Year 7

Cycle 1: Topic

Core knowledge:

- Commutativity, associativity, distributivity
- Place Value Systems
- Rounding: to nearest 10/100/1000, decimal places
- Order of operations
- Positive and negative numbers

Assessment:

- ➔ End of Cycle 1 Assessment
- ➔ Year 7 Autumn PUMA (Progress in Understanding Mathematics) Assessment; 60 Minutes

Cycle 2: Topic

Core knowledge:

- Introduction to algebra: expressions, equations and sequences
- Working with Units
- Properties of 2D shapes
- Measure, draw and identify angles
- Know and use simple angle facts
- Construct triangle and quadrilateral
- Perimeter and area of 2D shapes

Assessment:

- ➔ End of Cycle 2 Assessment
- ➔ Year 7 Spring PUMA (Progress in Understanding Mathematics) Assessment; 60 Minutes

Cycle 3: Topic

Core knowledge:

- Prime numbers and factorisation
- Understand, convert and use all operations with fractions
- Find fraction and percentage of amount
- Convert between fraction, decimal and percentages
- Divide into a given ratio.

Assessment:

- ➔ End of Cycle 3 Assessment
- ➔ Year 7 Summer PUMA (Progress in Understanding Mathematics) Assessment; 60 Minutes

Curriculum Sequencing:

Our all-through curriculum adopts a mastery/spiral approach to promote deep mathematical understanding. We start Year 7 by building on key concepts from KS2 and deepening student understanding of number, while ensuring all our pupils have numerical fluency. Algebra is introduced to encourage students to make further generalisations about the number system.

All core knowledge specified in this overview is contained within the KS3 National Curriculum, subject to some sequencing changes.

Year 8

Cycle 1: Topic

Core knowledge:

- Ratio and proportion
- Forming and solving linear equations: fractional, negative, unknowns on both sides
- Inequalities - forming, solving, representing on a number line
- Finding angles in parallel lines and polygons

Assessment:

- ➔ End of Cycle 1 Assessment
- ➔ Year 8 Autumn PUMA (Progress in Understanding Mathematics) Assessment; 60 Minutes

Cycle 2: Topic

Core knowledge:

- Construct and measure bearings
- Rounding and truncation
- Perimeter and area of parallelograms and trapezia
- Finding area and circumferences of circles
- 3D Shapes and Nets
- Finding surface area and volume of 3D shapes

Assessment:

- ➔ End of Cycle 2 Assessment
- ➔ Year 8 Autumn PUMA (Progress in Understanding Mathematics) Assessment; 60 Minutes

Cycle 3: Topic

Core knowledge:

- Drawing straight line graphs
- Finding the equations of straight line graphs
- Applying conversion and scale factors
- Understand direct and inverse proportion problems
- Univariate data: construct basic statistical diagrams
- Compare mean, median, mode and range
- Bivariate data: using scatter graphs

Assessment:

- ➔ End of Cycle 3 Assessment
- ➔ Year 8 Autumn PUMA (Progress in Understanding Mathematics) Assessment; 60 Minutes

Curriculum Sequencing:

Our all-through curriculum adopts a mastery/spiral approach to promote a deep mathematical understanding. In Year 8, we front-load number and algebra topics that embed multiplicative reasoning and build on algebraic manipulation. Then we expand knowledge of 2D shape to circles/parallelograms/trapezia, introduce 3D geometry and build understanding of probability and data handling. Students are equipped with the knowledge and skills necessary to move into Phase 4.

All core knowledge specified in this overview is contained within the Key Stage 3 National Curriculum, subject to some sequencing changes.

Year 9

Cycle 1: Topic

Core knowledge:

- Simple and compound interest, and repeated percentage change
- Indices: rules of indices with integer values
- Standard Form: operations with very large and very small numbers
- Surds: Decimal Approximation of Roots, rational and irrational numbers, operations with surds
- Solving more complex linear equations and inequalities
- Linear and non-linear sequences

Assessment:

- ➔ End of Cycle 1 Assessment
- ➔ Year 9 Autumn PUMA (Progress in Understanding

Cycle 2: Topic

Core knowledge:

- Quadratic expressions and equations; form, solve and understand graphical representations
- Geometry and Graphs - Coordinates, Linear Graphs, Pythagoras' Theorem, Geometric Reasoning, Angle Sum in a Triangle, Interior & Exterior Angles of Polygons
- Further Geometry - Transformations, Similarity and Congruence, Bearings, Trigonometric Ratios, Exact Values of Trigonometric Ratios

