



COURSE OUTLINE
MATHEMATICS APPLICATIONS - ATAR YEAR 11: 2022
UNITS 1 & 2



| Term | Week | Topic and key teaching points | Syllabus content | Resources | Assessment |
|------|-------|--------------------------------|---|---|---|
| | | TERM 1 | <u>Unit 1</u> | | |
| 1 | 1 | Use of Formulae | 1.2.1 substitute numerical values into algebraic expressions, and evaluate (with the aid of technology where complicated numerical manipulation is required) 1.2.2 determine the value of the subject of a formula, given the values of the other pronumerals in the formula (transposition not required) 1.2.3 use a spreadsheet or an equivalent technology to construct a table of values from a formula, including tables for formulas with two variable quantities; for example, a table displaying the body mass index (BMI) of people of different weights and heights | Textbook: Mathematics Applications Unit 1 A. J. Sadler Chapter 1 | |
| 1 | 2 | Percentages | 1.1.5 apply percentage increase or decrease in contexts, including determining the impact of inflation on costs and wages over time, calculating percentage mark-ups and discounts, calculating GST, calculating profit or loss in absolute and percentage terms, and calculating simple and compound interest | Chapter 2 | |
| 1 | 3 | Simple Interest | 1.1.5 apply percentage increase or decrease in contexts, including determining the impact of inflation on costs and wages over time, calculating percentage mark-ups and discounts, calculating GST, calculating profit or loss in absolute and percentage terms, and calculating simple and compound interest | Chapter 3 | |
| 1 | 4 | Compound Interest | 1.1.5 apply percentage increase or decrease in contexts, including determining the impact of inflation on costs and wages over time, calculating percentage mark-ups and discounts, calculating GST, calculating profit or loss in absolute and percentage terms, and calculating simple and compound interest | Chapter 4 | Test 1 Week 4 (Formulae, Percentages, & Simple Interest) |
| 1 | 5 & 6 | Other Financial considerations | 1.1.1 calculate weekly or monthly wage from an annual salary, wages from an hourly rate, including situations involving overtime and other allowances, and earnings based on commission or piecework 1.1.2 calculate payments based on government allowances and pensions | Chapter 5 | Investigation 1 Finance (Week 5) |



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| | | | <p>1.1.3 prepare a personal budget for a given income taking into account fixed and discretionary spending</p> <p>1.1.4 compare prices and values using the unit cost method</p> <p>1.1.6 use currency exchange rates to determine the cost in Australian dollars of purchasing a given amount of a foreign currency, or the value of a given amount of foreign currency, when converted to Australian dollars</p> <p>1.1.7 calculate the dividend paid on a portfolio of shares given the percentage dividend or dividend paid for each share, and compare share values by calculating a price-to-earnings ratio</p> <p>1.1.8 use a spreadsheet to display examples of the above computations when multiple or repeated computations are required; for example, preparing a wage-sheet displaying the weekly earnings of workers in a fast food store where hours of employment and hourly rates of pay may differ, preparing a budget, or investigating the potential cost of owning and operating a car over a year</p> | | |
| 1 | 7 - 10 | Matrices | <p>1.2.4 use matrices for storing and displaying information that can be presented in rows and columns; for example, databases, links in social or road networks</p> <p>1.2.5 recognise different types of matrices (row, column, square, zero, identity) and determine their size</p> <p>1.2.6 perform matrix addition, subtraction, multiplication by a scalar, and matrix multiplication, including determining the power of a matrix using technology with matrix arithmetic capabilities when appropriate</p> <p>1.2.7 use matrices, including matrix products and powers of matrices, to model and solve problems; for example, costing or pricing problems, squaring a matrix to determine the number of ways pairs of people in a communication network can communicate with each other via a third person</p> | Chapter 6 | Test 2 Week 10 (Compound Interest, Other Finance, & Matrices) |
| | | TERM 2 | <u>Unit 1</u> | | |



