HIGHER: Key Stage 4 Maths Curriculum

Long term plan Year 9

Autumn 1	
Chapter 1: Calculations	**Chapter 2: Expressions**
Assessment: Chapter Test A	**Assessment:** Chapter Test A
Builds Upon: • Order integers, decimals and negative numbers • Round to nearest 10,100, 1000 • Round to decimal places • Add/Subtract numbers with decimals • Multiply numbers with decimals • Divide using the algorithm (by hand) • Divide decimal numbers using the algorithm • Order of Operations (BIDMAS)	**Builds Upon:** • Apply algebraic notation to write simple expressions • Simplify expressions by collecting like terms (addition and subtraction) • Apply the Index laws (multiplication, division) • Apply the Index laws (fractional, negative and zero) • Expanding single brackets Expand two single brackets and simplify • Factorise single brackets
Introduces: • Rounding to significant figures • Estimate by rounding to one significant figure • Add/Subtract negative numbers • Multiply/Divide negative numbers • Manipulate of operations involving decimals (using one calculation to find the answer to another)	**Introduces:** • Simplifying algebraic fractions Add/Subtract algebraic fractions • Multiplying algebraic fractions • Divide algebraic fractions

Autumn 2

Chapter 3: Angles and Polygons

Assessment: Chapter Test A

Builds Upon:

- Measure and describe angles as acute, right, obtuse or reflex
- Describe and apply the properties of angles around a point (sum of 360 degrees)
- Describe and apply the properties of angles on a straight line (sum of 180 degrees)
- Derive and apply the sum of angles in triangles and quadrilaterals
- Calculate interior angles in polygons (using angles in a triangle)
- Deduce and apply the sum of interior angles of any polygon and use (n-2)*180

Introduces:

- Calculate bearings based on angles around a point
- Describe and apply the equivalence of vertically opposite angles
- Identify and apply the properties of angles in parallel lines (alternate, corresponding and co-interior rules)
- Apply knowledge of special triangles to derive angles
- Solve problems involving all of the above (providing reasons)
- Identify similarity between shapes
- Calculate and apply scale factors
- Identify and describe types of congruence (SSS, SAS, ASA, RHS)
- Apply similarity and congruence to problem solve
- Calculate and apply scale factors for area and volume from the linear scale factor
- Calculate exterior angles in polygons
- Solve problems involving angles in polygons

Spring 1

Chapter 4: Handing Data 1

Assessment: Chapter Test A

Builds Upon:

- Construct and interpreting bar charts
- Construct and interpret two way tables
- Calculate the mean, mode and median of listed data
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Introduces:

- Construct and interpret pie charts
- Calculate the mean, mode and median of data in a frequency table
- Understand the advantages and disadvantages of different averages
- Calculate the range and interquartile range
- Identify outliers and explain their effect on averages/ranges
- Compare distributions using averages and range
  Construct frequency tables for grouped data
- Construct and interpret Histograms with equal widths
- Construct and interpret Histograms with unequal class widths
- Calculate frequency density

Spring 2	
Chapter 5: Fractions Decimals and Percentages	**Chapter 6: Formulae & Functions**
Assessment: Chapter Test A	**Assessment:** Chapter Test A
Builds Upon: • Name and construct fraction diagrams • Convert between improper fractions and mixed numbers • Identify and create equivalent fractions • Simplifying fractions • Write fractions as decimals • Order fractions and mixed numbers • Calculate fractions of amounts • Calculating percentages of amounts • Multiplying fractions, including simplifying (cancelling common factors) • Multiplying fractions and mixed numbers • Dividing fractions and mixed numbers • Adding and subtracting fractions with the same denominator • Adding and subtracting fractions with different denominators • Adding and subtracting mixed numbers • Solve worded fraction problems • Write percentages as fractions and decimals • Converting between fractions, decimals and percentages • Compare using < or > and order fractions, decimals and percentages	**Builds Upon:** • Write formulae from sentences • Substitute to solve (positive and negative numbers) • Use standard formulae (e.g. kinematics) • Simplify expressions • Expand single brackets • Simplify algebraic fractions
Introduces: • Convert recurring decimals to fractions • Solving complex worded problems with a mixture of fractions, decimals and percentages	**Introduces:** • Change the subject of formulae • Construction mapping diagrams for functions • Write the inverse of a function f(x) → $f^{-1}(x)$ • Write and solve composite functions • Identify expressions, equations, inequalities, formulae and identities • Prove identities and find missing values Prove statements to be true or false • Expand double brackets • Factorise quadratic expressions • Distinguishing between, and factorise : $x^2 - 4$ and $x^2 - 4x$ • Complete the difference of two squares

Summer 1

Chapter 7: Working in 2D

Assessment: Chapter Test A

Builds Upon:

- Accurately measure and draw line segments and angles
- Bearings on a map
- Area of quadrilaterals (squares/rectangles/parallelograms/trapeziums) and triangles
- Area of compound 2D shapes