Assessment:

- ➔ End of Cycle 2 Assessment
- ➔ Year 9 Spring PUMA (Progress in

Cycle 3: Topic

Core knowledge:

- Further Algebra - Non-Linear Sequences, Quadratic Expressions and Equations, Factorising Quadratic Expressions, Quadratic Graphs, Solutions to Quadratic Equations
- Probability and Statistics - Probability Scale, Sample Spaces, Discrete and Continuous Data, Calculating and Interpreting Statistical Measures, Grouped and Ungrouped Data

Assessment:

- ➔ End of Cycle 3 Assessment
- ➔ Year 9 Summer PUMA (Progress in Understanding Mathematics) Assessment; 60

Mathematics) Assessment; 60 Minutes	Understanding Mathematics) Assessment; 60 Minutes	Minutes

Curriculum Sequencing:

Our all-through curriculum adopts a mastery/spiral approach to promote a deep mathematical understanding.

In Year 9, students start by applying their algebraic/number skills to compound interest, standard form and basic laws of indices. Students are then ready to be introduced to key concepts such as irrational numbers, representing algebra as graphs, quadratics and trigonometry. This sequencing constantly consolidates and builds on KS3 knowledge, equipping students with the knowledge and skills required to build solid foundations for GCSE content. We finish by deepening skills of data handling and statistical inference.

All core knowledge specified in this overview is contained within the National Curriculum, subject to some sequencing changes.

Year 10 (Foundation)

Cycle 1:

Core knowledge:

- Negative numbers
- Units and decimals
- Using fractions and converting between fractions, decimals and percentages
- Sharing ratio parts and wholes in a ratio; comparing ratios; relating ratios and fractions
- Linear equations and inequalities; brackets, fractions and negatives
- Sequences
- Coordinates and linear graphs: parallel lines

Cycle 2:

Core knowledge:

- Solving simultaneous equations
- Similarity and enlargement
- Proportion and multiplicative reasoning; unitary method and ratio tables
- Compound measures
- Real-life graphs; linking gradient and proportion
- Expanding and factorising quadratic expressions
- Sketching and using quadratic graphs
- Rules of indices
- Standard Form
- Simple and compound interest

Mid-year Assessment (Feb):

➔ x1 GCSE Style Non-Calculator Paper

Cycle 3:

Core knowledge:

- Pythagoras' Theorem, bearings and trigonometry
- Constructing algebraic and geometric proof
- Circles, including arcs and sectors
- Surface area and volume of 3D shapes
- Plans and elevations
- Fundamentals of probability
- Theoretical and Experimental Probability
- Product rule for counting
- Tree diagrams for independent and dependent events

End of Year Assessment:

➔ x1 GCSE Style Calculator Paper

➔ x1 GCSE Style Non-Calculator Paper

Curriculum Sequencing:

Our all-through curriculum adopts a mastery/spiral approach to promote a deep mathematical understanding.

In year 10, our Foundation curriculum starts students by consolidating and deepening key numerical/algebraic units, before being introduced to geometric topics that rely heavily on algebraic and numerical skills. The sequencing ensures students spend time applying key algebraic and geometric skills to real-life and increasingly unfamiliar contexts. The curriculum ensures that students have sufficient time over the year to practice and embed these important skills and concepts.

Links to National Curriculum: All core knowledge specified in this overview is contained within the KS4 National Curriculum, subject to some sequencing changes.

Year 10 (Higher)

Cycle 1:

Core knowledge:

- Surds: expand binomials and rationalise terms
- Simple and compound interest problems; finding the rate, number of years and original amount
- Non-linear sequences; pictorial and with surds
- Similarity and Enlargement
- Parallel and perpendicular lines
- Simultaneous equations; lines and quadratic

Cycle 2:

Core knowledge:

- Multi-step and exact value trigonometry problems
- 3D Pythagoras and trigonometry
- Non-right-angled trigonometry
- Circles, including arcs and sectors
- Surface area and volume of complex 3D shapes: pyramid, cone, sphere, frustum
- Plans and elevations
- Upper and lower bounds

Cycle 3:

Core knowledge:

