NSW Stage 6 Mathematics

EP Curriculum Map

Advanced: Year 11

Functions

MA-F1 Working with Functions

Content Descriptor	Lesson Names
use index laws and surds	• Introduction to Surds • Index Laws and Fractional Powers
solve quadratic equations using the quadratic formula and by completing the square (ACMMM008)	• The Quadratic Formula • Solving Monic Quadratic Equations • Solving Non-Monic Quadratic Equations • Applications of Quadratic Equations
manipulate complex algebraic expressions involving algebraic fractions	• Solving Linear Equations with Fractions
define and use a function and a relation as mappings between sets, and as a rule or a formula that defines one variable quantity in terms of another use function notation, domain and range, independent and dependent variables (ACMMM023) understand the concept of the graph of a function (ACMMM024) identify types of functions and relations on a given domain, using a variety of methods	• Introduction to Functions • Function Notation
define odd and even functions algebraically and recognise their geometric properties	*Further development planned*
define the sum, difference, product and quotient of functions and consider their domains and ranges where possible	• Adding, Subtracting and Multiplying Polynomials • Find the Range of a Function • Dividing Polynomials • The Remainder Theorem
define and use the composite function f(g(x)) of functions f(x) and g(x) where appropriate	*Further development planned*
recognise that solving the equation f(x) = 0 corresponds to finding the values of x for which the graph of y = f(x)	• The Factor Theorem

cuts the x-axis (the x-intercepts)	
model, analyse and solve problems involving linear functions	• Slope and Intercept from a Graph • Equations From Graphs • Parallel Lines • Perpendicular Lines • Finding the Equation of a Perpendicular Line
model, analyse and solve problems involving quadratic functions	• Features of Polynomial Graphs • Features of Graphs - Roots • Parabolas • Parabola Transformations • Multiple Transformations of Parabolas
solve practical problems involving a pair of simultaneous linear and/or quadratic functions algebraically and graphically, with or without the aid of technology; including determining and interpreting the break-even point of a simple business problem	• Solving Simultaneous Equations Using Graphs • Solving Simultaneous Equations Using Substitution • Solving Simultaneous Equations Using Elimination • Applications of Simultaneous Equations • Solving Simultaneous Linear Equations using Technology • Introduction to Non-Linear Simultaneous Equations • Solving Non-Linear Simultaneous Equations Using Graphs • Solving Linear and Quadratic Simultaneous Equations
recognise cubic functions of the form: $f(x) = kx^3$, $f(x) = k(x - b)^3 + c$ and $f(x) = k(x - a)(x - b)(x - c)$, where a, b, c and k are constants, from their equation and/or graph and identify important features of the graph	• Cubics • Expanding Cubic Expressions • Cubic Transformations • Factorising Cubic Polynomials
define a real polynomial $P(x)$ as the expression $a_n x^n + a_{(n-1)} x^{(n-1)} + \ldots + a_2 x^2 + a_1 x + a0$ where $n = 0,1,2, \ldots$ and $a_0, a_1, a_2, \ldots, a_n$ are real numbers identify the coefficients and the degree of a polynomial (ACMMM015)	• Introduction to Polynomials
identify the shape and features of graphs of polynomial functions of any degree in factored form and sketch their graphs	• Introduction to Polynomials • Evaluating Polynomials • Factorising Quartic Polynomials
recognise that functions of the form $f(x) = k/x$ represent inverse variation, identify the hyperbolic shape of their graphs and identify their asymptotes	• Hyperbola Graphs • Hyperbola Graph Transformations
define the absolute value $\|x\|$ of a real number x as the distance of the number from the origin on a number line without regard to its sign	*Further development planned*

use and apply the notation |x| for the absolute value of the real number x and the graph of y = |x| (ACMSM098)	
given the graph of y = f(x), sketch y = −f(x) and y = f(−x) and y = −f(−x) using reflections in the x and y-axes	• Inverse Functions and Transformations
recognise features of the graphs of x^2 +y^2 = r^2 and (x − a)^2 +(y −b)^2 = r^2, including their circular shapes, their centres and their radii (ACMMM020)	• Circle Graphs

