Explore the variation of means and proportions of random samples drawn from the same population	• Calculating Measures of Centre and Spread • Comparing Measures of Centre

Probability 1

Content Descriptor	Lesson Names
Construct sample spaces for single-step experiments with equally likely outcomes	• Introduction to Likelihood • Introduction to Probability • Probability Terminology • Comparing Probabilities • Experimental Probability
Assign probabilities to the outcomes of events and determine probabilities for events	• Introduction to Likelihood • Introduction to Probability • Probability Terminology • Comparing Probabilities • Experimental Probability • Probability as a Decimal and a Percentage • Probability as a Fraction • Calculating Probability
Identify complementary events and use the sum of probabilities to solve problems	• Calculating Complements • Complementary Events

Probability 2

Content Descriptor	Lesson Names
Describe events using language of 'at least', exclusive 'or' (A or B but not both), inclusive 'or' (A or B or both) and 'and'	• Describing Probabilities • Using Descriptions of Probability
Represent events in two-way tables and Venn diagrams and solve related problems	• Two-Way Tables • Using Two-Way Tables • Making Your Own Two-Way Tables • Venn Diagrams • Using Venn Diagrams • Making Your Own Venn Diagrams

Stage 5.1

Number and Algebra

Financial Mathematics

Content Descriptor	Lesson Names

Solve problems involving earning money	• Salaries and Wages • Timesheets • Commission • Piecework • Royalties • Overtime, Special rates and Allowances • Alternative Sources of Income • Government Benefits and Allowances • Retirement • Income Tax
Solve problems involving simple interest	• Introduction to Interest • Calculating Simple Interest • Rearranging the Simple Interest Formula
Connect the compound interest formula to repeated applications of simple interest using appropriate digital technologies	• Compound Interest Basic Formula

Indices

Content Descriptor	Lesson Names
Extend and apply the index laws to variables, using positive-integer indices and the zero index	• Dividing Powers • Division as the Base of a Power • Multiplication as the Base of a Power • Multiplying Powers • Powers as the Base of Another Power • The Zero Index
Simplify algebraic products and quotients using index laws	• Simplifying Algebraic Products with Index Laws • Simplifying Algebraic Quotients with Index Laws
Apply index laws to numerical expressions with integer indices	• Positive and Negative Integer Indices • Applying Index Laws

Linear Relationships

Content Descriptor	Lesson Names
Find the midpoint and gradient of a line segment (interval) on the Cartesian plane using a range of strategies, including graphing software	• Line Segments on Cartesian Planes • Midpoint of a Line Segment • Gradient of a Line Segment
Find the distance between two points located on the Cartesian plane using a range of strategies, including graphing software	• Line Segments on Cartesian Planes • Distance and Pythagoras' Theorem
Sketch linear graphs using the coordinates of two points	• Plotting Linear Graphs • Drawing Linear Graphs Using the Gradient • Graphing Using Technology - Casio Calculators
Solve problems involving parallel lines	• Parallel Lines

	• Perpendicular Lines

Non-Linear Relationships

Content Descriptor	Lesson Names
Graph simple non-linear relations, with and without the use of digital technologies	• Linear and Non-Linear Relationships • Parabolas • Exponential Graphs
Explore the connection between algebraic and graphical representations of relations such as simple quadratics, circles and exponentials using digital technologies as appropriate	• Linear and Non-Linear Relationships • Parabolas • Exponential Graphs • Circles • Transforming Parabolas • Transforming Parabolas - Dilation and Reflection • Transforming Parabolas - Translation • Transforming Circles

Measurement and Geometry

Area and Surface Area

Content Descriptor	Lesson Names
Calculate the areas of composite shapes	• Area of Composite Shapes • Area of Parallelograms • Area of Rectangles & Squares • Area of Rhombuses and Kites • Area of Trapeziums • Area of Triangles
Solve problems involving the surface areas of right prisms	• Surface Area of Prisms • Nets of Prisms