- Theoretical and Experimental Probability
- Product rule for counting
- Tree Diagrams for independent and dependent events
- Conditional Probability, including Venn Diagrams
- Algebraic Reasoning and Proof
- Manipulating and solving with algebraic fractions

• Represent inequalities on a graph; find regions • Further quadratics: quadratic formula, completing the square, solving on a graph	Mid-year Assessment (Feb): ➔ x1 GCSE Style Non-Calculator Paper	End of Year Assessment: ➔ x1 GCSE Style Calculator Paper ➔ x1 GCSE Style Non-Calculator Paper
Curriculum Sequencing: Our all-through curriculum adopts a mastery/spiral approach to promote a deep mathematical understanding. In year 10, students start by expanding their use of irrational numbers and applying their use of quadratics in graphical and geometric contexts. Across the year, students practice solving complex equations in a variety of contexts, building on their KS3 skills and knowledge. Students then spend time building their sense of statistics, interweaving the complex algebraic manipulation they have developed.		
All core knowledge specified in this overview is contained within the KS4 National Curriculum, subject to some sequencing changes.		

Year 10 L2 Further Maths

Cycle 1:

Core knowledge:

- Matrices - multiplying matrices, describing and combining transformations
- Algebra 1 - simplifying expressions, solving linear equations, expanding brackets, binomial expansion, manipulating surds, product rule for counting

Assessment:

➔ x1 Paper 1 style paper, Non-Calc (only content covered so far)

Cycle 2:

Core knowledge:

- Algebra 2 - factoring quadratics, simplifying algebraic fractions, completing the square
- Coordinate Geometry - parallel/perpendicular lines, equation of a line, intersection of two lines, equation of a circle

Assessment:

➔ x1 Paper 1 style paper, Non-Calc (only content covered so far)

Cycle 3:

Core knowledge:

- Algebra 4 - quadratic equations, the factor theorem, linear and quadratic inequalities
- Geometry 1- Pythagoras' theorem, angle facts, trigonometric functions, graphs and identities

Assessment:

➔ x1 full Paper 1
➔ x1 Paper 2 style paper, Calc (only content covered so far)

Curriculum Sequencing:

Our all-through curriculum adopts a mastery/spiral approach to promote a deep mathematical understanding.

Our L2 Further Maths curriculum builds and deepens content knowledge from the GCSE course across the year. The sequencing first introduces students to new content that requires little prior knowledge, before building on the GCSE Higher content that it runs alongside. By Cycle 3, students are ready to explore more A Level content, preparing them for taking an A-Level in Maths and Further Maths.

All core knowledge specified in this overview is contained within the AQA L2 Further Maths specification, which can be found here: https://filestore.aqa.org.uk/resources/mathematics/specifications/AQA-8365-SP-2018.PDF

Year 11 Foundation

Cycle 1:

Core knowledge:

Algebraic and Geometrical Reasoning:

- Algebraic Reasoning - develop simple mathematical arguments, show that two expressions are equivalent
- Vectors - use of column vectors, adding/subtracting, multiplying by a scalar
- Constructions and Loci - use rulers, protractors and compasses to construct perpendicular bisectors, angle bisectors, triangles and loci
- Congruence - recognise congruent triangle and prove congruence using SSS, ASA, AAS and RHS

Assessment:

➔ Mini mocks - x1 GCSE Foundation Calculator style paper

Cycle 2:

Core knowledge:

Statistics:

- Basic Statistics - calculate averages for grouped and ungrouped data, use summary statistics to compare datasets
- Sampling - understand and describe different types of sampling
- Representing Data - choosing appropriate pictorial representation, interpret and construct graphs for time series data
- Scatter Graphs - plot and use scatter graphs, interpolate and extrapolate data to make estimates, identify correlation and outliers

Assessment:

➔ Mock Examinations; x3 GCSE Foundation style papers (x1 Non-Calculator, x2 Calculator)

Cycle 3 - Revision

In the final cycle before GCSEs start, lessons will focus on revision. This may be done in a range of ways:

- Reteaching content based on prior assessment results
- Timed exam practice
- Past papers

Assessment:

➔ Formal GCSE Examinations

Curriculum Sequencing: Our all-through curriculum adopts a mastery/spiral approach to promote a deep mathematical understanding. In year 11, our Foundation curriculum builds on their improved application of number and algebra, starting with abstract algebraic proof. Students then deepen their knowledge of geometry, before spending time developing and deepening their handling of data and statistical reasoning. Revision and re-teaching for formal examinations will be determined via mock examinations and end-of-unit assessments.		
All core knowledge specified in this overview is contained within the KS4 National Curriculum, subject to some sequencing changes.		