Trigonometric Functions

MA-T1 Trigonometry and Measure of Angles

Content Descriptor	Lesson Names
use the sine, cosine and tangent ratios to solve problems involving right-angled triangles where angles are measured in degrees, or degrees and minutes	• Introduction to Trigonometry • Finding Side Lengths Using Trigonometry • Finding Angles Using Trigonometry
establish and use the sine rule, cosine rule and the area of a triangle formula for solving problems where angles are measured in degrees, or degrees and minutes	• The Sine Rule • Finding Angles Using the Sine Rule • The Cosine Rule • Finding Angles Using the Cosine Rule • Area of a Triangle: ½ ab sin C • Heron's Formula
find angles and sides involving the ambiguous case of the sine rule	• The Sine Rule: The Ambiguous Case
solve problems involving the use of trigonometry in two and three dimensions	• Trigonometry in 3D • 3D Problems Using Right-Angled Triangles • Review Lesson: Trigonometric Ratios • Review Lesson: Trigonometric Rules
solve practical problems involving Pythagoras' theorem and the trigonometry of triangles, which may involve the ambiguous case, including finding and using angles of elevation and depression and the use of true bearings and compass bearings in navigation	• Building with Pythagoras • Pirates' Treasure • Airplane Flight Paths • Applications of Trigonometry in Coding • Using Trigonometric Functions in Real World Applications • Using Inverse Trigonometric Functions in Real World Applications • Pythagoras and Trigonometry Spelling • Forestry Subdivision • Balloons Over Waikato • Bearings with Right-Angled Triangles • Angles of Elevation and Depression
understand the unit circle definition of sin θ, cos θ and tan θ and periodicity using degrees (ACMMM029)	• Understanding and Graphing Sine • Understanding and Graphing Cosine • Understanding and Graphing Tangent

define and use radian measure and understand its relationship with degree measure (ACMMM032)	• The Unit Circle and Radians
understand the unit circle definition of sin θ, cos θ and tan θ and periodicity using radians (ACMMM034)	• The Unit Circle and Radians • Understanding and Graphing Sine • Understanding and Graphing Cosine • Understanding and Graphing Tangent • Comparing Trigonometric Functions
solve problems involving trigonometric ratios of angles of any magnitude in both degrees and radians	• Special Triangles: 30-60-90 • Special Triangles: 45-45-90 • Trigonometric Ratios and Complementary Angles
recognise the graphs of y = sin x, y = cos x and y = tan x and sketch on extended domains in degrees and radians (ACMMM036)	*Further development planned*
derive the formula for arc length, $l = r\theta$ and for the area of a sector of a circle, A = 1/2 r2θ solve problems involving sector areas, arc lengths and combinations of either areas or lengths	• Area of Sectors and Segments • Finding an Arc Length

MA-T2 Trigonometric Functions and Identities

Content Descriptor	**Lesson Names**
define the reciprocal trigonometric functions, y = cosec x, y = sec x and y = cot x sketch the graphs of reciprocal trigonometric functions in both radians and degrees	*Further development planned*
prove and apply the Pythagorean identities cos^2x + sin^2x = 1, 1+ tan^2x = sec^2x and 1 +cot^2x = cosec^2x (ACMSM046)	• Comparing Trigonometric Functions
use tan x = sin x/cos x provided that cos $x \neq 0$	• Understanding and Graphing Tangent • Comparing Trigonometric Functions
prove trigonometric identities	*Further development planned*
evaluate trigonometric expressions using angles of any magnitude and complementary angle results	• Special Triangles: 30-60-90 • Special Triangles: 45-45-90 • Trigonometric Ratios and Complementary Angles
simplify trigonometric expressions and solve trigonometric equations, including those that reduce to quadratic equations	*Further development planned*