Numbers of Any Magnitude

Content Descriptor	Lesson Names
Investigate very small and very large time scales and intervals	• The Metric System • Units of Measurement • Time Scales • Rounding Sensibly • Rounding to Significant Figures • Precision and Accuracy • Precision in Context • Absolute vs. Relative Error • Limits of Accuracy
Express numbers in scientific-notation	• Introduction to Scientific Notation (Standard

	Form) - Large Numbers • Introduction to Scientific Notation (Standard Form) - Small Numbers • Significant Figures and Scientific Notation (Standard Form) • Ordering Numbers and Estimating Calculations in Scientific Notation (Standard Form) • Adding and Subtracting with Scientific Notation (Standard Form) • Multiplying and Dividing in Scientific Notation (Standard Form) • Leading Digit Approximation

Right-Angled Triangles

Content Descriptor	Lesson Names
Use similarity to investigate the constancy of the sine, cosine and tangent ratios for a given angle in right-angled triangles	• Introduction to Trigonometry • Finding Side Lengths Using Trigonometry • Finding Angles Using Trigonometry
Apply trigonometry to solve right-angled triangle problems	• Finding Side Lengths Using Trigonometry • Finding Angles Using Trigonometry
Solve right-angled triangle problems, including those involving angles-of-elevation-and-depression	• Angles of Elevation and Depression

Properties of Geometrical Figures

Content Descriptor	Lesson Names
Use the enlargement transformation to explain similarity	• Introduction to Similarity • The Enlargement Transformation
Solve problems using ratio and scale factors in similar figures	• Introduction to Scaling • Magnitude • Magnitude as a Ratio • Scaling on Cartesian Planes

Statistics and Probability

Single Variable Data Analysis

Content Descriptor	Lesson Names
Identify everyday questions and issues involving at least one numerical and at least one categorical-variable, and collect data directly from secondary sources	• Primary and Secondary Data • Types of Data • Collecting Data • Sampling
Construct back-to-back stem-and-leaf plots and	• Frequency Polygons

histograms and describe data, using terms including 'skewed', 'symmetric' and 'bi-modal'	• Histograms • Back-to-Back Stem and Leaf Plots • Dot Plots • Measures of Centre in Grouped Data • Shape and Mode • Symmetry and Skew in Data • Effect of Shape on Mean and Median
Compare data displays using mean, median and range to describe and interpret numerical data sets in terms of location (centre) and spread	• Back-to-Back Stem and Leaf Plots • Comparing Data Sets • Comparing Dot Plots • Comparing Histograms
Evaluate statistical reports in the media and other places by linking claims to displays, statistics and representative data	• Evaluating Statistical Graphs: Making our Graph • Evaluating Statistical Graphs: the Shape of the Graph • Evaluating Statistical Reports and Claims: Data Collection • Evaluating Statistical Reports and Claims: Data Reporting

Probability

Content Descriptor	Lesson Names
Calculate relative frequencies from given or collected data to estimate probabilities of events involving 'and' or 'or'	• Relative Frequencies • Using Relative Frequencies • Two-Way Tables • Using Two-Way Tables • Venn Diagrams • Using Venn Diagrams • Advanced Venn Diagrams and Two-Way Tables

Stage 5.2

Number and Algebra

Financial Mathematics

Content Descriptor	Lesson Names
Connect the compound-interest formula to repeated applications of simple-interest using appropriate digital technologies	• Compound Interest Basic Formula • Rearranging the Compound Interest Formula • Compound Interest - Months and Weeks • Rearranging Compound Interest - Months and Weeks • Depreciation

Ratios and Rates

Content Descriptor	Lesson Names
Solve problems involving direct proportion; explore the relationship between graphs and equations corresponding to simple rate problems	• Rates • Direct Proportion • Introduction to Inverse Proportion • Analysing Graphs • Introduction to Graphs • Applying Inverse Proportion

