NSW Stage 6 Mathematics

EP Curriculum Map

Standard: Year 11

Algebra

MS-A1 Formulae and Equations

Content Descriptor	Lesson Names
review substitution of numerical values into linear and non-linear algebraic expressions and equations	• Substituting Into and Evaluating Algebraic Expressions
develop and solve linear equations, including those derived from substituting values into a formula, or those developed from a word description	• Solving Linear Equations with Fractions • Substituting Into and Evaluating Algebraic Expressions • Rearranging Equations • Solving Linear Equations
calculate and interpret blood alcohol content (BAC) based on drink consumption and body weight calculate required medication dosages for children and adults from packets, given age or weight, using Fried's, Young's or Clark's formula as appropriate	*Further development planned*

MS-A2 Linear Relationships

Content Descriptor	Lesson Names
model, analyse and solve problems involving linear relationships, including constructing a straight-line graph and interpreting features of a straight-line graph, including the gradient and intercepts	• Graphs From Equations • Drawing the Line from an Equation • Slope and Intercept from a Graph • Equations From Graphs
construct and analyse a linear model, graphically or algebraically, to solve practical direct variation problems, including the cost of filling a car with fuel or a currency conversion graph	• How to Model Situations • Modelling Situations: Global Warming • Modelling Situations: Gym Membership • Modelling Situations: The Leaky Bike Tyre • Modelling Situations: The Road Trip

Measurement

MS-M1 Applications of Measurement

Content Descriptor	Lesson Names
review the use of different metric units of measurement including units of area, take measurements, and calculate conversions between common units of measurement, for example kilometres to metres or litres to millilitres	• Units of Length • Converting Further Units of Length • Units of Area • Converting Between Units of Area • Choosing Appropriate Units of Volume • Converting Units of Capacity • Converting Units of Volume • Converting Further Units of Capacity and Applications • Converting between Capacity and Volume • Calculating Volume and Capacity • Reading Scaled Instruments
calculate the absolute error of a reported measurement using Absolute error = 1/2 × Precision and state the corresponding limits of accuracy	• Precision and Accuracy • Precision in Context • Absolute vs. Relative Error • Limits of Accuracy
use standard form and standard metric prefixes in the context of measurement, with and without a required number of significant figures	• Units of Length • Converting Further Units of Length • Units of Area • Converting Between Units of Area • Choosing Appropriate Units of Volume • Converting Units of Capacity • Converting Units of Volume • Converting Further Units of Capacity and Applications • Converting between Capacity and Volume • Calculating Volume and Capacity • • Introduction to Standard Form - Large Numbers • Introduction to Standard Form - Small Numbers • Ordering Numbers and Estimating Calculations in Standard Form • Adding and Subtracting with Standard Form • Multiplying and Dividing in Standard Form • Significant Figures and Standard Form • Standard Form Glossary
review and extend how to solve practical problems requiring the calculation of perimeters and areas of triangles, rectangles, parallelograms, trapezia, circles, sectors of circles and composite shapes	• Perimeter • Finding the Perimeter of a Shape with an Unknown Side • Perimeter of Composite Shapes • Perimeters of Kites, Rhombuses, Trapeziums and

	Parallelograms • Perimeter, Composite Shapes and Unknown Sides • Parts of a Circle • Circumference of Circles • Using the Circumference of Circles • Area of Rectangles • Area of Triangles • Area of Parallelograms • Calculating the Area of Circles • Area of Composite Shapes • Area of Trapeziums • Using the Area of Circles • Area of Rhombus and Kites • Parts of a Triangle and the Hypotenuse • Pythagoras' Theorem • Introduction to Scaling • The Enlargement Transformation • Magnitude • Magnitude as a Ratio • Scaling on Cartesian Planes • Finding the Height of Right Pyramids • Surface Area of Complex Solids • Surface Area of Cylinders • Surface Area of Prisms • Surface Area of Right Pyramids • Surface Area of Right Cones • Surface Area of Spheres • Surface Area of Composite Solids
solve problems involving volume and capacity of solids including prisms, cylinders, spheres, pyramids and composite solids	• Volume of Rectangular Prisms • Volume of Right Pyramids • Calculating Volume of Rectangular Prisms • Volume of Right Cones • Volume of Spheres • Calculating Volume of Cylinders • Calculating Volume of Triangular Prisms • Volume of Composite Solids • Calculating Volume of Other Regular and Irregular Prisms • Volume of Composite Solids • Types of Prisms • Converting between Capacity and Volume
solve problems involving perimeters, area, surface area, volumes and capacity in a variety of contexts	• *This involves all the previous lessons, not reproduced here for brevity*
review the use of metric units of mass in solving problems, including grams, kilograms and tonnes, their abbreviations and how to convert between them	• Units of Mass • Converting Further Units of Mass and Applications