Calculus

MA-C1 Introduction to Differentiation

Content Descriptor	Lesson Names
distinguish between continuous and discontinuous functions, identifying key elements which distinguish each type of function	• Features of Graphs
describe the gradient of a secant drawn through two nearby points on the graph of a continuous function as an approximation of the gradient of the tangent to the graph at those points, which improves in accuracy as the distance between the two points decreases	• Introduction to Derivatives
examine and use the relationship between the angle of inclination of a line or tangent, θ, with the positive x-axis, and the gradient, m, of that line or tangent, and establish that tan θ = m describe the behaviour of a function and its tangent at a point, using language including increasing, decreasing, constant, stationary, increasing at an increasing rate	• Rates of Change • Introduction to Derivatives
interpret and use the difference quotient f(x+h)−f(x)/h as the average rate of change of f(x) or the gradient of a chord or secant of the graph y = f(x)	• Rates of Change • Introduction to Derivatives
interpret the meaning of the gradient of a function in a variety of contexts, for example on distance–time or velocity–time graphs	• Analysing Travel Graphs • Plotting and Reading Travel Graphs
examine the behaviour of the difference quotient f(x+h)−f(x)/h as h → 0 as an informal introduction to the concept of a limit (ACMMM081) interpret the derivative as the gradient of the tangent to the graph of y = f(x) at a point x (ACMMM085)	• Introduction to Derivatives
estimate numerically the value of the derivative at a point, for simple power functions (ACMMM086)	• Rates of Change • Introduction to Derivatives
define the derivative f'(x) from first principles, as lim_(h→0) f(x+h)−f(x)/h and use the notation for the derivative: dy/dx= f'(x) = y', where y = f(x) use first principles to find the derivative of simple polynomials, up to and including degree 3	• Differentiation By First Principles
understand the concept of the derivative as a function (ACMMM089)	• Differentiating Polynomials
sketch the derivative function (or gradient function) for a given graph of a function, without the use of algebraic	• Sketching the Gradient Function from the Original Function

techniques and in a variety of contexts including motion in a straight line	
interpret and use the derivative at a point as the instantaneous rate of change of a function at that point	• Introduction to Derivatives
use the formula d/dx(x^n) = nx^(n−1) for all real values of n differentiate a constant multiple of a function and the sum or difference of two functions	• Differentiating Polynomials
understand and use the product, quotient and chain rules to differentiate functions of the form f(x)g(x), f(x)/g(x) and f(g(x)) where f(x) and g(x) are functions	• The Product Rule • The Quotient Rule • The Chain Rule
calculate derivatives of power functions to solve problems, including finding an instantaneous rate of change of a function in both real life and abstract situations	• Practice Assessment - Bridge Construction • Rates of Change: Zeppelins • Tangents and Normals: Bridge Construction • Applications of Rates of Change • Distance, Velocity and Acceleration • Kinematics
use the derivative in a variety of contexts, including to finding the equation of a tangent or normal to a graph of a power function at a given point	• Finding a Point at a Gradient • Finding Multiple Solutions for a Gradient • Finding a Tangent to a Curve • Finding a Normal to a Curve • Gradient at a Point
determine the velocity of a particle given its displacement from a point as a function of time	• Distance, Velocity and Acceleration • Kinematics
determine the acceleration of a particle given its velocity at a point as a function of time	• Distance, Velocity and Acceleration • Kinematics

Exponential and Logarithmic Functions

MA-E1 Logarithms and Exponentials

Content Descriptor	Lesson Names
define logarithms as indices: y = a^x is equivalent to x = log_a y, and explain why this definition only makes sense when a > 0, a ≠ 1	• Introduction to Logarithms
recognise and sketch the graphs of y = ka^x, y = ka^−x where k is a constant, and y = log_ax	• Exponential Graphs
recognise and use the inverse relationship between logarithms and exponentials	• Solving Exponential Equations • Using the Laws of Logarithms
derive the log_arithmic laws from the index laws and use the algebraic properties of logarithms to simplify and evaluate log_arithmic expressions log_a m + log_a	• Deriving the Laws of Logarithms • Using the Laws of Logarithms • Combining Log Laws