Year 11 Higher

Cycle 1:

Core knowledge:

Geometrical Reasoning:

- Circle Theorems
- Vectors and Vector Proofs - use of column vectors, adding/subtracting, multiplying by a scalar, using to prove geometric arguments
- Further Transformations - enlarging shapes by fractional and negative scale factors, combining transformations
- Constructions and Loci - use rulers, protractors and compasses to construct perpendicular bisectors, angle bisectors, triangles and loci
- Congruence - recognise congruent triangle and prove congruence using SSS, ASA, AAS and RHS

Proportional Reasoning:

- Direct and Inverse Proportion - solving problems involving direct and/or inverse proportion, including quantities proportional to a power or root of another
- Compound Measures - speed, density, pressure
- Gradient and Area Under a Curve - estimate gradients of curves and areas under

Cycle 2:

Core knowledge:

Statistical Reasoning:

- Statistics - construct and interpret histograms, cumulative frequency diagrams and boxplots, compare distributions using measures of spread and location
- Scatter Graphs - plot and use scatter graphs, interpolate and extrapolate data to make estimates, identify correlation and outliers

Functions:

- Functions - use of function notation, finding inverses, composite functions
- Recurrence Relations - use iterative processes and recurrence formulae

Algebraic Reasoning:

- Non-Linear Graphs - polynomial, reciprocal, exponential and trigonometric graphs
- Algebraic Proof - develop mathematical arguments and use algebra to construct proofs
- Further Quadratics - factorise quadratics with a > 1, completing the square, sketching quadratic

Cycle 3:

In the final cycle before GCSEs start, lessons will focus on revision. This may be done in a range of ways:

- Reteaching content based on prior assessment results
- Timed exam practice
- Past papers

Assessment:

➔ Formal GCSE Examinations

graphs, interpret gradients and areas under real-world graphs Assessment: ➔ Mini Mock Examinations; x1 GCSE Higher Calculator Paper	functions Assessment: ➔ Mock Examinations; x3 GCSE Higher style papers (x1 Non-Calculator, x2 Calculator)	

Curriculum Sequencing:

Our all-through curriculum adopts a mastery/spiral approach to promote a deep mathematical understanding.

In year 11, students are led through geometrical, proportional and statistical reasoning topics, all of which are heavily reliant on their heightened algrebaic manipulation. Functions and other non-linear graphs provide the final deepening of algebraic understanding, before time is given for revision and re-teaching for formal examinations, determined via mock examinations and end-of-unit assessments.

All core knowledge specified in this overview is contained within the KS4 National Curriculum, subject to some sequencing changes.

Year 11 L2 Further Maths

Cycle 1:

Core knowledge:

- Geometry 2 - area of a triangle, sine and cosine rule, lines and planes in three dimensions
- Algebra 3 - functions, composite functions, graphs of functions, inverse functions

Assessment:

➔ x1 full Paper 1, Non-Calc
➔ x1 Paper 2 style paper, Calc (only content covered so far)

Cycle 2:

Core knowledge:

- Algebra 4 - simultaneous equations, indices, algebraic proof, sequences
- Calculus - differentiation, tangents and normals, stationary points

Assessment:

➔ x1 full Paper 1, Non-Calc
➔ x1 full Paper 2, Calc

Cycle 3 - Revision

In the final cycle before GCSEs start, lessons will focus on revision. This may be done in a range of ways:

- Reteaching content based on prior assessment results
- Timed exam practice
- Past papers

Assessment:

➔ Formal L2 Further Maths examination

Curriculum Sequencing:

Our all-through curriculum adopts a mastery/spiral approach to promote a deep mathematical understanding.

Our L2 Further Maths curriculum in Year 11 builds and deepens content knowledge from the GCSE course, as well as introducing students to some more complex topics. Once pupils have developed their GCSE knowledge in geometry, they are led through advanced algebraic skills involving functions, proofs and calculus. This increases pupil understanding at GCSE, and prepares them for taking an A-Level in Maths and Further Maths.