Algebraic Techniques

Content Descriptor	Lesson Names
Apply the four operations to simple algebraic fractions with numerical denominators	• Adding Algebraic Fractions • Subtracting Algebraic Fractions • Multiplying Algebraic Fractions • Dividing Algebraic Fractions • Simplifying Multiplication and Division
Apply the four operations to algebraic fractions with pronumerals in the denominator	• Operations Including Binomial Fractions
Apply the distributive law to the expansion of algebraic expressions, including binomials, and collect like terms where appropriate	• Expanding and the Distributive Law • Expanding Binomial Products • Expanding Cubic Expressions • Expanding Differences of Two Squares • Expanding Perfect Squares
Factorise algebraic expressions by taking out a common algebraic factor	• Factorising with Index Laws • Identifying Algebraic Factors • Identifying Complicated Algebraic Factors
Expand binomial products and factorise monic quadratic expressions using a variety of strategies	• Connecting Expanding and Factorising • Factorisation by Grouping • Factorising by Completing the Square • Factorising Differences of Two Squares • Factorising Perfect Squares • Factorising Quadratic Trinomials

Indices

Content Descriptor	Lesson Names
Apply index laws to algebraic expressions involving integer indices	• Positive and Negative Integer Indices • Applying Index Laws • Simplifying Algebraic Products with Index Laws • Simplifying Algebraic Quotients with Index Laws

Equations

Content Descriptor	Lesson Names
Solve linear equations	• Rearranging and Solving Equations • Solving Using Algebraic Methods • Word Problems • Solving Word Problems • Applications of Linear Equations
Solve linear equations involving simple algebraic fractions	• Non-Integer Solutions to Linear Equation
Solve simple quadratic equations using a range of strategies	• Completing the Square: Method 1 - Using Rearrangement • Completing the Square: Method 2 - Using Differences of Two Squares • Factorising Perfect Squares • Factorising Quadratic Expressions • Grouping • Guess and Check • Solving Quadratic Equations Using Technology • The Quadratic Formula
Substitute values into formulas to determine an unknown	• Rearranging and Solving Equations from Formulas • Using Formulas
Solve problems involving linear equations, including those derived from formulas	• Rearranging and Solving Equations from Formulas • Using Formulas • Word Problems • Solving Word Problems • Applications of Linear Equations
Solve linear inequalities and graph their solutions on a number-line	• Introduction to Inequalities • Rearranging Inequalities • Solving Inequalities • Chained Inequalities
Solve linear simultaneous equations, using algebraic and graphical techniques, including with the use of digital technologies	• Using Elimination to Solve Simultaneous Equations • Using Graphs to Solve Simultaneous Equations • Using Substitution to Solve Simultaneous Equations

Linear Relationships

Content Descriptor	Lesson Names
Interpret and graph linear relationships using the gradient-intercept form of the equation of a straight line	• Linear Patterns and Rules • Plotting Linear Graphs

	• Determining Linear Rules • Drawing Linear Graphs Using the Gradient • Graphing Using Technology - Casio Calculators • Horizontal and Vertical Lines
Solve problems involving parallel and perpendicular lines	• Parallel Lines • Perpendicular Lines

Non-Linear Relationships

Content Descriptor	Lesson Names
Graph simple non-linear relationships, with and without the use of digital technologies, and solve simple related equations	• Circles • Exponential Graphs • Parabolas • Transforming Circles • Transforming Parabolas • Transforming Parabolas - Dilation and Reflection • Transforming Parabolas - Translation
Explore the connection between algebraic and graphical representations of relationships such as simple quadratics, circles and exponentials using digital technologies as appropriate	• Circles • Exponential Graphs • Parabolas • Transforming Circles • Transforming Parabolas • Transforming Parabolas - Dilation and Reflection • Transforming Parabolas - Translation

Measurement and Geometry

Area and Surface Area

Content Descriptor	Lesson Names
Calculate the surface areas of cylinders and solve related problems	• Surface Area of Cylinders
Solve problems involving surface area for a range of prisms, cylinders and composite solids	• Surface Area of Prisms • Surface Area of Complex Solids

