Maths 5 Year Curriculum Plan

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Teaching and Learning Vision

Knowledge is power. Information is liberating.
Kofi Annan

At Smith's Wood Academy, we believe all students, whatever their background, are able to become **experts** in the disciplines that they study. Their expertise will be achieved through quality teaching and the dissemination of deep knowledge by highly skilled and knowledgeable subject experts. The Mastery approach to teaching will prevail – in every classroom, every lesson, every day.

Our students have the right to be introduced to **deep knowledge** and a **wealth of information** from the spectrum of subjects that they study. They will be introduced to, and understand, theories and principles that have influenced, continue to influence, and will influence in the future, the world in which they live. They will be prepared to fully engage in academic discussion about their learning.

This learning will secure a successful place in society for our students. They will go further than they ever thought possible.

Teaching and Learning Vision for the Maths Department

It is our mission to introduce young people to the life-changing power of mathematics, to make it relevant and inspire them to achieve great results.

We can turn every learner into a *Maths*

At the end of Year 11 students in Maths will....

Know and understand

Number

1. how to apply the four operations, including formal written methods, to integers, decimal fractions and simple fractions (proper and improper), and mixed numbers – all both positive and negative
2. how to apply relationships between operations, including inverse operations, using conventional notation for priority of operations, including brackets, powers, roots and reciprocals
3. how to calculate with roots, and with integer and fractional indices
4. how to state exactly the result of calculations with fractions, surds and multiples of π; simplify and rationalise denominators
5. how to calculate and interpret with standard form $A \times 10^n$, where $1 \leq A < 10$ and n is an integer
6. how to apply relationships between fractions and decimal representations, including recurring and terminating decimals
7. how to apply the relationship between ratio and fractions
8. how to define percentage as 'number of parts per hundred', interpret percentages and percentage changes as fractions or decimals, and calculate these multiplicatively; apply repeated percentage change; and solve reverse percentage problems
9. how to interpret fractions and percentages as operators
10. how to check calculations using estimation and approximation, including solutions obtained using technology
11. how to round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures), including simple error intervals using inequality notation
12. how to apply and interpret limits of accuracy, including upper and lower bounds
13. how to apply the concepts and vocabulary of prime numbers, factor (divisor), multiple, common factors, common multiples, highest common factor and lowest common multiple.

Algebra

1. how to interpret and apply algebraic notation
2. manipulate algebraic expressions (including those involving surds and algebraic fractions) by: ☐ collecting like terms ☐ multiplying a single term over a bracket ☐ taking out common factors ☐ expanding products of two or more binomials ☐ factorising quadratic expressions, including the difference of two squares ☐ simplifying expressions involving sums, products and powers, including the laws of indices

3. argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments and proofs
4. how to derive a formula, in order to solve a problem, then solve the formula
5. how to understand and use function notation
6. express composition of two familiar functions using function notation
7. find the inverse of familiar one-to-one functions (e.g. linear functions, reciprocal function, squaring) expressed algebraically
8. apply the conventions for coordinates in the plane and plot points in all four quadrants
9. plot equations that correspond to straight-line graphs in the coordinate plane; apply $y = mx + c$ and the relationship between gradients of parallel and perpendicular lines
10. deduce and apply equivalence between algebraic and graphical representations of linear, quadratic, cubic, reciprocal, exponential and trigonometric relationships
11. recognise, sketch and produce graphs of linear, quadratic, simple cubic functions, the reciprocal function $y = 1/x$ with $x \neq 0$, the exponential function $y = kx$ for positive integer values of k, and the trigonometric functions $y = \sin x$, $y = \cos x$ and $y = \tan x$
12. sketch translations and reflections of a given function
13. generate terms of a sequence using term-to-term and position-to-term definitions
14. recognise and use triangle, square and cube numbers, arithmetic progressions and geometric progressions
15. deduce linear and quadratic expressions to calculate the nth term of a sequence
16. deduce the sum of an arithmetic series, including where they arise in contextual problems
17. construct and test conjectures about recursive and long term behaviour of geometric, quadratic and other sequences, including where they arise in contextual problems
18. construct linear equations in one variable, and solve algebraically and approximately using a graph (including those that require rearrangement)
19. identify and interpret gradients and intercepts of linear functions graphically and algebraically
20. construct quadratic equations and solve algebraically by factorising, completing the square and using the formula; and solve approximately by using a graph (including those that require rearrangement)
21. identify and interpret gradients, roots, intercepts, turning points of quadratic functions graphically; deduce roots algebraically and turning points by completing the square
22. solve equations numerically using systematic trial and improvement
23. construct and solve simultaneous equations in two variables (linear/linear or linear/quadratic) algebraically, and approximately using a graph
24. solve linear and quadratic inequalities in one or two variables; represent the solution set on a number line, in set notation and on a graph
25. plot and interpret graphs of functions, including piece-wise linear, exponential and reciprocal graphs, to approximate solutions to contextual problems such as simple kinematic problems involving distance, velocity and acceleration

26. calculate or estimate areas under graphs, and interpret results in cases such as velocity-time graphs and graphs in financial contexts

27. construct, interpret, apply and connect algebraic, graphical and function representations, including in contextual problems.