All core knowledge specified in this overview is contained within the AQA L2 Further Maths specification, which can be found here:
https://filestore.aqa.org.uk/resources/mathematics/specifications/AQA-8365-SP-2018.PDF

Year 12 A Level Maths

Cycle 1:

Pure Maths Core knowledge:

- Algebraic Expressions, Equations and Inequalities
- Quadratics and the discriminant
- Algebraic Methods and proofs
- Binomial Expansion
- Straight-Line Graphs and linear/quadratic models
- Circle problems
- Vectors with geometric problems and modelling
- Graphs and Transformations

Applied Maths Core knowledge:

- Sampling Methods
- Statistical Measures - Central Tendency and

Cycle 2:

Pure Maths Core knowledge:

- Introduction to differentiation: using the gradient function and modelling
- Integration: indefinite, definite and area under curves
- Trigonometric ratios and transforming trigonometric graphs
- Trigonometric identities and equations

Applied Maths Core knowledge:

- Binomial Distribution - Modelling Using the Binomial Distribution, Finding Probabilities for Repeated Independent Events
- Hypothesis Testing for

Cycle 3:

Pure Maths Core knowledge:

- Exponentials functions and modelling
- Laws of and solving logarithms
- Natural logarithms
- Proofs and Partial Fractions
- Functions and mappings
- Graphing inverse and composite functions
- The modulus function
- Combining transformations

Applied Maths Core knowledge:

- Modelling problems, graphical problems
- Moments - uniform bodies, tilting problems, variable centre of mass.

Spread, Standard Deviation and Variance • Statistical Diagrams - Histograms, Cumulative Frequency, Reading and Interpreting Diagrams • Basic principles of mechanics - modelling assumptions, components. • Constant acceleration formulae - SUVAT - involving gravity. • Newton's Second Law of Motion - Pulleys, Connected Particles, Reaction Forces Assessment Point 1: ➔ Pure Maths Baseline assessment for course suitability in late September ➔ Applied Content is NOT covered in Assessment Point 1, course suitability is determined through the Pure Mathematics assessment ONLY. In-class Topic Assessments will be used for in-cycle assessment.	PMCC - Hypothesis Testing for Positive/Negative Correlation of a Population from a Sample • Probability - Laws of Probability, Probability Diagrams, Two Way Tables, Venn Diagrams • 2D Vectors - component forms, angles above/below axes • Variable Acceleration - Differentiating, Integrating, solving problems involving graphs. Assessment Point 2: ➔ Adjusted A/S Past/Mock Pure Mathematics Paper including questions only on topics covered. ➔ One Complete A/S Past/Mock Paper on All Statistics Content	• Probability Distributions - Tabular Distributions, Probability Mass Functions • Correlation and Linear Regression - Product Moment Correlation Coefficient, Equation of Regression Line, Interpreting Coefficients Assessment Point 3: ➔ End of Year Assessment - Full set of A/S Past/Mock Papers for Pure and Applied.
Curriculum Sequencing: Due to the intertwining nature of Mathematics at this level and the higher prerequisite requirements, the sequencing is broadly centred around high-level concepts that allow students to revisit the skills		

and knowledge they already have before building on these and applying them in new contexts.

In some specific cases, the sequencing has been adapted to allow parallel courses to run smoothly and to provide pupils studying multiple strands of Mathematics with the most efficient and practical sequence through their learning. For example, Calculus content on A-Level Mathematics is moved forward in the course to support pupils sitting A-Level Further Mathematics in parallel.

All core knowledge specified in this overview is contained within the Pearson Edexcel A Level Mathematics (2017) course:
https://qualifications.pearson.com/en/qualifications/edexcel-a-levels/mathematics-2017.html

Year 13 A Level Maths

Cycle 1:

Pure Maths Core knowledge:

- Radian measure
- Inverse and reciprocal trigonometric functions
- Addition & double angle formulae
- Differentiating all functions
- Product, chain and quotient rule
- Differential equations
- Integrating all functions
- Integrating by substitution and parts
- Trapezium rule

Applied Maths Core knowledge:

- Friction - horizontal plane, inclined planes, involving components
- Projectiles - horizontal projection, projection at any angle, general projectile formulae.
- Application of Forces -

Cycle 2:

Pure Maths Core knowledge:

- Parametric equations
- Arithmetic & geometric sequences
- Further binomial expansion
- Binomial expansion with partial fractions
- Numerical methods
- Vectors