Introduces:

- Apply scale to drawings -find distances on a map and in real life
- Sketching lines such as y = -2, y = x etc.
- Completing transformations:
    - Translations
    - Reflections
    - Rotations from origin and a point
    - Enlargements (scale factor greater than 1, between 0 and 1, & negative)
    - Enlargements from a point
    - Combinations of Transformations
- Describing transformations

Summer 2	
Chapter 8: Probability	**Chapter 9: Estimation and Approximation**
Assessment: Chapter Test A	**Assessment:** Chapter Test A
Builds Upon: • Understand the probability scale • Construct sample space diagrams List sample space of an experiment • Write experimental and theoretical probabilities as fractions	**Builds Upon:** • Round to appropriate degree of accuracy (10,100,1000s, dps, sfs) • Use approximation to make estimates • Check calculations using approximation and estimation • Use common calculator functions • Convert units of length, mass, volume, capacity, time and area • Calculate the upper and lower bounds of rounded values
Introduces: • Write experimental and theoretical probabilities as relative frequencies • Calculate expected frequencies • Compare theoretical probabilities with experimental probabilities • Recognise mutually exclusive events and exhaustive events • Understand that the probabilities of mutually exclusive exhaustive events sum to one • Compare bias and equally likely events	**Introduces:** • Estimate square roots • Calculate compound units of speed and density • Rearrange compound unit calculations to find missing values • Use inequality notation to state error intervals and interpret limits of accuracy

Year 10

Autumn 1
Chapter 10: Equations and Inequalities
Assessment: Chapter Test A
Builds Upon: • Solving two step equations (brackets, negatives) • Solving equations involving fractions (and implied brackets) • Solving equations with the unknown on both sides • Forming and solving equations • Solving by completing the square • Solving by applying the quadratic formula • Forming and solving quadratic equations • Solving simultaneous equations graphically • Solving simultaneous equations using elimination • Solving equations using trial and improvement •
Introduces: • Solving quadratics graphically for the roots (x intercepts) • Solving quadratics with/without coeff of x^2 by factorising • Solving simultaneous equations using substitution • Solving simultaneous equations between a linear and quadratic • Forming and solving simultaneous equations • Using iteration formulae to find a solution to a given number of decimal places

Autumn 2

Chapter 11: Circles and Constructions

Assessment: Chapter Test A

Builds Upon:

- Circumference of circles
- Area of circles
- Circumference and area of composite shapes involving parts of circles
- Construct angle
- Construct line bisectors (of a line, from a point to a line, from a point on a line)
- Construct triangles
- Construct quadrilaterals,
- Construct an angle of 60 degrees
- Construct loci from points, lines, around shapes etc.
- Construct loci involving a change of radius or rolling shapes etc.

Introduces:

- Arc length
- Area of sectors
- Perimeter and area of composite shapes involving sectors
- Circle Theorems
- Proof of circle theorems

Spring 1	
Chapter 12: Ratio and proportion	**Chapter 13: Factors, powers and roots**
Assessment: Chapter Test A	**Assessment:** Chapter Test A
Builds Upon: • Express proportions of an amounts as fractions or percentages • Calculate percentage increases and decreases using multiplication • Find the original value follow a percentage increases and decreases • Simplify ratios • Write ratios from worded questions	**Builds Upon:** • Know and use the language of prime numbers, factors and multiples • Write a number as the product of its prime factors (prime decomposition) • Construct a prime factor venn • Identify HCF • Identify LCM • Find square and cube roots of numbers and apply law of indices •
Introduces: • Share amounts into a ratio (ADAM) • Use scale factors, scale diagrams and maps. • Understand and calculate simple interest	**Introduces:** • Estimate the square or cube root of an integer • Simplify expressions involving surds • Rationalise fractions involving surds

Spring 2	
Chapter 14: Graphs 1	**Chapter 15: Working in 3D**
Assessment: Chapter Test A	**Assessment:** Chapter Test A
Builds Upon: • Equation of a straight line y=mx+c • Calculating gradient • Identifying y intercept • Graphing linear equations • Writing the equation for linear graphs • Properties of parallel and perpendicular lines • Writing the equations for parallel and perpendicular lines • Equation of quadratic curves $ax^2+bx+c=y$ • Graph quadratic equations •	**Builds Upon:** • Draw and interpret net diagrams • Calculate surface area of 3D shapes • Draw and interpret plans and elevation of 3D shapes • Calculate volume of a right prism • Calculate volume of a cylinder
Introduces: • Identifying x intercepts (roots) and y intercepts graphically and algebraically • Identifying turning points graphically and algebraically • Properties of quadratic functions • Kinematic graphs (solving distance, speed and acceleration problems) • Solving Inequalities • Graphing Inequalities	**Introduces:** • Apply compound units to calculate mass (m=vd) • Calculate the volume of frustums, spheres, hemispheres pyramids and cones • Apply reasoning and problem solving