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| 2 | 1 | The Theorem of Pythagoras | 1.3.1 use Pythagoras' theorem to solve practical problems in two dimensions and for simple applications in three dimensions | Chapter 7 | |
| 2 | 2 | Perimeter and Area | 1.3.2 solve practical problems requiring the calculation of perimeters and areas of circles, sectors of circles, triangles, rectangles, parallelograms and composites | Chapter 8 | |
| 2 | 3 & 4 | Surface Area and Volume | 1.3.3 calculate the volumes of standard three-dimensional objects, such as spheres, rectangular prisms, cylinders, cones, pyramids and composites in practical situations, for example, the volume of water contained in a swimming pool 1.3.4 calculate the surface areas of standard three-dimensional objects, such as spheres, rectangular prisms, cylinders, cones, pyramids and composites in practical situations; for example, the surface area of a cylindrical food container | Chapter 9 | |
| 2 | 4 & 5 | Similarity | 1.3.5 review the conditions for similarity of two-dimensional figures, including similar triangles 1.3.6 use the scale factor for two similar figures to solve linear scaling problems 1.3.7 obtain measurements from scale drawings, such as maps or building plans, to solve problems 1.3.8 obtain a scale factor and use it to solve scaling problems involving the calculation of the areas of similar figures and surface areas and volumes of similar solids | Chapter 10 | Test 3 Week 5 (Pythagoras, Perimeter, Area, Surface Area and Similarity) |
| 2 | 6 | Exam Revision | | | |
| 2 | 7 & 8 | Exams | Semester One | | |
| | | TERM 2 | <u>Unit 2</u> | | |



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| 2 | 9 | Univariate Data: Classify, organise and display | <p>2.1.1 review the statistical investigation process; identifying a problem and posing a statistical question, collecting or obtaining data, analysing the data, interpreting and communicating the results</p> <p>2.1.2 classify a categorical variable as ordinal, such as income level (high, medium, low) or nominal, such as place of birth (Australia, overseas) and use tables and bar charts to organise and display data</p> <p>2.1.3 classify a numerical variable as discrete, such as the number of rooms in a house, or continuous, such as the temperature in degrees Celsius</p> | <p>Textbook: Mathematics Applications Unit 2 A. J. Sadler</p> <p>Chapter 1</p> | |
| 2 | 10 | Summarising data and describing distributions | 2.1.4 with the aid of an appropriate graphical display (chosen from dot plot, stem plot, bar chart or histogram), describe the distribution of a numerical data set in terms of modality (uni or multimodal), shape (symmetric versus positively or negatively skewed), location and spread and outliers, and interpret this information in the context of the data | Chapter 2 | |
| | | TERM 3 | <u>Unit 2</u> | | |
| 3 | 1 | Measures of dispersion or spread | <p>2.1.5 determine the mean and standard deviation of a data set using technology and use these statistics as measures of location and spread of a data distribution, being aware of their limitations</p> <p>2.1.6 use the number of deviations from the mean (standard scores) to describe deviations from the mean in normally distributed data sets</p> | Chapter 3 | |
| 3 | 2 & 3 | Boxplots, histograms and more about describing distributions | <p>2.1.10 construct and use parallel box plots (including the use of the 'Q1 – 1.5 x IQR' and 'Q3 + 1.5 x IQR' criteria for identifying possible outliers) to compare groups in terms of location (median), spread (IQR and range) and outliers, and interpret and communicate the differences observed in the context of the data</p> <p>2.1.4 with the aid of an appropriate graphical display (chosen from dot plot, stem plot, bar chart or histogram), describe the distribution of a numerical data set in terms of modality (uni or multimodal), shape (symmetric versus positively or negatively skewed), location and spread</p> | Chapter 4 | Test 4 Week 3 (Univariate Data, Summarising Data, Measures of Dispersion or Spread, Boxplots, Histograms and more about describing distributions) |



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MATHEMATICS APPLICATIONS - ATAR YEAR 11: 2022

