including 'possible', 'probable', 'likely', 'certain' 4.1.2 describe ways of expressing probabilities formally using fractions, decimals, ratios and percentages 4.1.4 recognise that the repetition of chance events is likely to produce different results 4.1.5 recognise the law of large numbers and identify relative frequency as probability 4.1.7 construct a sample space for an experiment which represents a practical situation 4.1.8 use a sample space to determine the probability of outcomes for an experiment 4.1.9 use arrays or tree diagrams to determine the outcomes and the probabilities for experiments 4.1.10 identify situations in real-life contexts where probability is used for decision making 4.1.11 determine and use probabilities (relative frequencies) from given data to predict proportions and the number of outcomes that are likely to occur	Term 2 Week 9 Task 4 Test 2 **Right-triangle Geometry, Area and Volume**
3	2.1 - 2.4	**Simple probabilities in practical situations**	4.1.3 perform simulations of experiments using technology	

PROGRAMME OUTLINE
MATHEMATICS ESSENTIALS – YEAR 12: 2022
UNIT 3 AND UNIT 4

Term		Topic and Key Teaching Points	Syllabus Content	Assessments
	(7 h)		4.1.6 identify factors that may cause the simulation to no longer model the real world event	
3	**3.1-4.3** (7 h)	**Earth geometry** Methods of locating positions on the earth's surface given latitude and longitude; global positioning system, globe, atlas and digital technologies. Calculations of distance between two places on Earth on same longitude using arc length formula. Distance between two places on Earth using technology. Solve practical problems involving the location of and distance between positions on the Earth's surface	4.2.1 locate positions on the earth's surface given latitude and longitude using a range of methods; for example, a global positioning system (GPS), a globe, an atlas and digital technologies 4.2.2 use the arc length formula to calculate distances between two places on Earth on the same longitude 4.2.3 determine distances between two places on Earth using appropriate technology	Term 3 Week 2 Task 5 Practical Application2 **Probability and Simulations**
3	**4.4-6.3** (8 h)	**Time** Link between longitude and time Problems involving time zones in Australia and neighbouring nations, Greenwich Mean Time and International Date Line, time differences, travel involving time zone changes.	4.2.4 understand the link between longitude and time 4.2.5 solve problems involving time zones in Australia and neighbouring nations making any necessary allowances for daylight saving 4.2.6 solve problems involving Greenwich Mean Time and the International Date Line 4.2.7 determine time differences between two places on Earth 4.2.8 solve problems associated with time zones; for example, internet and phone usage 4.2.9 solve problems relating to travelling east and west, incorporating time zone changes	Term 3 Week 6 Task 6 Test 3 **Earth Geometry and Time Zones**

PROGRAMME OUTLINE
MATHEMATICS ESSENTIALS – YEAR 12: 2022
UNIT 3 AND UNIT 4

Term		Topic and Key Teaching Points	Syllabus Content	Assessments
3	5.4-6.2 (3 h)	**Compounding relationships** Real-life, compounding situations expressed as a recurrence relationship; compound interest, population growth. Solve practical problems involving compounding situations.	4.3.1 review the principles of simple interest 4.3.2 understand the concept of compound interest as a recurrence relation 4.3.3 consider similar problems involving compounding; for example, population growth	
3	6.3-8.2 (8 h)	**Compounding loans and investments**	4.3.4 use technology to calculate the future value of a compound interest loan or investment and the total interest paid or earned 4.3.5 use technology to compare, numerically and graphically, the growth of simple interest and compound interest loans and investments 4.3.6 use technology to investigate the effect of changing the interest rate and the number of compounding periods on the future value of a loan or investment	
3	8.3-9.4 (6 h)	**Reducing balance loans** Examples in context: Using formula, graphs and spreadsheets to calculate the outcomes of investment accounts with compound interest Using percentages, rates and spreadsheets to investigate personal loan calculations	4.3.7 use technology and a recurrence relation to model a reducing balance loan 4.3.8 investigate the effect of the interest rate and repayment amount on the time taken to repay a loan	Term 3 Week 9 Task 7 Practical Application 3 **Compound Interest and Reducing Balance Loans**

Term		Topic and Key Teaching Points	Syllabus Content	Assessments
		Calculating and analysing the costs, hidden traps, advantages and disadvantages for payment plans with interest free periods using rates and percentages		
3	10	**Finishing In-Class Assessment**	Finalising final in-class assessment	