Applied Maths Core knowledge:

- Normal Distribution - Finding Probabilities, Inverse Normal Distribution, Finding Unknown Parameters.
- Hypothesis Testing for 'p' for a Binomial Distribution, Finding Critical Values, One-Tailed Tests, Two-Tailed Tests
- Normal Distribution - Standard Normal Distribution, Approximating

Cycle 3:

Core knowledge:

- Revision for A-Level examinations

Assessment:

Formal Examinations for End of Course

static particles, rigid bodies, dynamics & inclined planes. • Further kinematics - differentiating vectors, vectors in 3D, integrating vectors Assessment Point 5: ➔ Full set of A/S Past/Mock Papers	a Binomial Distribution with Large n, Hypothesis Testing for the Mean of a Normal Distribution. Assessment Point 6: ➔ Full set of A Level Past/Mock Papers	

Curriculum Sequencing:

Due to the intertwining nature of Mathematics at this level and the higher prerequisite requirements, the sequencing is broadly centred around high-level concepts that allow students to revisit the skills and knowledge they already have before building on these and applying them in new contexts.

In some specific cases, the sequencing has been adapted to allow parallel courses to run smoothly and to provide pupils studying multiple strands of Mathematics with the most efficient and practical sequence through their learning. For example, Calculus content on A-Level Mathematics is moved forward in the course to support pupils sitting A-Level Further Mathematics in parallel.

All core knowledge specified in this overview is contained within the Pearson Edexcel A Level Mathematics (2017) course:
https://qualifications.pearson.com/en/qualifications/edexcel-a-levels/mathematics-2017.html

Year 12 Futher Maths

Cycle 1:

Core knowledge:

- Imaginary and complex numbers
- Multiplying complex numbers
- Complex conjugates
- Solving quadratic, cubic and quartic equations
- Modulus-argument form
- Argand Diagrams and Loci
- Matrix multiplication
- Determinants
- Inverses of 2x2 and 3x3 matrices
- Solving systems of simultaneous equations
- Linear transformations in 2- and 3-Dimensions
- Algorithms, including Bubble and Quick sort
- Graphs and Networks, including Graph theory
- Route Inspection
- Linear Programming

Assessment Point 1:

➔ Baseline assessment for course suitability in late September

Cycle 2:

Core knowledge:

- Sums of natural, square and cube numbers
- Roots of Polynomials
- Proof by Induction
- Equation of a line and plane in 3-dimensions in vector form
- Scalar Product
- Calculating angles and perpendiculars between lines and planes
- Volumes of Revolution, including modelling
- Critical Path Analysis
- Discrete Random Variables
- Binomial distribution
- Poisson Distribution
- Hypothesis Testing
- Contingency Tables

Assessment Point 2:

➔ Adjusted AS Past/Mock Paper including questions only on topics covered.

Cycle 3:

In the final cycle before AS Examinations start, lessons will focus on revision. This may be done in a range of ways:

- Reteaching content based on prior assessment results
- Timed exam practice
- Past papers

Post examinations, students will begin to study the following Year 13 content:

- De Moivre's Theorem
- Roots of Unity
- The Planarity Algorithm
- Floyd's Algorithm

Assessment Point 3:

➔ Formal AS Examinations

Curriculum Sequencing:

Due to the prerequisite content required from Mathematics A Level, we have carefully considered the sequencing of this course and adapted it to provide pupils with the most efficient and practical sequence through their learning.

Students will be introduced to key concepts, such as calculus, parallel to the Mathematics A Level to deepen and develop the fundamental skills required to thrive.

All core knowledge specified in this overview is contained within the Pearson Edexcel A Level Further Mathematics (2017) course:

https://qualifications.pearson.com/content/dam/pdf/A%20Level/Mathematics/2017/specification-and-sample-assesment/as-l3-further-mathematics-specification.pdf

Year 13 Further Maths

Cycle 1:

Core knowledge:

- Maclaurin Series
- Hyperbolic functions, including inverse functions, graphs and identities
- Improper Integrals
- Mean value of a function
- Differentiating and Integrating Inverse Trigonometric Functions, Hyperbolic Functions and Partial Fractions
- The Simplex Algorithm
- Critical Path Analysis
- Nearest Neighbour Algorithm

Assessment Point 5:

Full AS Style Examination

- ➔ Paper 1: Core Pure
- ➔ Paper 2: Decision 1 and Further Statistics 1

Cycle 2:

Core knowledge:

- First Order Differential Equations
- Second Order Homogeneous and Non-homogeneous Differential Equations
- Modelling with first order differential equations
- Simple Harmonic Motion
- Damped and Forced Harmonic Motion
- Coupled first-order simultaneous differential equations
- Volumes of Revolutions, including parametric curves
- Polar coordinates
- Geometric and negative binomial distributions
- Hypothesis testing
- The central limit theorem

Assessment Point 6:

Full A Level Style Examination

- ➔ Paper 1: Core Pure

Cycle 3:

In the final cycle before A Level Examinations start, lessons will focus on revision. This may be done in a range of ways:

- Reteaching content based on prior assessment results
- Timed exam practice
- Past papers

Assessment:

- ➔ Formal A Level Examinations

	➔ Paper 2: Core Pure ➔ Paper 3: Further Statistics 1 ➔ Paper 4: Decision 1	

Curriculum Sequencing:

Due to the prerequisite content required from Mathematics A Level, we have carefully considered the sequencing of this course and adapted it to provide pupils with the most efficient and practical sequence through their learning.

Students will be introduced to key concepts, such as calculus, parallel to the Mathematics A Level to deepen and develop the fundamental skills required to thrive.

All core knowledge specified in this overview is contained within the Pearson Edexcel A Level Further Mathematics (2017) course: https://qualifications.pearson.com/content/dam/pdf/A%20Level/Mathematics/2017/specification-and-sample-assesment/a-level-l3-further-mathematics-specification.pdf

Year 12 Mathematical Studies

Cycle 1:

Core knowledge:

- Recap of GCSE content - linear graphs, circles, Pythagoras' Theorem, similarity and limits of accuracy, substitution into formulae
- Collecting and Sampling Data - understand and use different sampling techniques (random and non-random)
- Percentages - calculating compound interest, solving problems with decay or depreciation
- Taxation - calculate tax, national insurance and net pay for different annual salaries
- Fermi Estimates - use assumptions to make mathematically sensible estimates

Assessment Point 1:

➔ Baseline assessment for course suitability in late September

Cycle 2:

Core knowledge:

- Types of Data
- Representing Data Numerically 1 - calculate measures of location and spread, percentiles, quartiles, deciles, standard deviation and variance of listed data
- Representing Data Diagrammatically 1 - construct and interpret stem and leaf diagrams and box plots, compare distributions of data
- Interest Rates - calculate and solve problems involving AER and APR
- Critical Path Analysis - construct activity networks, calculate early/late times and construct Gantt charts for compound projects

Assessment Point 2:

➔ One Past/Mock Paper 1 style paper assessing content covered thus far

Cycle 3:

Core knowledge:

- Solutions to Financial Problems - currency exchange, inflation, student loans
- Critical Analysis - critically analyse data and statistics used in media/marketing etc, critique and correct mathematical arguments
- Representing Data Diagrammatically 2 - construct and interpret histograms and cumulative frequency diagrams
- Representing Data Numerically 2 - calculate and identify statistical measures from histograms and cumulative frequency diagrams

Assessment Point 3:

➔ One Past/Mock Paper 1

Curriculum Sequencing: The course starts by consolidating core numerical and Mathematical skills from previous Key Stages that are essential for the course. The course content is broadly arranged into high-level concepts where essential skills are learned and practiced first and then applied to contextual, often real-world, problems. The content is sequenced to support pupils building their critical skills such as estimating, interpreting and critiquing across all of the high-level concepts such as financial problems, critical paths, statistical analysis, probability and risk/cost-benefit analysis.		
All core knowledge specified in this overview is contained within the AQA L3 Mathematical Studies specification, which can be found here: https://filestore.aqa.org.uk/resources/mathematics/specifications/AQA-1350-SP-2014.PDF		

Year 13 Mathematical Studies

Cycle 1:

<u>Core knowledge:</u>

- Probability - calculate probabilities of events, understand and interpret venn diagrams and tree diagrams, calculate the probability of combined events, use the conditional probability formula, calculate expected values
- Cost Benefit Analysis - use probabilities to calculate expected costs and benefits of decisions

Assessment Point 4:

➔ One Past/Mock Paper 1

➔ One Past/Mock Paper 2 style paper on content covered thus far.