Ratio, proportion and rates of change

1. use ratio and scale factor notation, including 1: r where r is a rational number, and apply methods involving conversion, mixing, measuring, scaling, comparing quantities and concentration
2. compare lengths, areas and volumes using ratio notation and scale factors and make links to similarity
3. construct and interpret equations that describe direct and inverse proportion
4. recognise and interpret graphs that illustrate direct and inverse proportion
5. apply the concepts of speed, unit pricing and density using compound units
6. interpret the gradient at a point on a curve as the rate of change, and apply the concepts of instantaneous and average rate of change in graphical representations (chords and tangents)
7. apply percentage change, including percentage increase, decrease and original value problems, simple interest in financial mathematics, and repeated growth
8. solve growth and decay problems, including compound interest and use iterative processes
9. apply the concepts and vocabulary of ratio, direct and inverse proportion and rates of change, represented graphically and algebraically.

Geometry and measures

1. apply the concepts and vocabulary of mass, length, time, money and other measures
2. derive and apply formulae to calculate perimeter and area of: triangles, parallelograms, trapezia, circles, and composite shapes, and surface area, cross-sectional area and volume of: cuboids (including cubes), prisms (including cylinders), spheres, pyramids, cones and composite solids
3. measure line segments and angles in geometric figures, including interpreting maps and scale drawings
4. sketch and describe using conventional terms and notations: points, lines, planes, vertices, parallel and perpendicular lines, right angles, and regular, symmetric and irregular plane polygons
5. draw and construct using mathematical tools: parallel and perpendicular lines, right angles, angle bisectors, and regular, symmetric and irregular plane polygons
6. construct and interpret 2D representations of 3D shapes
7. apply the properties and definitions of: special types of quadrilaterals, including square, rectangle, parallelogram, trapezium, kite and rhombus; and triangles and other plane figures using appropriate language
8. apply the properties of: angles at a point, angles at a point on a straight line, perpendicular lines, vertically opposite angles, parallel and intersecting lines, triangles and quadrilaterals, and interior and exterior angles of polygons

9. identify, describe and construct congruent and similar shapes on coordinate axes, by considering rotation, reflection, translation and enlargement (including negative and fractional scale factors)
10. identify, describe and construct shapes transformed by stretch parallel to an axis; identify invariant points and lines of each transformation
11. apply the concepts of congruence and similarity, including the relationships between lengths, areas and volumes in similar figures
12. apply angle facts, triangle congruence, similarity and properties of named quadrilaterals to derive results and prove conjectures about angles and sides, using transformational, axiomatic, and property-based deductive reasoning
13. identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment
14. calculate arc lengths, angles and areas of sectors
15. apply and prove circle theorems concerning angles, radii, tangents and chords, and apply them within geometric proofs
16. interpret and express trigonometric relationships algebraically and geometrically
17. apply trigonometric ratios, sine and cosine rules, and Pythagoras's theorem in two and three dimensions
18. derive and apply area $=\frac{1}{2}\ ab\sin C$ to calculate the area, sides or angles of any triangle
19. describe translations as 2D vectors
20. apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors; construct geometric arguments and proofs
21. describe the changes and invariance achieved by combinations of rotations, reflections and translations.

Probability

1. record and describe the frequency of outcomes of probability experiments using tables and frequency trees
2. apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments
3. relate relative expected frequencies to theoretical probability, using appropriate language and the 0-1 scale
4. apply the property that the probabilities of an exhaustive set of mutually exclusive outcomes sum to one
5. enumerate sets and combinations of sets systematically, using tables, grids, tree diagrams and Venn diagrams
6. construct theoretical possibility spaces for single and combined events with equally likely and mutually exclusive outcomes and use these to calculate theoretical probabilities
7. calculate the probability of independent and dependent combined events, including tree diagrams and other representations and know the underlying assumptions
8. calculate and interpret conditional probabilities through representation using two-way tables, tree diagrams, Venn diagrams and by using the formula understand that empirical samples tend towards theoretical probability distributions, with increasing sample size and with lack of bias

9. interpret risk through assigning values to outcomes (e.g. games, insurance)
10. calculate the expected outcome of a decision and relate to long-run average outcomes.