n = log_a(mn), log_a m − log_a n = log_a (m/n), log_a(m^n) = nlog_a m,log_a a = 1, log_a 1 = 0, log_a 1/x= −log_a x	
consider different number bases and prove and use the change of base law log_a x =logb x/logb a	• Deriving the Laws of Logarithms • Using the Laws of Logarithms • Combining Log Laws
interpret and use logarithmic scales, for example decibels in acoustics, different seismic scales for earthquake magnitude, octaves in music or pH in chemistry (ACMMM154)	• Logarithmic Scales
solve algebraic, graphical and numerical problems involving logarithms in a variety of practical and abstract contexts, including applications from financial, scientific, medical and industrial contexts	• Using the Laws of Logarithms • Combining Log Laws
establish and use the formula d(e^x)/dx= e^x(ACMMM100) apply the differentiation rules to functions involving the exponential function, f(x) = ke^ax, where k and a are constants	• Natural Logarithms
work with natural logarithms in a variety of practical and abstract contexts	*Further development planned*
solve equations involving indices using logarithms (ACMMM155)	• Using the Laws of Logarithms • Combining Log Laws
graph an exponential function of the form y = a^x for a > 0 and its transformations y = ka^x + c and y = ka^(x+b) where k, b and c are constants	*Further development planned*
establish and use the algebraic properties of exponential functions to simplify and solve problems (ACMMM064) solve problems involving exponential functions in a variety of practical and abstract contexts, using technology, and algebraically in simple cases (ACMMM067)	• Solving Exponential Equations
graph a logarithmic function y = log_a x for a > 0 and its transformations y = k log_a x + c, using technology or otherwise, where k and c are constants	*Further development planned*
model situations and solve simple equations involving logarithmic or exponential functions algebraically and graphically	• Solving Exponential Equations
identify contexts suitable for modelling by exponential and logarithmic functions and use these functions to solve practical problems (ACMMM066, ACMMM158)	*Further development planned*

Statistical Analysis

MA-S1 Probability and Discrete Probability Distributions

Content Descriptor	Lesson Names
understand and use the concepts and language associated with theoretical probability, relative frequency and the probability scale	• Probability Terms and Concepts • Likelihood • Terminology
solve problems involving simulations or trials of experiments in a variety of contexts	• Relative Frequencies • Using Relative Frequencies
use arrays and tree diagrams to determine the outcomes and probabilities for multi-stage experiments (ACMEM156)	• Introduction to Two-Step Experiments • Tree Diagrams • Using Tree Diagrams • Arrays • Using Arrays
use Venn diagrams, set language and notation for events, including $\bar{A}$(or A' or $A\hat{}c$) for the complement of an event A, $A \cap B$ for 'A and B', the intersection of events A and B, and $A \cup B$ for 'A or B', the union of events A and B, and recognise mutually exclusive events (ACMMM050)	• Venn Diagrams • Using Venn Diagrams
establish and use the rules: $P(\bar{A}) = 1 - P(A)$ and $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ (ACMMM054)	• Calculating Complements • Intersections and Unions
understand the notion of conditional probability and recognise and use language that indicates conditionality (ACMMM056) use the notation $P(A\|B)$ and the formula $P(A\|B) = P(A \cap B)/P(B)$, $P(B) \neq 0$ for conditional probability (ACMMM057)	• Introduction to Conditional Probability
understand the notion of independence of an event A from an event B, as defined by $P(A\|B) = P(A)$ (ACMMM058) use the multiplication law $P(A \cap B) = P(A)P(B)$ for independent events A and B and recognise the symmetry of independence in simple probability situations (ACMMM059)	• Introduction to Independence
define and categorise random variables	*Further development planned*
use discrete random variables and associated probabilities to solve practical problems (ACMMM142)	• Expected Number
understand that a sample mean, $\bar{x}$, is an estimate of the associated population mean μ, and that the sample standard deviation, s, is an estimate of the associated	*Further development planned*

population standard deviation, σ, and that these estimates get better as the sample size increases and when we have independent observations	

Advanced: Year 12

Functions

MA-F2 Graphing Techniques

Content Descriptor	**Lesson Names**
apply transformations to sketch functions of the form y = kf(a(x +b))+c, where f(x) is a polynomial, reciprocal, absolute value, exponential or logarithmic function and a, b, c and k are constants	• Inverse Functions and Transformations
use graphical methods with supporting algebraic working to solve a variety of practical problems involving any of the functions within the scope of this syllabus, in both real-life and abstract contexts	*Further development planned*