use metric units of energy to solve problems, including calories, kilocalories, joules and kilojoules, their abbreviations and how to convert between them use units of energy and mass to solve problems related to food and nutrition, including calories use units of energy to solve problems involving the amount of energy expended in activities, for example kilojoules use units of energy to solve problems involving the consumption of electricity, for example kilowatt hours, and investigate common appliances in terms of their energy consumption	*Further development planned*

MS-M2 Working with Time

Content Descriptor	Lesson Names
indicate positions on the Earth's surface	*Further development planned*
calculate times and time differences around the world	• Recording Time • Clocks • Converting 12- and 24-Hour Time • Time Zones • Timetables • Personal Timetables • Reading Timetables • Using Multiple Timetables

Financial Mathematics

MS-F1 Money Matters

Content Descriptor	Lesson Names
apply percentage increase or decrease in various contexts, eg calculating the goods and services tax (GST) payable on a range of goods and services, and calculating profit or loss in absolute and percentage terms	• Goods and Services Tax • Income Tax • Introduction to Interest • Calculating Simple Interest • Rearranging the Simple Interest Formula • Profit and Loss • Calculating Profit and Loss
calculate simple interest for different rates and periods (ACMEM064)	• Introduction to Interest • Calculating Simple Interest • Rearranging the Simple Interest Formula

calculate the depreciation of an asset using the straight-line method as an application of the simple interest formula use a spreadsheet to calculate and graph compound interest as a recurrence relation involving repeated applications of simple interest	*Further development planned*
calculate monthly, fortnightly, weekly, daily or hourly pay rates from a given salary, wages involving hourly rates and penalty rates, including situations involving overtime and other special allowances, and earnings based on commission (including commission based on a sliding scale), piecework or royalties	• Salaries and Wages • Alternative Sources of Income • Commission • Retirement • Piecework • Royalties • Government Benefits and Allowances • Overtime, Special Rates and Allowances • Timesheets • • Applying Government Benefits: The Life of Matilda
calculate income tax calculate net pay following deductions from income	• Income Tax
use technology to perform financial computations, for example calculating percentage change, calculating tax payable and preparing a wage-sheet	*Further development planned*
interpret and use information about a household's electricity, water or gas usage and related charges and costs from household bills	• Budgeting • Making a Budget • Review: Budgeting • • Extended Investigation: Preparing a Personal Budget
plan for the purchase of a car plan for the running and maintenance of a car	*Further development planned*
prepare a personal budget for a given income, taking into account fixed and discretionary spending (ACMGM004)	• Extended Investigation: Preparing a Personal Budget

Statistical Analysis

MS-S1 Data Analysis

Content Descriptor	Lesson Names
describe and use appropriate data collection methods	• What is Sampling?

for a population or samples	• Types of Sampling: Probability Sampling • Types of Sampling: Non-Probability Sampling • Sampling Errors • Analysing Sampling in Reports • Data Cleaning • Statistics in Organisations
classify data relating to a single random variable	• Types of Data
review how to organise and display data into appropriate tabular and/or graphical representations	• Dot Plots and Column (Bar) Graphs • Stem and Leaf Plots • Histograms • Two-Way Tables • Using Two-Way Tables • Line Graphs • Tallies and Tables
interpret and compare data by considering it in tabular and/or graphical representations	• Pick Your Display Method • Displaying Data • Misleading Data and Graphs • Box and Whisker Plots • Comparing Data Sets • Back-to-Back Stem and Leaf Plots • Comparing Dot Plots • Comparing Histograms • Comparing Box and Whisker Plots
describe the distinguishing features of a population and sample	• The Mean • The Median • The Mode • Introduction to Standard Deviation • Calculating Standard Deviation • Calculating Standard Deviation Using Technology
summarise and interpret grouped and ungrouped data through appropriate graphs and summary statistics	• The Mode • The Mean • The Median • The Range • Quartiles • Measures of Centre in Grouped Data • Comparing the Measures of Spread • Introduction to Standard Deviation • Calculating Standard Deviation • Calculating Standard Deviation Using Technology • Investigating the Standard Deviation • Using the Standard Deviation to Compare Data Sets
investigate and describe the effect of outliers on summary statistics	• Data Cleaning • Outliers