Statistics

1. apply statistics to describe a population or a large data set, inferring properties of populations or distributions from a sample, whilst knowing the limitations of sampling
2. construct and interpret appropriate charts and diagrams, including bar charts, pie charts and pictograms for categorical data, and vertical line charts for ungrouped discrete numerical data
3. construct and interpret diagrams for grouped discrete data and continuous data, i.e. histograms with equal class intervals and cumulative frequency graphs
4. interpret, analyse and compare univariate empirical distributions through:
5. appropriate graphical representation involving discrete, continuous and grouped data
6. appropriate measures of central tendency, spread and cumulative frequency (median, mean, range, quartiles and inter-quartile range, mode and modal class)
7. describe relationships in bivariate data: sketch trend lines through scatter plots; calculate lines of best fit; make predictions; interpolate and extrapolate trends

Be able to

Use and apply standard techniques

Students should be able to:
- accurately recall facts, terminology and definitions
- use and interpret notation correctly
- Accurately carry out routine procedures or set tasks requiring multi-step solutions.

Reason, interpret and communicate mathematically

Students should be able to:
- make deductions, inferences and draw conclusions from mathematical information
- construct chains of reasoning to achieve a given result
- interpret and communicate information accurately
- present arguments and proofs
- assess the validity of an argument and critically evaluate a given way of presenting information.

Solve problems within mathematics and in other contexts

Students should be able to:
- translate problems in mathematical or nonmathematical contexts into a process or a series of mathematical processes
- make and use connections between different parts of mathematics
- interpret results in the context of the given problem
- evaluate methods used and results obtained

- evaluate solutions to identify how they may have been affected by assumptions made.

Have been exposed to the following texts

- GCSE Edexcel Mathematics Student books at Foundation and Higher
- MathsWatch is a premium product for the revision of mathematical techniques. You have access to hundreds of videos clips (either: a 1 minute quick reminder or a longer more detailed explanation). There are also AO1 worksheets on each topic with worked answers. We often reference clip numbers in past papers to support learning. https://www.mathswatchvle.com/
- CGP revision guide and workbook. Excellent resources summarising key learning points (in colour), illustrating solution techniques and essential practice specific to awarding body

Have been exposed to the following knowledge and theories that span beyond the GCSE specification

- Compound transformations of functions
- Domain and range of functions considering corresponding changes when domain is restricted.
- Relationship of quadratic and cubic graphs to turning points
- the conditions in quadratics for equal roots, for distinct real roots and for no real roots
- Extend the formula of the circle to include those not centred on the origin.
- Collecting quantitative and qualitative primary and secondary data
- Representing a situation mathematically , making assumptions & simplifications
- Evaluating methods and situations including how they have been affected by assumptions made
- Appreciate the strengths and limitations of random, cluster, stratified and quota sampling methods and applying this understanding when designing sampling strategies
- Appreciate that improving accuracy by removing bias and increasing sample size may cost/save both time and money
- Calculate Tax, National Insurance, Student Loan contributions using HMRC guidelines
- Calculate APR using the equation
- Compare borrowings using APR
- Calculate AER using the formula , using this to compare interest rates
- Calculate three point moving average
- Look at different estimation techniques example scaling, sub dividing, assumptions
- Calculate the standard deviation and its advantages and disadvantages
- Use the factor theorem for integer values of the variable(cubic)
- Introduction to complex numbers
- Know that the gradient function dy/dx gives the gradient of the curve and measures the rate of change of y with respect to x (Grade 7+ pupils only)

Developed their cultural and social capital through the following extra-curricular work

High Ability Learners in both KS3 and KS4 will all sit the UK Junior and Intermediate Maths Challenge respectively. The UK Maths Trust has designed these challenges in order to stimulate interest in Mathematics and further develop problem-solving skills. It is a real opportunity to look at Mathematics in a different light. In order to support the pupils a weekly Maths Challenge Club runs after school where pupils are exposed to the previous challenge papers and techniques to answer difficult questions.

Along with taking part in the above individual challenge, 4 pupils from Year 7 and 8 compete nationally in an annual team challenge. This involves working as a team with the aim of promoting mathematical dexterity, teamwork and communication skills. For our pupils it gives them an opportunity to meet and compete against grammar schools in the area with the aim of building their confidence in their mathematical ability.

Top performing pupils from the UK Junior Maths Challenge have the opportunity to compete in the Junior Olympiad. This consists of a two-hour paper of more in depth mathematical problems including proofs. The aim of this is to ensure that the most able pupils are challenged but more so that they can develop resilience. The Maths department to support this exam provides extra lessons.

School Trips
We endeavour every year to take pupils in a trip that will enable to look at Mathematics in the real world. This year we are focusing on mathematics in action with the horse racing industry. Pupils have to research information on the industry and then we go on a trip a Racecourse where pupils are exposed to Mathematics via :

Weighing Room
Jockey's Equipment
Photo Finish /Final Furlong
Planning a Diet
Race card Reading
Probability

We are also looking at taking pupils to a rugby match next academic year. The majority of our cohort follow football and are unfamiliar with rugby. The idea behind taking them to a rugby match is to not only look at how Mathematics is involved in rugby via:

Try, Conversions etc.
Optimal angles for conversions
Field calculations
Ticket cost/profit and loss

We also want to focus on fan's behaviour at a rugby match compared to a football match, in particular focusing on segregation, language and the atmosphere it creates.