Trigonometric Functions

MA-T3 Trigonometric Functions and Graphs

Content Descriptor	**Lesson Names**
examine and apply transformations to sketch functions of the form y = kf(a(x + b))+ c, where a, b, c and k are constants, in a variety of contexts, where f(x) is one of sin x, cos x or tan x, stating the domain and range when appropriate	• Comparing Trigonometric Functions
solve trigonometric equations involving functions of the form kf(a(x + b))+ c, using technology or otherwise, within a specified domain use trigonometric functions of the form kf(a(x + b))+ c to model and/or solve practical problems involving periodic phenomena	*Further development planned*

Calculus

MA-C2 Differential Calculus

Content Descriptor	Lesson Names
establish the formulae $d/dx(\sin x) = \cos x$ and $d/dx(\cos x) = -\sin x$ by numerical estimations of the limits and informal proofs based on geometric constructions (ACMMM102)	*Further development planned*
calculate derivatives of trigonometric functions	• Trigonometric Functions
establish and use the formula $d/dx(a^x) = (\ln a)a^x$	• Exponential Functions
calculate the derivative of the natural logarithm function $d/dx(\ln x) = 1/x$	• Natural Logarithms
establish and use the formula $d/dx(\log_a x) = 1/(x\ln a)$	*Further development planned*
apply the product, quotient and chain rules to differentiate functions of the form $f(x)g(x)$, $f(x)/g(x)$ and $f(g(x))$ where $f(x)$ and $g(x)$ are any of the functions covered in the scope of this syllabus, for example xe^x, $\tan x$, $1/x^n$, $x \sin x$, $e^{-x}\sin x$ and $f(ax + b)$ (ACMMM106)	• The Product Rule • The Quotient Rule • The Chain Rule • Combining Multiple Rules • Mixed Differentiation Techniques

MA-C3 Applications of Differentiation

Content Descriptor	Lesson Names
use the first derivative to investigate the shape of the graph of a function	• Finding Stationary Points • Classifying Stationary Points by Reading Graphs • Increasing and Decreasing Functions
define and interpret the concept of the second derivative as the rate of change of the first derivative function in a variety of contexts, for example recognise acceleration as the second derivative of displacement with respect to time (ACMMM108, ACMMM109)	• The Second Derivative
use any of the functions covered in the scope of this syllabus and their derivatives to solve practical and abstract problems	• Differentiating Polynomials: River Float
use calculus to determine and verify the nature of stationary points, find local and global maxima and minima and points of inflection (horizontal or otherwise), examine behaviour of a function as $x \to \infty$ and $x \to -\infty$ and hence sketch the graph of the function (ACMMM095)	• Finding Stationary Points • Classifying Stationary Points by Reading Graphs • Sketching Graphs
solve optimisation problems for any of the functions covered in the scope of this syllabus, in a wide variety of	• Optimisation

contexts including displacement, velocity, acceleration, area, volume, business, finance and growth and decay	