Volume

Content Descriptor	Lesson Names
Solve problems involving the volumes of right prisms	• Volume of Rectangular Prisms • Calculating Volume of Triangular Prisms • Calculating Volume of Other Regular and Irregular Prisms • Volume of Composite Solids
Solve problems involving volume for a range of prisms,	• Calculating Volume of Cylinders

cylinders and composite solids	• Volume of Composite Solids

Right-Angled Triangles

Content Descriptor	Lesson Names
Apply trigonometry to solve right-angled triangle problems	• Introduction to Trigonometry • Finding Side Lengths Using Trigonometry • Finding Angles Using Trigonometry
Solve right-angled triangle problems, including those involving direction and angles-of-elevation-and-depression	• Angles of Elevation and Depression • Bearings with Right-Angled Triangles

Properties of Geometrical Figures

Content Descriptor	Lesson Names
Formulate proofs involving congruent-triangles and angle properties	• Conditions for Congruence: ASA, AAS and HL • Conditions for Congruence: SSS and SAS • Working with Congruent Triangles • Congruence of Rhombuses, Trapeziums and Kites • Congruence of Squares, Rectangles and Parallelograms • Angle Proofs • Introduction to Proofs and Logic • Parallelogram and Rhombus Proofs • Rectangle and Square Proofs
Use the enlargement transformations to explain similarity and to develop the conditions for triangles to be similar	• Similarity Tests • The Enlargement Transformation
Apply logical reasoning, including the use of congruence and similarity, to proofs and numerical exercises involving plane shapes	• Angle Proofs • Introduction to Proofs and Logic • Parallelogram and Rhombus Proofs • Rectangle and Square Proofs

Statistics and Probability

Single Variable Data Analysis

Content Descriptor	Lesson Names
Determine quartiles and interquartile-range	• Range • Quartiles • Five Point Summary • Interquartile Range
Construct and interpret box plots and use them to	• Box and Whisker Plots

compare data sets	• Plotting Box and Whisker Plots • Comparing Box and Whisker Plots
Compare shapes of box plots to corresponding histograms and dot plots	• Box and Whisker Plots, Histograms and Dot Plot
Investigate reports of surveys in digital media and elsewhere for information on how data was obtained to estimate population means and medians	• Misleading Reports

Bivariate Data Analysis

Content Descriptor	Lesson Names
Investigate and describe bivariate-numerical-data where the independent-variable is time	• Introduction to Bivariate Data • Bivariate Variables • Introduction to Time Series • Analysing Time Series
Use scatter plots to investigate and comment on relationships between two numerical variables	• Introduction to Bivariate Data • Bivariate Variables • Plotting Using a Calculator • Plotting Using a Spreadsheet • Analysing Trend by Eye • Making Predictions by Eye

Probability

Content Descriptor	Lesson Names
List all outcomes for two-step chance experiments, with and without replacement, using tree diagrams or arrays; assign probabilities to outcomes and determine probabilities for events	• Introduction to Two-Step Experiments • Arrays • Using Arrays • Tree Diagrams • Using Tree Diagrams
Describe the results of two- and three-step chance experiments, with and without replacement, assign probabilities to outcomes, and determine probabilities of events; investigate the concept of independence	• Probabilities and Three-Step Experiments • Arrays • Building Three-Step Tree Diagrams • Probabilities of Unequal Outcomes • Three-Step Experiments and Unequal Outcomes • Tree Diagrams with Unequal Outcomes • Introduction to Independence • Investigating Independent Events using Chance Diagrams
Use the language of 'if ... then', 'given', 'of', 'knowing that' to investigate conditional statements and to identify common mistakes in interpreting such language	• Introduction to Conditional Probability • Calculating Conditional Probabilities using Arrays • Calculating Conditional Probability Using Tree Diagrams

	• Investigating Conditional Probability with Two-Way Tables • Investigating Conditional Probability with Venn Diagrams • Word Problems