SMITH'S WOOD ACADEMY

5 Year Curriculum Plan

Year 7 Maths at Smith's Wood Academy	
The Year 7 curriculum at Smith's Wood Academy is designed to focus on a smooth transition from Primary to Secondary school with this in mind there is a large proportion designated to number and number systems. This is to address any misconceptions or gaps in knowledge so as to ensure that the building blocks for a successful maths qualification are secure. From this the curriculum moves to type of numbers, sequences and calculations involving decimals, percentages and fractions. Pupils are also introduced to the concept of algebra and apply their number knowledge to calculations that now involve variables such as x and y. Where appropriate, pre-assessments/diagnostics will used to inform teaching and hence, accelerate learning. Post-assessments will then gauge student progress.	

Year 7 Units of Study		Length of unit
Unit 1	Investigating Number Systems • Place value (with very large or very small numbers, and when calculating with decimals); • Round numbers and measures as desired; order positive/negative integers & decimals.	In lessons Au1: 6 lessons
Unit 2	Pattern Sniffing • Generate a sequence from a term-to-term rule; Triangular, square and cube numbers, simple arithmetic progressions. • Prime numbers, factors (divisors), multiples, common factors, common multiples, highest common factor and lowest common multiple; • Positive integer powers and associated roots; recognise powers of 2, 3, 4, 5	Au 1: 7 lessons
Unit 3	Solving Calculation Problems • Four operations, including formal written methods, for integers and decimals; Order of operations, including brackets; Use of the symbols =, ≠, <, >, ≤, ≥; Estimate answers; • Check calculations using approximation and estimation • Substitute into formulae and expressions; Use standard mathematical formulae; Concepts and vocabulary of expressions, equations, formulae and terms; Use and interpret algebraic notation.	Au 1: 8 lessons
Unit 4	Generalising Arithmetic • Recognise and use relationships between operations, including inverse operations • Simplify and manipulate algebraic expressions by collecting like terms and multiplying a single term over a bracket; Use and interpret algebraic notation.	Au 2: 8 lessons

Unit 5	**Exploring Shape** • Identify properties of the faces, surfaces, edges and vertices of 3D shapes. • Use conventional geometrical terms and notations and standard labelling conventions for the sides and angles of triangle • Angles at a point, angles at a point on a straight line, vertically opposite angles • Properties of special types of quadrilaterals, triangles and other plane figures	Au 2: 8 lessons
Unit 6	**Reasoning with Measures** • Calculate perimeters of 2D shapes; Calculate area of triangles, parallelograms, trapezia; • Know the formulae for circumference and area of a circle; Calculate volume of cuboids.	Au 2: 8 lessons
Unit 7	**Discovering Equivalence** • Define percentage as 'number of parts per hundred'; Interpret percentages and percentage changes as a fraction or a decimal, including multiplicatively; Express one quantity as a percentage of another; Compare two quantities using percentages; Solve problems involving percentage change. • Interpret fractions and percentages as operators; order positive and negative integers, decimals and fractions. Express one quantity as a fraction of another.	Sp 1: 10 lessons
Unit 8	**Reasoning with Fractions** • Four operations for fractions and mixed numbers; express an amount as a fraction of another • Record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees; Apply ideas of randomness, fairness and equally likely events; Relate relative expected frequencies to theoretical probability; Construct sample spaces and use these to calculate theoretical probabilities	Sp 1: 11 lessons
Unit 9	**Solving Number Problems** • Solve linear equations in one unknown algebraically	Sp 2: 8 lessons
Unit 10	**Investigating Statistics** • Interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete numerical data. • Interpret, analyse and compare the distributions of data sets through appropriate measures of central tendency (median, mean, mode and modal class) and spread (range)	Sp 2: 7 lessons
Unit 11	**Visualising Shape** • Draw diagrams from written description • Measure line segments and angles in geometric figures	Su 1: 6 lessons

	• Identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference	
Unit 12	Exploring Change • Coordinates – 4 quadrants; Solve geometrical problems on coordinate axes; Use and understand lines parallel to the axes and $y = x, y = -x$.	Su 1: 6 lessons
Unit 13	Proportional Reasoning • Use ratio notation, including reduction to simplest form • Divide a given quantity into two parts in a given part:part or part:whole ratio	Su 1: 4 lessons
Unit 14	Describing Position • Identify, describe and construct congruent shapes by considering rotation, reflection and translation; Describe translations as 2D vectors	Su 2: 6 lessons
Unit 15	Measuring and Estimating • Use standard units of mass, length, capacity, area time, money and other measures (including standard compound measures) using decimal quantities where appropriate • Convert between related standard units • Convert between miles and kilometres and apply this to solve problems	Su 2: 8 lessons