investigate real-world examples from the media illustrating appropriate and inappropriate uses or misuses of measures of central tendency and spread (ACMEM056)	• Misleading Data and Graphs • Statistics in Organisations
describe, compare and interpret the distributions of graphical displays and/or numerical datasets and report findings in a systematic and concise manner	• Shape and Mode • Symmetry and Skew in Data • Effect of Shape on Mean and Median • Outliers • Comparing the Measures of Spread
construct and compare parallel box-plots	• Box and Whisker Plots • Comparing Data Sets • Comparing Box and Whisker Plots

MS-S2 Relative Frequency and Probability

Content Descriptor	Lesson Names
review, understand and use the language associated with theoretical probability and relative frequency	• Likelihood • Probability as a Fraction • Probability as a Decimal and a Percentage • Terminology • Introduction to Two-Step Experiments
determine the probabilities associated with simple games and experiments	• Calculating Probability • Calculating Complements • Chance Games
use arrays and tree diagrams to determine the outcomes and probabilities for multistage experiments (ACMEM156)	• Introduction to Two-Step Experiments • Tree Diagrams • Using Tree Diagrams • Arrays • Using Arrays
solve problems involving simulations or trials of experiments in a variety of contexts	• Relative Frequencies • Using Relative Frequencies • Differences in Results • Experimental Probability
solve problems involving probability and/or relative frequency in a variety of contexts	• Relative Frequencies • Using Relative Frequencies • Experimental Probability

Standard 1: Year 12

Algebra

MS-A3 Types of Relationships

Content Descriptor	Lesson Names
solve a pair of simultaneous linear equations graphically, by finding the point of intersection between two straight-line graphs, with and without technology	• Solving Simultaneous Equations Using Graphs • Solving Simultaneous Linear Equations using Technology
develop a pair of simultaneous linear equations to model a practical situation solve practical problems that involve determining and interpreting the point of intersection of two straight-line graphs, including the break-even point of a simple business problem where cost and revenue are represented by linear equations	• Applications of Simultaneous Equations
construct a graph from a table of values both with and without technology	• Graphs From Equations
sketch the shape of a graph from a description of a situation, for example the time passed and the depth of water in different shaped containers, or the speed of a race car as it moves around different shaped tracks	*Further development planned*
determine the best model (linear or exponential) to approximate a graph by considering its shape, using technology where appropriate	• How to Model Situations
identify the strengths and limitations of linear and non-linear models in given practical contexts	*Further development planned*

Measurement

MS-M3 Right-angled Triangles

Content Descriptor	Lesson Names
review the application of Pythagoras' theorem to solve practical problems in two dimensions	• Parts of a Triangle and the Hypotenuse • Pythagoras' Theorem
review and extend the use of trigonometric ratios (sin, cos, tan) to solve practical problems	• Introduction to Trigonometry • Finding Side Lengths Using Trigonometry • Finding Angles Using Trigonometry • Review Lesson: Trigonometric Ratios • Using Trigonometric Functions in Real World

	Applications • Using Inverse Trigonometric Functions in Real World Applications
understand various navigational methods	• Bearings with Right-Angled Triangles
solve practical problems involving angles of elevation and depression and bearings	• Bearings with Right-Angled Triangles • Angles of Elevation and Depression • Pirates' Treasure

MS-M4 Rates

Content Descriptor	Lesson Names
use rates to solve practical problems	• Cost per Item • When a Best Buy isn't the Best Option • Best Buys Using Unit Costs • Plotting and Reading Travel Graphs • Analysing Travel Graphs
solve problems involving heart rates and blood pressure	*Further development planned*