Cycle 2:

<u>Core knowledge:</u>

- Graphical Representation - create and interpret graphs in financial contexts
- Personal finance - VAT, mortgages, repayment of credit

Once core content is covered, lessons will progress to recaps and revision.

Unseen preliminary material is released in March from AQA. Content teaching will then be based on this. Pupils will critically analyse the data given in the Preliminary Material in preparation for doing so in their formal examination.

Assessment Point 5:

➔ One Past/Mock Paper 1

➔ One School-Constructed Paper 2 based on Preliminary Material

Cycle 3 - Revision

In the final cycle before formal examinations start, lessons will focus on revision. This may be done in a range of ways:

- Reteaching content based on prior assessment results
- Timed exam practice
- Past papers

Assessment:

➔ Formal Level 3 examinations

Curriculum Sequence: The course content is broadly arranged into high-level concepts where essential skills are learned and practiced first and then applied to contextual, often real-world, problems. The content is sequenced to support pupils building their critical skills such as estimating, interpreting and critiquing across all of the high-level concepts such as financial problems, critical paths, statistical analysis, probability and risk/cost-benefit analysis.		
All core knowledge specified in this overview is contained within the AQA L3 Mathematical Studies specification, which can be found here: https://filestore.aqa.org.uk/resources/mathematics/specifications/AQA-1350-SP-2014.PDF		

Year 12 Statistics

Cycle 1:

Core knowledge:

- Statistical Measures, Variance & Standard Deviation, Outliers, Reading and Interpreting Diagrams, Misrepresentation.
- Probability, Sample Spaces, Probability Diagrams,Conditional Probability, Mutually Exclusive and Independent Events
- Random Variables, Expectation, Probability Distributions, Binomial Distribution
- Correlation, Linear Regression, Spearman's Rank Correlation Coefficient, PMCC

Assessment Point 1:

➔ Baseline assessment for course suitability in late September

Cycle 2:

Core knowledge:

- Continuous Random Variables, Normal Distribution, Finding Unknown Parameters, Sampling Methods, Suitability of Sampling Methods, Sampling Distribution of the Mean of a Normal, Normal Approximation to a Binomial Distribution with Large n,
- Hypothesis Testing - PMCC, Spearman's Rank, Sample Mean (Normal), Proportion, Contingency Tables, Association

Assessment Point 2:

➔ Reduced A/S Past/Mock Paper 1

Cycle 3:

Core knowledge:

- Sign Tests - One-Sample Sign Tests, One-Sample WIlcoxon Signed-Rank Test, Wilcoxon Rank-Sum Test, Paired Sign Test, Paired Wilcoxon Signed-Rank Test.

Assessment Point 3:

➔ Full set of two A/S Statistics Past/Mock Papers

Curriculum Sequencing:
All core knowledge specified in this overview is contained within the KS3 National Curriculum, subject to some sequencing changes.

Year 13 Statistics

Cycle 1:

Core knowledge:

- Bayes Theorem
- Central Limit theorem
- Confidence intervals for the mean of a normal distribution with known and unknown variance.
- Hypothesis tests for the mean of a large sample and with unknown variance
- Power of a hypothesis test
- Exponential distribution
- Hypothesis test for the difference between population means

Assessment Point 4:

➔ Full AS Mock papers

Cycle 2:

Core knowledge:

- Expected frequencies for binomial, Poisson, Normal, Exponential, R and U distributions
- Hypothesis testing for goodness of fit to distributions
- Analysis of Variance
- Paired sample t test
- Cohen's d

Assessment Point 5:

➔ Full A Level Mock papers

Cycle 3:

In the final cycle before formal examinations start, lessons will focus on revision. This may be done in a range of ways:

- Reteaching content based on prior assessment results
- Timed exam practice
- Past papers

Assessment:

➔ Formal A Level examinations

Curriculum Sequencing:

Due to the intertwining nature of Mathematics at this level and the higher prerequisite requirements, the sequencing is broadly centred around high-level concepts that allow students to revisit the skills and knowledge they already have before building on these and applying them in new contexts. For example, the Central limit theorem needs to be covered before moving onto confidence intervals and hypothesis testing for large samples. Some sections of the A Level course are covered in Cycle 3 of Y12 allowing part of Cycle 2 in Y13 to be left for revision based on individual student's progress.