Summer 1	
PPES	**Chapter 16: Handling Data 2**
Assessment 2x 90 minute PPEs	**Assessment:** Chapter Test A
	Builds Upon: • Calculate estimated mean, modal class and class interval of the median for grouped data • Construct scatter graphs and describe correlation • Make predictions based on the correlation (interpolation vs. extrapolation) • Construct time series graphs • Discuss any short term trends, seasonal variation and longer term trends • Construct histograms • Solve frequency density problems using histograms
	Introduces: • Construct and interpret box plots • Construct and interpret cumulative frequency graphs Compare spread using box plots

Summer 2	
Chapter 17: Calculations 2	**Chapter 18: Graphs 2**
Assessment: Chapter Test A	**Assessment:** Chapter Test A
Builds Upon: Convert in and out of index form • Solve calculations involving index laws (including roots, negatives, fractional indices) • Convert in and out of standard form • Solve calculations in standard form	**Builds Upon:** • Graphing linear and quadratics equations • Sketching translations (including reflections, transformations etc.)
Introduces: • Simplify and manipulate surds • Solve calculations involving factions, surds and pi • Construction mapping diagrams for functions • Write the inverse of a function f(x) → $f^{-1}(x)$ • Write and solve composite functions	**Introduces:** • Recognise and plot graphs of cubic functions • Recognise and plot graphs of reciprocal functions • Recognise and sketch graphs of exponential functions • Recognise and sketch trigonometric functions • To recognise and sketch translation and reflections of graphs • Draw and interpret non-standard graphs of real-life situations • Gradients and areas under graphs • Equation of a circle • Find the tangent to a circle at a point

Year 11

Autumn 1
Chapter 19: Pythagoras, Trigonometry and Vectors
Assessment: Chapter A Test
Builds Upon: • Apply Pythagoras' theorem to find long sides • Apply Pythagoras' theorem to find short sides
Introduces: • Apply Pythagoras' theorem to find distance between two points • Apply trigonometric ratios (sin/cos/tan) to find missing sides in right angle triangles • Apply trigonometric ratios (sin/cos/tan) to find missing angles in right angle triangles • Know the exact values of sinØ and cosØ for Ø= 0, 30,45,60,90 degrees • Know the exact value of tan Ø for Ø= 0,30,45,60 degrees • Apply the sine rule to find missing lengths and angles • Apply the cosine rule to find missing lengths and sides • Apply sine formula for the area of non right angle triangles • Solve 3D Pythagoras' theorem and trigonometry problems • Write column vectors and draw vector diagrams • Add and subtract vectors • Calculate multiples of vectors using a scalar • Use vectors in geometric proofs

Autumn 2		
PPES	**Chapter 20 Combined Events**	**Chapter 21: Sequences**
Assessment 2x 90 minute PPES	**Assessment**: Chapter A Test	**Assessment** Chapter A Test
	Builds Upon: • Arrange sets into Venn diagrams • Describe sets using Venn diagrams (intersection, union and complement) • Construct possibility (sample) space diagrams Calculate probabilities from sample space diagrams • Use tree diagrams to show the frequency or probabilities of two events • Use tree diagrams to calculate the probabilities of independent and dependent events	**Builds Upon:** • Write sequence using term to term rule • Write sequences using position to term rule (nth rule) • Write the position to term rule (nth rule) for a linear sequence • Recognise special types of sequence (square, cube, triangular, arithmetic, geometric, Fibonacci and quadratic) • Find terms of quadratic sequence using term to term or position to term rule • Write the position to term rule (nth rule) for a quadratic sequence
	Introduces: • Use Venn diagrams to record outcomes and calculate probabilities of events • Calculate estimated outcomes using probabilities	**Introduces:** • Applications to problem solving

Spring 1

Chapter 22: Units and Proportionality

Assessment: Chapter A Test

Builds Upon:

- Calculations using standard and compound units (speed, density and pressure)
- Compare lengths, areas, and volumes of similar shapes
- Solve direct proportion problems
- Interpret the gradient of a straight line graph as a rate of change
- Solve inverse proportion problems

Introduces:

- Interpret graphs that illustrate direct and inverse proportion
- Set up, solve and interpret growth and decay problems

Spring 2		
PPES	**23: Algebraic Proofs**	**GCSE EXAM REVISION**
Assessment 2x 90minute PPES	**Assessment NA**	**Assessment NA**
	Builds Upon • Algebraic identities • Constructing mathematical arguments	**Builds Upon:** Content informed by QLAs and teacher led
	Introduces • Counter examples • LHS/RHS proofs • Odd/Even proofs	**Introduces:**

Summer 1
GCSE EXAM REVISION
Assessment: **3 x 90 minute formal public exams**
Builds Upon: Content informed by QLAs and teacher led
Introduces:

Summer 2