Stage 5.3

Number and Algebra

Ratios and Rates

Content Descriptor	Lesson Names
Solve problems involving direct proportion; explore the relationship between graphs and equations corresponding to simple rate problems	• Direct Proportion • Introduction to Inverse Proportion • Applying Inverse Proportion • Introduction to Graphs • Analysing Graphs • Constant Rates • Drawing Constant Rates • Reading Constant Rates • Variable Rates • Rates of Change • Analysing Rates of Change

Algebraic Techniques

Content Descriptor	Lesson Names
Add and subtract algebraic fractions with numerical denominators, including those with binomial numerators	• Adding Algebraic Fractions • Subtracting Algebraic Fractions • Multiplying Algebraic Fractions • Dividing Algebraic Fractions • Simplifying Multiplication and Division • Operations Including Binomial Fractions
Expand binomial products using a variety of strategies	• Expanding Binomial Products
Factorise monic and non-monic quadratic expressions	• Connecting Expanding and Factorising • Factorisation by Grouping • Factorising by Completing the Square • Factorising Differences of Two Squares • Factorising Perfect Squares • Factorising Quadratic Trinomials

Surds and Indices

Content Descriptor	Lesson Names
Define rational and irrational numbers and perform operations with surds and fractional indices	• Real Numbers • Introduction to Surds • Multiplying and Dividing Surds • Simplifying Surds • Adding and Subtracting Surds • Index Laws and Fractional Powers • Expanding Surds • Conjugate and Perfect Square Surds • Rationalising Denominators

Equations

Content Descriptor	Lesson Names
Solve complex linear equations involving algebraic fractions	•
Solve a wide range of quadratic equations derived from a variety of contexts	• Monic Factorisation • Solving Monic Quadratic Equations • Non-Monic Factorisation • Solving Non-Monic Quadratic Equations • The Quadratic Formula • Writing Quadratic Equations
Solve simple cubic equations	•
Rearrange literal equations	• Rearranging and Solving Equations from Formulas • Using Formulas
Solve simultaneous equations, where one equation is non-linear, using algebraic and graphical techniques, including the use of digital technologies	• Graphical Non-Linear Simultaneous Equations

Linear Relationships

Content Descriptor	Lesson Names
Find the midpoint and gradient of a line-segment-interval on the Cartesian plane	• Line Segments on Cartesian Planes • Midpoint of a Line Segment • Gradient of a Line Segment
Find the distance between two points located on the Cartesian plane	• Line Segments on Cartesian Planes • Distance and Pythagoras' Theorem
Sketch linear graphs using the coordinates of two points	• Drawing Graphs Using the Equation
Solve problems using various standard forms of the equation of a straight line	• Rearranging and Solving Equations • Rearranging Linear Equations

Solve problems involving parallel and perpendicular lines	• Parallel Lines • Perpendicular Lines

Non-Linear Relationships

Content Descriptor	Lesson Names
Describe, interpret and sketch parabolas, hyperbolas, circles and exponential functions and their transformations	• Features of Polynomial Graphs • Features of Graphs - Roots • Parabolas • Parabola Transformations • Transforming Parabolas - Dilation and Reflection • Transforming Parabolas - Translation • Multiple Transformations of Parabolas • Circle Graphs • Transforming Circles • Exponential Graphs • Hyperbola Graphs • Hyperbola Graph Transformations • Exponential Graphs
Describe, interpret and sketch cubics, other curves and their transformations	• Features of Polynomial Graphs • Features of Graphs - Roots • Cubics • Cubic Transformations • Quartics

Polynomials

Content Descriptor	Lesson Names
Investigate the concept of a polynomial and apply the factor and remainder theorems to solve problems	• Introduction to Polynomials • Evaluating Polynomials • Adding, Subtracting and Multiplying Polynomials • Dividing Polynomials • The Remainder Theorem • The Factor Theorem • Factorising Cubic Polynomials • Factorising Quartic Polynomials • Solving Polynomials
Apply an understanding of polynomials to sketch a range of curves and describe the features of these curves from their equation	• Factorising Cubic Polynomials • Factorising Quartic Polynomials • Solving Polynomials • Features of Polynomial Graphs • Features of Graphs - Roots

