A Level Mathematics Learning Journey

Revision + Examination

Further Probability
- Arcs and sectors of circles
- Proof in algebra and geometry **and equation of a circle and the tangent to a circle**
- **Rates of change and gradients of chords and tangents**

Normal Distribution
- **Area under a graph and interpreting in context**

Further Hypothesis Testing
- **Functions – will be taught at every appropriate opportunity (e.g. algebraic notation, rearranging formulae, linear graphs, mappings etc) and then brought together as a topic here**

Moments
- Graphical solutions of equations
- Quadratic equations; roots of functions, solving by factorising, **complete the square, quadratic formula, quadratic inequalities**
- Cubic/reciprocal graphs, **exponential graphs, trig graphs, transformations of graphs**
- **Quadratic Simultaneous equations**

Statics + Dynamics
- Expand/factorise binomials and triple brackets
- **Algebraic fractions**

Equilibrium + Resolving
- Limits of accuracy **and upper and lower bounds**
- **Trigonometry in all triangles**

Projectiles
- Solve problems involving compound units
- Equations of parallel **and equations of perpendicular lines**
- **braic arguments**
- **braic proof and recurring decimal proof**

3D Vectors
- Vectors and **vector proofs**
- Coordinates (including midpoints, coordinate problems)
- Using angle and shape facts to derive results **and circle theorems**

Numerical Methods
- Similar shapes
- Exploring trigonometric ratios with 30-60-90 and 45-45-90 triangles of varying dimensions (*not sin,cos,tan)
- Trigonometry and Pythagoras in right angled triangles, **3-D trigonometry and Pythagoras**

Parametric + Implicit
- Calculations with and rules of indices and **fractional indices**
- Indices and Surds

Differential Equations
- Calculations with standard form
- Repeated change and percentage/fraction problems
- Standard non-linear sequences **and recurrence relations and iteration**

Proof by Contradiction
- Represent and describe distributions and **histograms, cumulative frequency and box plots**
- Identify misleading graphs
- Correlation, using lines of best fit and interpolation/ extrapolation

Partial Fractions
- Combine transformations
- Enlargement **and negative scale factors of enlargement.**

Further Integration
- Use known angle and shape facts to obtain simple proofs
- Transformations (translation, rotation, reflection) and combined transformations
- Combined events, including tree diagrams **and conditional probability**

Further Differentiation
- Set notation & Venn diagrams
- Populations and samples; **capture/recapture**
- Linear simultaneous equations
- Graphical solutions to simultaneous linear equations
- Listing and **the product rule for counting**
- Theoretical and experimental probability
- Quadratic and non-linear graphs and links with quadratic equations
- Construct and solve equations and inequalities

Radians, Arcs + Sectors
- Expansion incl. double brackets
- Sequences including arithmetic & geometric
- Factorisation incl. double brackets and solving simple quadratic equations
- Linear graphs
- Algebraic manipulation (rearranging and **advance rearranging**)

Sequences + Series
- Relationships and Proportionality
- Direct and inverse proportion
- Variation and **variation with powers (direct and inverse proportion with algebra)**

Further Trigonometry
- Further construction and loci
- Triangles and quadrilaterals (angles on diagonals)
- Bearings
- Congruence and similarity
- Angles in polygons

YEAR 13

Modulus + Transformations
- Pythagoras – 2-D and **3-D Pythagoras**
- Volume and surface area of prisms, composite solids, pyramids, cones and spheres (with formula **and without for pyramids and cones.**) and mass, density and volume
- 3-D shapes & their nets; plans and elevations
- Circumference and area of a circle

Functions
- Rounding, significant figures and estimation
- Constructing pie and interpreting pie charts
- Ratio and Rate incl. speed, distance, time and pressure

Proof
- Ratio – problem solving
- Maps and scales
- Proportional Reasoning
- Ratio – equivalence and simplifying
- Scatter graphs, basic correlation and drawing lines of best fit
- Compare two data sets including stem-and-leaf diagrams
- Probability
- Averages from grouped data

Sampling + Data
- Find unknown angles (incl. parallel lines)
- Draw accurate triangles and quadrilaterals Measuring lengths NS
- Conversion between length units and between area units
- Area of trapeziums
- Areas and perimeters of composite figures

Probability + Binomial Distribution
- FDP of amounts
- Amounts as percentages

Hypothesis Testing
- Percentage Increase and Decrease
- Reverse Percentages

Binomial Expansion

Forces + Motion
- Cartesian coordinates and an introduction to functions

Kinematics
- Linear sequences: nth term
- Linear equations
- Expressions and equations from real- world situations
- Formulate and evaluate expressions

Vectors
- Standard form (Powers of 10 NS)

Exponentials + Logarithms
- Prime Factorisation to find LCM, HCF, squares, cubes
- Basic laws of indices
- Basic introduction to Surds and four operations
- Primes and indices

Trigonometry
- Interpret and compare statistical representations
- Percentage of an amount
- Convert FDP
- Proportional Reasoning / Proportion
- Averages and the range incl. Frequency tables
- Find the whole, given the part an
- Ordering FDP & equivalence

Graphs + Transformations
- Draw, measure and name angles Time
- Find unknown angles (straight lines, at a point, vertically opposite, triangles and quadrilaterals)

Differentiation
- Properties of triangles and quadrilaterals
- Equivalent fractions and ordering Factors NS
- Adding & subtracting same denominators
- Adding & subtracting different denominators
- Divide fractions
- Introduction to fractions NS
- Mixed numbers & improper fractions
- Fraction of a quantity & multiplying fractions

Integration
- Negative Numbers
- Substitution
- Sequences (term-to-term, not nth term)
- Order of operations
- Simplify algebraic expressions

Coordinate Geometry
- Calculate the mean
- Venn Diagrams and sets
- Area of rectangles, triangles and parallelograms

Inequalities + Set Notation
- Rounding and Estimating
- Factors, HCF, multiples, LCM
- Multiply and divide (including decimals)
- Perimeter

Quadratics
- Place value (including decimals) inc. multiplying and dividing by positive powers of 10.
- Add and subtract (including decimals) Number bonds NS
- Conversion between metric units of measurements

Indices + Surds
- Construct statistical diagrams incl. an intro to Venn Diagrams
- Collecting and organising data

YEAR 12