MS-M5 Scale Drawings

Content Descriptor	Lesson Names
solve practical problems involving ratio, for example map scales, mixtures for building materials or cost per item	• Ratios • Scales and Locations on Maps
use the conditions for similarity of two-dimensional figures, including similar triangles, to solve related problems	*Further development planned*
use the linear scale factor for two similar figures to solve problems (ACMGM022)	• Introduction to Scaling • The Enlargement Transformation • Magnitude • Magnitude as a Ratio • Scaling on Cartesian Planes
obtain measurements from scale drawings, including maps (including cultural mappings or models) or building plans, to solve problems estimate and compare quantities, materials and costs using actual measurements from scale drawings, for example using measurements for packaging, clothing, cooking, painting, bricklaying and landscaping including sustainability issues	*Further development planned*

Financial Mathematics

MS-F2 Investment

Content Descriptor	Lesson Names
calculate the future value (FV) or present value (PV) and the interest rate (r) of a compound interest investment using the formula FV= PV(1 + r)^n	*Further development planned*
solve practical problems involving compounding, for example determine the impact of inflation on prices and wages or calculate the appreciated value of items, for example antiques	• Inflation and Purchasing Power

MS-F3 Depreciation and Loans

Content Descriptor	Lesson Names
calculate the depreciation of an asset using the declining-balance method, using the formula s=V_0(1−r)^n, where s is the salvage value of the asset after n periods, V_0 is the initial value of the asset, r is the depreciation rate per period, expressed as a decimal, and n is the number of periods, and realise that this is the compound interest formula, with a negative value for r recognise a reducing balance loan as a compound interest loan with periodic repayments and use a spreadsheet to model a reducing balance loan	• Depreciation
recognise credit cards as an example of a reducing balance loan and solve practical problems relating to credit cards	*Further development planned*

Statistical Analysis

MS-S3 Further Statistical Analysis

Content Descriptor	Lesson Names
understand and use the statistical investigation process: identifying a problem and posing a statistical question, collecting or obtaining data, representing and analysing that data, then communicating and interpreting findings	• PPDAC: The Statistical Enquiry Cycle • Problem: Forming a Comparative Investigative Question • Plan: Sample Size • Data: Data Cleaning • Analysis: Measures of Centre • Analysis: Measures of Spread • Analysis: Making an Inference Using Shift

	• Analysis: Making an Inference Using DBM:OVS • Conclusion: Writing the Conclusion
construct a bivariate scatterplot to identify patterns in the data that suggest the presence of an association (ACMGM052)	• Plotting Using a Calculator • Plotting Using a Spreadsheet • Analysing Trend by Eye
use bivariate scatterplots (constructing them when needed) to describe the patterns, features and associations of bivariate datasets, justifying any conclusions	• Analysing Trend by Eye • Introduction to Bivariate Data • Bivariate Variables
model a linear relationship to the data by fitting a line of best fit by eye and by using technology (ACMEM141, ACMEM142)	• Least Squares Fitting using a Spreadsheet • Least Squares Fitting using a Calculator • Lines of Best Fit by Eye
use the line of best fit to make predictions by either interpolation or extrapolation (ACMEM145)	• Making Predictions by Eye • Making Predictions Using the Equation
collect data, interpret and construct graphs using contexts, for example sustainability, household finance and the human body	*Further development planned*

Networks

MS-N1 Networks and Paths

Content Descriptor	Lesson Names
identify and use network terminology: vertices, edges, paths, the degree of a vertex, directed networks and weighted edges	• Network Basics • Equivalent Networks • Traversable Networks • The Shortest Path
solve problems involving network diagrams	• Network Basics • Equivalent Networks • Traversable Networks
determine the minimum spanning tree of a given network with weighted edges,	• Hamiltonian Networks • The Shortest Path • Minimum Spanning Trees
find a shortest path from one place to another in a network with no more than 10 vertices	• Hamiltonian Networks • The Shortest Path • Minimum Spanning Trees