UNITS 1 & 2



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| | | | and outliers, and interpret this information in the context of the data 2.1.11 compare groups on a single numerical variable using medians, means, IQRs, ranges or standard deviations, and as appropriate; interpret the differences observed in the context of the data and report the findings in a systematic and concise manner | | |
| | 4 & 5 | Standard scores and the normal distribution | 2.1.6 use the number of deviations from the mean (standard scores) to describe deviations from the mean in normally distributed data sets 2.1.7 calculate quantiles for normally distributed data with known mean and standard deviation in practical situations 2.1.8 use the 68%, 95%, 99.7% rule for data one, two and three standard deviations from the mean in practical situations 2.1.9 calculate probabilities for normal distributions with known mean and standard deviation in practical situations | Chapter 13 | |
| 3 | 5 | The Statistical investigation process | 2.1.12 implement the statistical investigation process to answer questions that involve comparing the data for a numerical variable across two or more groups; for example, are Year 11 students the fittest in the school? | Chapter 5 | Investigation 2 Statistics (Week 5) |
| 3 | 6 | Solving Equations | 2.3.1 identify and solve linear equations (with the aid of technology where complicated manipulations are required) 2.3.2 develop a linear formula from a word description and solve the resulting equation | Chapter 6 & 7 | |
| 3 | 7 & 8 | Linear relationships | 2.3.3 construct straight-line graphs both with and without the aid of technology 2.3.4 determine the slope and intercepts of a straight-line graph from both its equation and its plot 2.3.5 construct and analyse a straight-line graph to model a given linear relationship; for example, modelling the cost of filling a fuel tank of a car against the number of litres of petrol required. 2.3.6 interpret, in context, the slope and intercept of a straight-line graph used to model and analyse a practical situation | Chapter 8 | |
| 3 | 8 & 9 | Piecewise defined relationships | 2.3.9 sketch piece-wise linear graphs and step graphs, using technology when appropriate 2.3.10 interpret piece-wise linear and step graphs used to model practical situations; for | Chapter 9 | Test 5 Week 9 (Normal Distribution, Linear |



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UNITS 1 & 2



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| | | | example, the tax paid as income increases, the change in the level of water in a tank over time when water is drawn off at different intervals and for different periods of time, the charging scheme for sending parcels of different weights through the post | | Relationships, and Piecewise) |
| 3 | 10 | Simultaneous Linear | 2.3.7 solve a pair of simultaneous linear equations graphically or algebraically, using technology when appropriate 2.3.8 solve practical problems that involve determining the point of intersection of two straight-line graphs; for example, determining the break-even point where cost and revenue are represented by linear equations | | |
| | | TERM 4 | <u>Unit 2</u> | | |
| 4 | 1 & 2 | Simultaneous linear equations | 2.3.7 solve a pair of simultaneous linear equations graphically or algebraically, using technology when appropriate 2.3.8 solve practical problems that involve determining the point of intersection of two straight-line graphs; for example, determining the break-even point where cost and revenue are represented by linear equations | Chapter 12 | |
| 4 | 2 & 3 | Trigonometry for right angled triangles | 2.2.1 use trigonometric ratios to determine the length of an unknown side, or the size of an unknown angle in a right-angled triangle 2.2.4 solve practical problems involving right-angled and non-right-angled triangles, including problems involving angles of elevation and depression and the use of bearings in navigation | Chapter 10 | |
| 4 | 3 & 4 | Trigonometry for triangles that are not right angled | 2.2.2 determine the area of a triangle, given two sides and an included angle by using the rule or given three sides by using Heron's rule, and solve related practical problems 2.2.3 solve problems involving non-right-angled triangles using the sine rule (acute triangles only when determining the size of an angle) and the cosine rule | Chapter 11 | Test 6 Week 4 (Simultaneous, Right and Non-Right-Angled Trigonometry) |
| 4 | 5 | Exam revision | | | |
| 4 | 6 & 7 | Exams | | Semester two exams Units 1 and 2 | |



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