Year 8 Mathematics at Smith's Wood Academy

The Year 8 curriculum at Smith's Wood Academy focuses on expanding their existing number knowledge through problem solving and reason to begin a deeper understanding of Mathematics and how many topics overlap. This is evident in sequences where algebra is required. Pupils are also introduced to Venn diagrams when looking to find the Lowest Common Multiple and Highest Common Factor. Pupils will focus on expanding their knowledge and understanding by solving linear equations and apply these skills to area questions. Where appropriate, pre-assessments/diagnostics will used to inform teaching and hence, accelerate learning. Post-assessments will then gauge student progress.	

Year 8 Units of Study

		Length of unit
Unit 1	Investigating Number Systems • Interpret standard form (i.e. convert into and out of) • Round numbers to appropriate accuracy (including dp and sf)	Au 1: 4 lessons
Unit 2	Pattern Sniffing	Au 1: 9 lessons

	• Generate a sequence from a term-to-term rule and position-to-term rule; nth term of linear sequences • Prime numbers, highest common factors, lowest common multiples, prime factorisation, product notation and unique factorisation theorem. • Positive integer powers.	
Unit 3	Solving Calculation Problems • Calculate with numbers in standard form • Apply four operations to integers and decimals; use conventional order of operations for these calculations • Substitute into formulae; change the subject of a formula; use algebraic notation.	Au 1: 9 lessons
Unit 4	Generalising Arithmetic • Write expressions and inequalities; Simplify and manipulate algebraic expressions by factorising; simplify expressions involving sums, differences and products including the laws of indices.	Au 2: 7 lessons
Unit 5	Exploring Shape • Angles on parallel lines • Derive and use sum of angles in a triangle; interior and exterior angles of regular polygons	Au 2: 5 lessons
Unit 6	Reasoning with measure • Calculate perimeters of 2D shapes including circles; • Calculate areas of circles and composite shapes; • Know and apply formulae to calculate volumes of right prisms and cylinders	Au 2: 11 lessons
Unit 7	Discovering Equivalence • Work with percentages greater than 100%; • Solve percentage change problems including original amount and simple interest problems; • Work interchangeably with terminating decimals and their fraction equivalents	Sp 1: 9 lessons
Unit 8	Reasoning with Fractions • Apply four operations to fractions; Calculate exactly with fractions • Apply the property of probabilities summing to 1 • Enumerate sets, outcomes etc systematically using tables, grids and Venn diagrams • Construct theoretical possibility spaces and use them to calculate theoretical probabilities	Sp 1: 11 lessons
Unit 9	Solving number problems • Solve linear equations with unknown on both sides	Sp 2: 8 lessons

Unit 10	Investigating statistics	Sp 2: 8 lessons
	• Use and interpret scatter graphs; Recognise correlation • Interpret, analyse and compare the distributions of data sets through appropriate graphical representation (discrete, continuous and grouped data). • Interpret, analyse and compare the distributions of data sets through appropriate measures of central tendency and spread	
Unit 11	Visualising Shape	Su 1: 11 lessons
	• Measure line segments and angles in geometric figures, including interpreting scale drawings and maps • Use bearings • Standard ruler and compass constructions (perpendicular bisector, perpendicular from/at a given point, angle bisector) • Use constructions to solve loci problems • Interpret plans and elevations of 3D shapes	
Unit 12	Exploring Change	Su 1: 10 lessons
	• Plot graphs of equations that correspond to straight line graphs • Solve linear equations using a graph • Identify and interpret gradients and intercepts of functions graphically and algebraically • Recognise, sketch and interpret graphs of linear and quadratic functions	
Unit 13	Proportional Reasoning	Su 2: 8 lessons
	• Recognise a ratio problem; apply ratio to real problems; Express a multiplicative relationship as a ratio or fraction; Understand and use proportion as equality of ratios; • Relate ratio to fractions and to linear functions; Compare lengths, areas and volumes using ratio notation; • Use scale factors, scale diagrams and maps; identify and work with fractions in ratio problems; • solve problems involving direct and inverse proportion using graphical and algebraic representations. • Find approximate solutions to linear equations using a graph	
Unit 14	Describing Position	Su 2: 5 lessons
	• Identify, describe and construct similar shapes (including on coordinate axes) using enlargement	
Unit 15	Measuring and Estimating	Su 2: 6 lessons
	• Use compound units; change freely between compound units in numerical contexts	

- Plot and interpret graphs of non-standard functions in real contexts and use to solve
- simple kinematic problems

Year 9 Maths at Smith's Wood Academy

Pupil's at Smith's Wood Academy begin their GCSE journey in Year 9 where the curriculum focuses on exposing them to new topics and concepts in particular surrounding shape and geometry via constructions & loci, Pythagoras' Theroem and angles in polygons. It also builds on their basic algebraic knowledge and expands into quadratic equations and graphs. By January, pupils will have developed enough knowledge and skills to access GCSE papers. Hence, the step from Key Stage 3 to 4 becomes visible. During this time pupils ability and desire regarding higher and foundation papers for Year 11 will begin to show based on these Grade 4/5 topics. Where appropriate, pre-assessments/diagnostics will used to inform teaching and hence, accelerate learning. Post-assessments will then gauge student progress.