Standard 2: Year 12

Algebra

MS-A4 Types of Relationships

Content Descriptor	Lesson Names
solve a pair of simultaneous linear equations graphically, by finding the point of intersection between two straight-line graphs, with and without technology	• Solving Simultaneous Equations Using Graphs • Solving Simultaneous Linear Equations using Technology
develop a pair of simultaneous linear equations to model a practical situation solve practical problems that involve determining and interpreting the point of intersection of two straight-line graphs, including the break-even point of a simple business problem where cost and revenue are represented by linear equations	• Applications of Simultaneous Equations
use an exponential model to solve problems	• Introduction to Exponential Functions • Equations and Graphs of Exponential Relationships
construct and analyse a quadratic model to solve practical problems involving quadratic functions or expressions of the form y=axˆ2 + bx + c, for example braking distance against speed	• Parabolas • Parabola Transformations • Multiple Transformations of Parabolas
recognise that reciprocal functions of the form y=k/x, where k is a constant, represent inverse variation, identify the rectangular hyperbolic shape of these graphs and their important features	• Hyperbola Graphs • Hyperbola Graph Transformations

Measurement

MS-M6 Non-right-angled Trigonometry

Content Descriptor	Lesson Names
review and use the trigonometric ratios to find the length of an unknown side or the size of an unknown angle in a right-angled triangle	• Pythagoras' Theorem • Review Lesson: Trigonometric Ratios
use technology to investigate the sign of sin A and cos A for 0° ≤ A ≤ 180°	*Further development planned*
determine the area of any triangle, given two sides and an included angle, by using the rule A = 1/2ab sin c, and	• Area of a Triangle: ½ ab sin C • Heron's Formula

solve related practical problems	
solve problems involving non-right-angled triangles using the sine rule, a/sin A=b/sin B=c/sin c (ambiguous case excluded)	• The Sine Rule • Finding Angles Using the Sine Rule
solve problems involving non-right-angled triangles using the cosine rule, c^2 = a^2 + b^2 – 2ab cos C	• The Cosine Rule • Finding Angles Using the Cosine Rule
understand various navigational methods	• Bearings with Right-Angled Triangles
solve practical problems involving Pythagoras' theorem, the trigonometry of right-angled and non right-angled triangles, angles of elevation and depression and the use of true bearings and compass bearings	• Bearings with Right-Angled Triangles • Angles of Elevation and Depression • Building with Pythagoras • Pirates' Treasure • Airplane Flight Paths • Forestry Subdivision • Balloons Over Waikato
construct and interpret compass radial surveys and solve related problems	*Further development planned*

MS-M7 Rates and Ratios

Content Descriptor	Lesson Names
use rates to solve and describe practical problems	• Rates
solve practical problems involving ratio, for example capture-recapture, mixtures for building materials or cost per item	• Ratios • Scales and Locations on Maps
obtain measurements from scale drawings, including maps (including cultural mappings or models) or building plans, to solve problems	*Further development planned*

Financial Mathematics

MS-F4 Investments and Loans

Content Descriptor	Lesson Names
calculate the future value (FV) or present value (PV) and the interest rate (r) of a compound interest investment using the formula FV=PV(1+r)^n	• Compound Interest Basic Formula • Rearranging the Compound Interest Formula • Compound Interest - Months and Weeks • Rearranging Compound Interest - Months and Weeks
solve practical problems involving compounding, for example determine the impact of inflation on prices and wages	• Inflation and Purchasing Power
work with shares and calculate the appreciated value of	• Shares

items, for example antiques	• Dividends and Yields
calculate the depreciation of an asset using the declining-balance method using the formula s = V_0(1 – r)^n, where s is the salvage value of the asset after n periods, V_0 is the initial value of the asset, r is the depreciation rate per period, expressed as a decimal, and n is the number of periods, as an application of the compound interest formula	• Depreciation
solve practical problems involving reducing balance loans, for example determining the total loan amount and monthly repayments recognise credit cards as an example of a reducing balance loan and solve practical problems relating to credit cards	*Further development planned*

MS-F5 Annuities

Content Descriptor	Lesson Names
solve compound interest related problems involving financial decisions, for example a home loan, a savings account, a car loan or an annuity	• Simple and Compound Interest