MA-C4 Integral Calculus

Content Descriptor	**Lesson Names**
define anti-differentiation as the reverse of differentiation and use the notation ∫ f(x) dx for antiderivatives or indefinite integrals (ACMMM114, ACMMM115)	• Integrating Polynomials • Anti-Differentiating Polynomials
recognise that any two anti-derivatives of f(x) differ by a constant	• Finding the Constant of Integration
establish and use the formula ∫ x^n dx =1/(n+1)x^(n+1) + c, for n ≠ −1 (ACMMM116)	• Integrating Polynomials
establish and use the formula ∫ f′ (x)[f(x)]^n dx =1/(n+1)[f(x)]^(n+1) + c where n ≠ −1 (the reverse chain rule)	• Integrating Products: Reverse Chain Rule
establish and use the formulae for the anti-derivatives of sin (ax + b), cos (ax + b) and sec^2(ax + b)	• Integrating Trigonometric Functions • Trigonometric Functions: Finding the Constant
establish and use the formulae ∫ e^x dx = e^x + c and ∫ e^(ax+b) dx =1/a e^(ax+b) +c	• Integrating Exponentials
establish and use the formulae ∫1/x dx = ln |x| + c and ∫f′ (x)/f(x)dx = ln |f(x)| + c for x ≠ 0, f(x) ≠ 0, respectively	• Integration of Inverses
establish and use the formulae ∫ a^x dx =a^x/ln a+ c	• Integrating Exponentials
recognise and use linearity of anti-differentiation (ACMMM119)	• Finding the Constant of Integration • Equation of the Original Function • Trigonometric Functions: Finding the Constant
determine indefinite integrals of the form ∫ f(ax + b) dx (ACMMM120)	• Integrating Quotients: Factorising and Cancelling • Integrating Quotients: Generalised Logarithms • Integrating Rational Functions and Surds • Integration by Substitution • Identifying Substitutions
determine f(x), given f′ (x) and an initial condition f(a) = b in a range of practical and abstract applications including coordinate geometry, business and science	• Equation of the Original Function
know that ‘the area under a curve’ refers to the area between a function and the x-axis, bounded by two values of the independent variable and interpret the area under a curve in a variety of contexts	• Introduction to Definite Integrals • Area Under a Curve
determine the approximate area under a curve using a variety of shapes including squares, rectangles (inner and outer rectangles), triangles or trapezia	• The Rectangle Rule • The Trapezium Rule • Simpson's Rule

use the notation of the definite integral $\int_a^b f(x)\,dx$ for the area under the curve $y = f(x)$ from $x = a$ to $x = b$ if $f(x) \geq 0$	• Introduction to Definite Integrals • Area Under a Curve
use the Trapezoidal rule to estimate areas under curves	• The Trapezium Rule
use geometric ideas to find the definite integral $\int_a^b f(x)\,dx$ where $f(x)$ is positive throughout an interval $a \leq x \leq b$ and the shape of $f(x)$ allows such calculations, for example when $f(x)$ is a straight line in the interval or $f(x)$ is a semicircle in the interval	*Further development planned*
understand the relationship of position to signed areas, namely that the signed area above the horizontal axis is positive and the signed area below the horizontal axis is negative	• Area Above and Below the x-Axis
using technology or otherwise, investigate the link between the anti-derivative and the area under a curve	• Area Under a Curve • Area Above and Below the x-Axis
use the formula $\int_a^b f(x)\,dx = F(b) - F(a)$, where $F(x)$ is the anti-derivative of $f(x)$, to calculate definite integrals (ACMMM131)	*Further development planned*
calculate the area under a curve (ACMMM132)	• Area Under a Curve • Area Above and Below the x-Axis
calculate areas between curves determined by any functions within the scope of this syllabus (ACMMM134)	• Area Between Two Curves
integrate functions and find indefinite or definite integrals and apply this technique to solving practical problems	• Area Beneath a Curve: Further Questions • Definite Integrals: Further Questions • Rates of Change • Kinematics

Financial Mathematics

MA-M1 Modelling Financial Situations

Content Descriptor	Lesson Names
solve compound interest problems involving financial decisions, including a home loan, a savings account, a car loan or superannuation	• Alice's New Car
know the difference between a sequence and a series	• Introduction to Sequences • Summing Arithmetic Sequences • The Arithmetic Sum Rule • Summing Geometric Sequences
recognise and use the recursive definition of an arithmetic sequence: $T_n = T_{n-1} + d$, $T_1 = a$	• Recursive Sequences • Finding an Arithmetic Term
establish and use the formula for the nth term (where n is a positive integer) of an arithmetic sequence: $T_n = a +$	• Finding an Arithmetic Term • Finding a Term Number for an Arithmetic