Year 9 Units of Study

		Length of unit
Unit 1	Investigating Number Systems and Algebraic Patterns • Direct & inverse proportion • Cartesian coordinates • Linear Graphs • Sequences nth terms	Aut 1: 28 lessons
Unit 2	Reasoning with measure • Constructions and loci • Parallel Lines and Angles • Triangles and quadrilaterals • Angles in polygons • Congruence and similarity	Aut 2: 32 lessons
Unit 3	Generalising Arithmetic • Construct and solve equations and inequalities • Quadratic graphs • Real life graphs	Sp 1: 28 lessons

	• Graphical solutions to simultaneous equations	
Unit 4	Investigating Statistics • Scatter Graphs • Mean of a grouped table • Speed Distance Time • Cumulative Frequency • Box Plots	Sp 2: 20 lessons
Unit 5	Manipulating Algebra • Expansion • Factorisation • Changing the subject of a formula	Su 1: 24
Unit 6	Visualising Shape • Pythagoras' theorem • Transformations (translation, rotation and reflection)	Su 2: 28

Year 10 Maths at Smith's Wood Academy

Year 10 higher curriculum focuses securing Grade 4 to 6 topics for our higher ability pupils. They will begin to expand their mathematical knowledge in Geometry by looking at 2-dimensional and 3 dimensional Trigonometry. Within Number they will focus on calculating indices & surds without a calculator and link the reasoning why behind such calculations. From December onwards pupils will have the knowledge to access higher exam papers and begin their journey towards GCSE higher.

Year 10 foundation has many link over topics with higher within the grade 4/5 category. They will be exposed to new concepts such as Standard Form which they will develop techniques for calculations with and without a calculator. Standard Form is linked closely to Science and Speed, Distance, Time thus covering cross curricular subjects. Pupil's knowledge of previous topics such as Enlargement will be further developed using vector notation and scale factors.

Year 10 Units of Study		Length of unit
Unit 1	Investigating Number Systems and Algebraic Patterns • Calculations with rules of indices • Standard form	Aut 1: 28 lessons

	• Calculating with standard form • Compound interest • Growth and Decay • Non- Linear sequences	
Unit 2	Reasoning with measure • Enlargement • Similar shapes • Bearings • Trigonometry in right angled triangles	Aut 2: 32 lessons
Unit 3	Algebraic methods • Expand and factorise binomials • Quadratic equations • Cubic and reciprocal graphs • Simultaneous equations • Graphical solutions to equations	Sp 1: 28 lessons
Unit 4	Investigating statistics • Populations and sampling • Theoretical and experimental probability • Listing and set notation • Venn diagrams • Tree diagrams	Sp 2: 20 lessons
Unit 5	Visualising Shape • Angle & Shape Facts • Loci • Area of circles of sectors • Volume of 3D shapes: cuboids and prisms • Vectors	Su 1: 18 lessons
Unit 6	Exploring change • Coordinates including midpoint • Equation of parallel & perpendicular lines • Equation of a circle	Su 2: 10 lessons
Unit 7	Measuring and Estimating	Su 2: 20 lessons

	- Properties of 3D shapes; plans and elevations - Estimation - Surface area and volume of pyramids, cones and spheres - Angle proofs - Limits of accuracy	

Year 11 Maths at Smith's Wood Academy

Year 11 higher Mathematics focuses predominately on Grade 5 to 9 topics in particular algebra and statistics. The curriculum aims to build resilience in problem solving & reasoning not only for their exam but to prepare them for the workplace or to continue maths to A level. Many of the topics intertwine as the grade gets higher hence many of the algebra topics will involve basic revision of number skills such as fractions, Bidmas and Ratio & Proportion.

Year 11 foundation curriculum focuses on ensuring all topics Grade 1-4 are secure. This has been determined via a diagnostic review of common topics and pupil's performance in their mocks. It focuses on building their confidence in algebra and number and how this skills can be transferred to other topics and questions. Pupils will also spend a significant amount of time improving their calculator knowledge and application as they will have 2 calculator papers to sit in June.

The strategy for year 11 encompasses three phases within the boundaries of each mock examination commencing with the end of the year 10 series. These will be characterised by QLA (Question Level Analysis) of the papers for each group. This will inform the scheme of work for particular classes between each of the mock exams. DNAs will be used to cover a range of techniques.