Statistical Analysis

MS-S4 Bivariate Data Analysis

Content Descriptor	Lesson Names
construct a bivariate scatterplot to identify patterns in the data that suggest the presence of an association (ACMGM052)	• Plotting Using a Calculator • Plotting Using a Spreadsheet • Analysing Trend by Eye
use bivariate scatterplots (constructing them when needed) to describe the patterns, features and associations of bivariate datasets, justifying any conclusions	• Analysing Trend by Eye • Bivariate Variables • Correlation Coefficient • Calculating the Correlation Coefficient using a Calculator • Calculating the Correlation Coefficient using a Spreadsheet
model a linear relationship by fitting an appropriate line of best fit to a scatterplot and using it to describe and quantify associations	• Least Squares Fitting using a Spreadsheet • Least Squares Fitting using a Calculator • Lines of Best Fit by Eye
use the appropriate line of best fit, both found by eye and by applying the equation, to make predictions by either interpolation or extrapolation	• Making Predictions by Eye • Making Predictions Using the Equation

solve problems that involve identifying, analysing and describing associations between two numerical variables	• Analysing Trend by Eye • Least Squares Fitting using a Spreadsheet • Least Squares Fitting using a Calculator • Lines of Best Fit by Eye • Making Predictions by Eye • Making Predictions Using the Equation
construct, interpret and analyse scatterplots for bivariate numerical data in practical contexts	• Analysing Trend by Eye • Least Squares Fitting using a Spreadsheet • Least Squares Fitting using a Calculator • Lines of Best Fit by Eye • Making Predictions by Eye • Making Predictions Using the Equation

MS-S5 The Normal Distribution

Content Descriptor	Lesson Names
recognise a random variable that is normally distributed, justifying their reasoning, and draw an appropriate 'bell-shaped' frequency distribution curve to represent it	• Introducing the Normal Distribution • The Standard Normal Distribution
calculate the z-score (standardised score) corresponding to a particular value in a dataset	• Calculating Probabilities with the Normal Distribution • Working Backwards: Mean and Standard Deviation
use calculated z-scores to compare scores from different datasets, for example comparing students' subject examination scores	• Calculating Probabilities with the Normal Distribution • Applications of the Normal Distribution
use collected data to illustrate that, for normally distributed random variables, approximately 68% of data will have z-scores between -1 and 1, approximately 95% of data will have z-scores between -2 and 2 and approximately 99.7% of data will have z-scores between -3 and 3 (known as the empirical rule)	• Calculating Probabilities with the Normal Distribution • Applications of the Normal Distribution
use z-scores to identify probabilities of events less or more extreme than a given event	• Calculating Probabilities with the Normal Distribution • Applications of the Normal Distribution • Working Backwards: Calculating Bounds • Working Backwards: Mean and Standard Deviation
use z-scores to make judgements related to outcomes of a given event or sets of data	• Calculating Probabilities with the Normal Distribution • Applications of the Normal Distribution • Working Backwards: Calculating Bounds • Working Backwards: Mean and Standard Deviation

Networks

MS-N2 Network Concepts

Content Descriptor	Lesson Names
identify and use network terminology: vertices, edges, paths, the degree of a vertex, directed networks and weighted edges	• Network Basics • Equivalent Networks • Traversable Networks • The Shortest Path
solve problems involving network diagrams	• Network Basics • Equivalent Networks • Traversable Networks
determine the minimum spanning tree of a given network with weighted edges	• Hamiltonian Networks • The Shortest Path • Minimum Spanning Trees
find a shortest path from one place to another in a network with no more than 10 vertices	• Hamiltonian Networks • The Shortest Path • Minimum Spanning Trees

MS-N3 Critical Path Analysis

Content Descriptor	Lesson Names
construct a network to represent the duration and interdependencies of activities that must be completed during a particular project, for example a student schedule, or preparing a meal given activity charts, prepare network diagrams and use critical path analysis to determine the minimum time for a project to be completed solve small-scale network flow problems, including the use of the 'maximum-flow minimum-cut' theorem, for example determining the maximum volume of oil that can flow through a network of pipes from an oil storage tank (the source) to a terminal (the sink) (ACMGM109)	*Further development planned*