(n – 1) d, where a is the first term and d is the common difference, and recognise its linear nature	Sequence
establish and use the formulae for the sum of the first n terms of an arithmetic sequence: sn = n/2 (a +l) where l is the last term in the sequence and sn = n/2{2a +(n – 1) d}	• Summing Arithmetic Sequences • The Arithmetic Sum Rule
identify and use arithmetic sequences and arithmetic series in contexts involving discrete linear growth or decay such as simple interest (ACMMM070)	• Using Sequences and Series in Context
recognise and use the recursive definition of a geometric sequence: Tn = rTn−1, T1 = a(ACMMM072)	• Recursive Sequences • Geometric Sequences
establish and use the formula for the nth term of a geometric sequence: Tn = ar^(n−1), where a is the first term, r is the common ratio and n is a positive integer, and recognise its exponential nature (ACMMM073)	• Geometric Sequences
establish and use the formula for the sum of the first n terms of a geometric sequence: sn =a(1−r^n)/(1−r)=a(r^n −1)/(r−1) (ACMMM075)	• Summing Geometric Sequences
derive and use the formula for the limiting sum of a geometric series with |r| < 1: s = a/(1−r)	• Sums to Infinity
use geometric sequences to model and analyse practical problems involving exponential growth and decay (ACMMM076)	• Using Sequences and Series in Context
solve problems involving financial decisions, including a home loan, a savings account, a car loan or superannuation	• Alice's New Car

Statistical Analysis

MA-S2 Descriptive Statistics and Bivariate Data Analysis

Content Descriptor	**Lesson Names**
classify data relating to a single random variable	• Types of Data
organise, interpret and display data into appropriate tabular and/or graphical representations including Pareto charts, cumulative frequency distribution tables or graphs, parallel box-plots and two-way tables	• Comparing Data Sets • Comparing Box and Whisker Plots
summarise and interpret grouped and ungrouped data through appropriate graphs and summary statistics	*Data Displays* • Measures of Centre and Spread • Quartiles and the Interquartile Range • Dot Plots, Stem and Leaf Plots and Histograms • Comparing Data Sets • Column (Bar) Graphs

	Standard Deviation • Introduction to Standard Deviation • Calculating Standard Deviation • Calculating Standard Deviation Using Technology • Investigating the Standard Deviation • Using the Standard Deviation to Compare Data Sets • Comparing the Measures of Spread *Features* • Shape and Mode • Symmetry and Skew in Data • Effect of Shape on Mean and Median • Measures of Centre in Grouped Data
calculate measures of central tendency and spread and investigate their suitability in real-world contexts and use to compare large datasets	• Measures of Centre and Spread
identify outliers and investigate and describe the effect of outliers on summary statistics	• Clusters and Outliers • Shape and Mode • Symmetry and Skew in Data • Effect of Shape on Mean and Median • Measures of Centre in Grouped Data
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 where needed), to describe the patterns, features and associations of bivariate datasets, justifying any conclusions	• Plotting Using a Calculator • Plotting Using a Spreadsheet • Analysing Trend by Eye • Bivariate Variables
calculate and interpret Pearson's correlation coefficient (r) using technology to quantify the strength of a linear association of a sample (ACMGM054)	• 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 of the fitted line, 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 numeric variables	• Correlation Coefficient • Analysing Trend by Eye • Least Squares Fitting using a Spreadsheet

	• Least Squares Fitting using a Calculator • Making Predictions by Eye • Making Predictions Using the Equation
construct, interpret and analyse scatterplots for bivariate numerical data in practical contexts	• Plotting Using a Calculator • Plotting Using a Spreadsheet • Analysing Trend by Eye

MA-S3 Random Variables

Content Descriptor	**Lesson Names**
use relative frequencies and histograms obtained from data to estimate probabilities associated with a continuous random variable (ACMMM164) understand and use the concepts of a probability density function of a continuous random variable obtain and analyse a cumulative distribution function with respect to a given probability density function	*Further development planned*
identify the numerical and graphical properties of data that is normally distributed	• Introducing the Normal Distribution • The Standard Normal Distribution
calculate probabilities and quantiles associated with a given normal distribution using technology and otherwise, and use these to solve practical problems (ACMMM170)	• Introducing the Normal Distribution • The Standard Normal Distribution • Calculating Probabilities with the Normal Distribution • Applications of the Normal Distribution
understand and calculate the z-score (standardised score) corresponding to a particular value in a dataset	• Calculating Probabilities with the Normal Distribution
use z-scores to compare scores from different datasets, for example comparing students' subject examination scores	• Applications of the Normal Distribution
use collected data to illustrate the empirical rules for normally distributed random variables	*Further development planned*
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
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