Year 11 Units of Study		Length of unit
Unit 1	- Expand and factorise binomials - Rearranging - Quadratic equations - Quadratic graphs - Simultaneous equations(linear & quadratic) - Algebraic Fraction - Population & Sampling	Aut 1: 28 lessons
Unit 2	- Algebraic Proofs - Functions - Cubic & reciprocal graph	Aut 2: 32 lessons

	• Exponential Graph • Interpreting graphs (R) • Equation of a straight line	
Unit 3	• Theoretical & Experimental Probability • Listing & set notation • Venn diagrams • Tree diagrams • Limits of accuracy(upper & lower bounds) • Iteration • Linear equations & inequalities	Sp 1: 28 lessons
Unit 4	• Sequences • Similar shapes • Compound interest & depreciation • Direct & Inverse Proportion • Enlargement • Histograms	Sp 2: 20 lessons
	Year 11 Foundation	
Unit 1	• Types of numbers primes, factors , HCF, LCM N4 • Prime factorisation • Powers & roots including estimation • Laws of indices • Fractions all operations • Standard Form	
Unit 2	• Fractions, Decimals Percentages • Percentages • Rounding • Estimation	
Unit 3	• Linear Equations • Linear Inequalities • Solution Sets • Expanding single & double brackets • Factorising	

	• Substitution • Formulae • Plotting graphs(linear and quadratic)	
Unit 4	• Sequences • Area of circle(sectors) • Area of a trapezium(compound shapes) • Surface Area • Volume • Pythagoras & Trigonometry • Transformations including enlargement	
Unit 5	• Probability trees • Venn diagrams • Vectors • Ratio & Proportion • Graphs with ratio • Angles in parallel lines •	

SMITH'S WOOD
A C A D E M Y

5 Year Curriculum Plan Overview

Year 7

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Autumn Term 1	Unit 1 Investigate Number systems	Unit 1 Investigate Number systems	Unit 2 Pattern Sniffing	Unit 2 Pattern Sniffing	Unit 3 Solving Calculation Problems	Unit 3 Solving Calculation Problems	Unit 3 Solving Calculation Problems	
Autumn Term 2	Unit 4 Generalising Arithmetic	Unit 4 Generalising Arithmetic	Unit 5 Exploring shape	Unit 5 Exploring shape	Unit 5 Exploring shape	Unit 6 Reasoning with Measures	Unit 6 Reasoning with Measures	Unit 6 Reasoning with Measures
Spring Term 1	Unit 7 Discovering Equivalence	Unit 7 Discovering Equivalence	Unit 7 Discovering Equivalence	Unit 8 Reasoning with Fractions	Unit 8 Reasoning with Fractions	Unit 8 Reasoning with Fractions	Unit 8 Reasoning with Fractions	
Spring Term 2	Unit 9 Solving Number Problems	Unit 9 Solving Number Problems	Unit 9 Solving Number Problems	Unit 10 Investigating Statistics	Unit 10 Investigating Statistics			
Summer Term 1	Unit 11 Visualising shape	Unit 11 Visualising shape	Unit 12 Exploring Change	Unit 12 Exploring Change	Unit 13 Proportional Reasoning	Unit 13 Proportional Reasoning		
Summer Term 2	Unit 14 Describing Position	Unit 14 Describing Position	Unit 15 Measuring & Estimating	Unit 15 Measuring & Estimating	Unit 15 Measuring & Estimating	2 weeks revision for end of year exams		

SMITH'S WOOD ACADEMY

Year 8

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Autumn Term 1	Unit 1 Investigate Number systems	Unit 2 Pattern Sniffing	Unit 2 Pattern Sniffing	Unit 2 Pattern Sniffing	Unit 3 Solving Calculation Problems	Unit 3 Solving Calculation Problems	Unit 3 Solving Calculation Problems	
Autumn Term 2	Unit 4 Generalising Arithmetic	Unit 4 Generalising Arithmetic	Unit 5 Exploring shape	Unit 5 Exploring shape	Unit 5 Exploring shape	Unit 6 Reasoning with Measures	Unit 6 Reasoning with Measures	Unit 6 Reasoning with Measures
Spring Term 1	Unit 7 Discovering Equivalence	Unit 7 Discovering Equivalence	Unit 7 Discovering Equivalence	Unit 8 Reasoning with Fractions	Unit 8 Reasoning with Fractions	Unit 8 Reasoning with Fractions	Unit 8 Reasoning with Fractions	
Spring Term 2	Unit 9 Solving Number Problems	Unit 9 Solving Number Problems	Unit 9 Solving Number Problems	Unit 10 Investigating Statistics	Unit 10 Investigating Statistics			
Summer Term 1	Unit 11 Visualising shape	Unit 11 Visualising shape	Unit 11 Visualising shape	Unit 12 Exploring Change	Unit 12 Exploring Change	Unit 12 Exploring Change		
Summer Term 2	Unit 13 Proportional Reasoning	Unit 13 Proportional Reasoning	Unit 14 Describing Position	Unit 15 Measuring & Estimating	Unit 15 Measuring & Estimating	2 weeks revision for end of year exams		