Logarithms

Content Descriptor	Lesson Names
Use the definition of a logarithm to establish and apply the laws of logarithms	• Introduction to Logarithms • Deriving the Laws of Logarithms • Using the Laws of Logarithms • Combining Log Laws • Logarithmic Scales
Solve simple exponential equations	• Solving Exponential Equations

Functions and Other Graphs

Content Descriptor	Lesson Names
Describe, interpret and sketch functions	• Introduction to Functions • Function Notation • Inverse Functions and Transformations

Measurement and Geometry

Area and Surface Area

Content Descriptor	Lesson Names
Solve problems involving the surface areas of right pyramids, right cones, spheres and related composite solids	• Finding the Height of Right Pyramids • Surface Area of Cylinders • Surface Area of Prisms • Surface Area of Right Cones • Surface Area of Right Pyramids • Surface Area of Spheres • Surface Area of Complex Solids • Surface Area of Composite Solids

Volume

Content Descriptor	Lesson Names
Solve problems involving the volumes of right pyramids, right cones, spheres and related composite solids	• Volume of Right Cones • Volume of Right Pyramids • Volume of Spheres • Volume of Composite Solids

Trigonometry and Pythagoras' Theorem

Content Descriptor	Lesson Names
Apply pythagoras-theorem and trigonometry to solve three-dimensional problems in right-angled triangles	• Pythagoras' Theorem in 3D • Trigonometry in 3D

	• 3D Problems Using Right-Angled Triangles
Use the unit circle to define trigonometric functions, and graph them, with and without the use of digital technologies	• The Unit Circle and Radians • Understanding and Graphing Cosine • Understanding and Graphing Sine • Understanding and Graphing Tangent • Comparing Trigonometric Functions
Solve simple trigonometric equations	• Special Triangles: 30-60-90 • Special Triangles: 45-45-90 • Trigonometric Ratios and Complementary Angles
Establish the sine, cosine and area rules for any triangle and solve related problems	• The Sine Rule • Finding Angles Using the Sine Rule • The Sine Rule: The Ambiguous Case • The Cosine Rule • Area of a Triangle: ½ ab sin C

Properties of Geometrical Figures

Content Descriptor	Lesson Names
Formulate proofs involving congruent-triangles and angle properties	• Introduction to Proofs and Logic • Showing Congruence • Angle Proofs
Apply logical reasoning, including the use of congruence and similarity, to proofs and numerical exercises involving plane shapes	• Showing Similarity • Showing Congruence • Scaling and Measurement • Parallelogram and Rhombus Proofs • Rectangle and Square Proofs • Angle Proofs

Circle Geometry

Content Descriptor	Lesson Names
Prove and apply tangent and secant properties of circles	• Tangents, Secants and the Alternate Segment Theorem • Intersecting Chords, Secants and Tangents

Statistics and Probability

Single Variable Data Analysis

Content Descriptor	Lesson Names
Calculate and interpret the mean and standard-deviation of data and use these to compare data sets	• Introduction to Standard Deviation • Investigating the Standard Deviation • Calculating Standard Deviation • Calculating Standard Deviation Using

	Technology • Comparing the Measures of Spread • Using the Standard Deviation to Compare Data Sets

Bivariate Data Analysis

Content Descriptor	Lesson Names
Use information technologies to investigate bivariate-numerical-data sets; where appropriate, students use a straight line to describe the relationship, allowing for variation	• Least Squares Fitting using a Calculator • Least Squares Fitting using a Spreadsheet • Lines of Best Fit by Eye • Making Predictions by Eye
Investigate reports of studies in digital media and elsewhere for information on their planning and implementation	• Analysing Sampling in Reports • Misleading Reports • Sampling Errors • Statistics in Organisations • Types of Sampling: Non-Probability Sampling • Types of Sampling: Probability Sampling • What is Sampling?