Year 9

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Autumn Term 1	Unit 1 Investigate Number	Unit 1 Investigate Number	Unit 1 Investigate Number/	Unit 1 Investigate Algebraic systems	Unit 1 Investigate Algebraic systems	Unit 1 Investigate Algebraic systems	Unit 1 Investigate Algebraic systems	
Autumn Term 2	Unit 2 Reasoning with measure	Unit 2 Reasoning with measure	Unit 2 Reasoning with measure	Unit 2 Reasoning with measure	Unit 2 Reasoning with measure	Unit 2 Reasoning with measure	Unit 2 Reasoning with measure	Unit 2 Reasoning with measure
Spring Term 1	Unit 3 Generalising arithmetic	Unit 3 Generalising arithmetic	Unit 3 Generalising arithmetic	Unit 3 Generalising arithmetic	Unit 3 Generalising arithmetic	Unit 3 Generalising arithmetic	Unit 3 Generalising arithmetic	
Spring Term 2	Unit 4 Investigating statistics	Unit 4 Investigating statistics	Unit 4 Investigating statistics	Unit 4 Investigating statistics	Unit 4 Investigating statistics			
Summer Term 1	Unit 5 Manipulating algebra	Unit 5 Manipulating algebra	Unit 5 Manipulating algebra	Unit 5 Manipulating algebra	Unit 5 Manipulating algebra	Unit 5 Manipulating algebra		
Summer Term 2	Unit 6 Visualising shape	Unit 13 Visualising shape	Unit 14 Visualising shape	Unit 15 Visualising shape	Unit 15 Visualising shape	2 weeks revision for end of year exams		

SMITH'S WOOD ACADEMY

Year 10

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Autumn Term 1	Unit 1 Investigate Number systems	Unit 1 Investigate Number systems	Unit 1 Investigate Number systems	Unit 1 Investigate Number systems	Unit 1 Investigate Number systems	Unit 1 Investigate Algebraic systems	Unit 1 Investigate Algebraic systems	
Autumn Term 2	Unit 2 Reasoning with measure	Unit 2 Reasoning with measure	Unit 2 Reasoning with measure	Unit 2 Reasoning with measure	Unit 2 Reasoning with measure	Unit 2 Reasoning with measure	Unit 2 Reasoning with measure	Unit 2 Reasoning with measure
Spring Term 1	Unit 3 Algebraic methods	Unit 3 Algebraic methods	Unit 3 Unit 3 Algebraic methods	Unit 3 Algebraic methods	Unit 3 Algebraic methods	Unit 3 Unit 3 Algebraic methods	Unit 3 Algebraic methods	
Spring Term 2	Unit 4 Investigating statistics	Unit 4 Investigating statistics	Unit 4 Investigating statistics	Unit 4 Investigating statistics	Unit 4 Investigating statistics			
Summer Term 1	Unit 5 Visualising shape	Unit 5 Visualising shape	Unit 5 Visualising shape	Unit 5 Visualising shape	Unit 6 Exploring change	Unit 6 Exploring change		
Summer Term 2	Unit 7 Measuring & estimating	Unit 7 Measuring & estimating	Unit 7 Measuring & estimating	Unit 7 Measuring & estimating	Unit 7 Measuring & estimating	2 weeks revision for end of year exams		

Year 11 Higher

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Autumn Term 1	Unit 1 Algebra 1	Unit 1 Algebra 1	Unit 1 Algebra 1	Unit 1 Algebra 1	Unit 2 Algebra 2	Unit 2 Algebra 2	Unit 2 Algebra 2	Unit 2 Algebra 2
Autumn Term 2	Unit 3 Statistics	Revision Week	Unit 3 Statistics	Unit 3 Statistics	Unit 4 Mixed	Unit 4 Mixed	Unit 4 Mixed	Unit 4 Mixed
Spring Term 1	Unit 4	Unit 4	Unit 4	Revision week				
Spring Term 2								
Summer Term 1								
Summer Term 2								

Year 11 Foundation

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Autumn Term 1	Unit 1	Unit 1	Unit 1	Unit 1	Unit 2	Unit 2	Unit 2	Unit 2
Autumn Term 2	Unit 3	Revision Week	Unit 3	Unit 3	Unit 4	Unit 4	Unit 4	Unit 4
Spring Term 1	Unit 5	Unit 5	Unit 5	Revision week				
Spring Term 2								
Summer Term 1								
Summer Term 2								