National Curriculum Progression
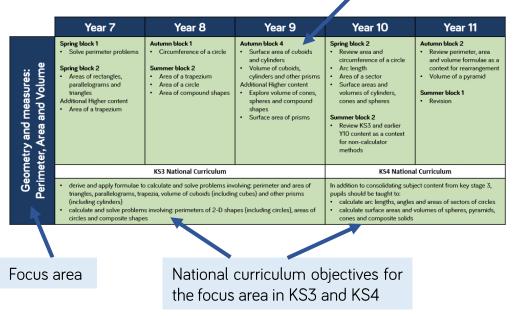
Years 7 to 11

#MathsEveryoneCan

2019-20

White Rose Maths

How does this document work?

The aim of this document is to give an at-a-glance guide to how the White Rose Maths curriculum links to the Key Stage 3 and 4 National Curriculum, and how it progress through topics.

In each of the major topic areas (Number, Measurement, Geometry and Measures, Probability, Statistics), the curriculum has been broken down into key strands. For each of these strands, you can then see how the NC objectives are covered in that year, together with the half-term(s) in which that objective is met and where it is revisited/developed.

The aspects of the objectives that are met, developed or revisited in our schemes of learning

Focus area

National curriculum objectives for the focus area in KS3 and KS4

Who is it for?

This progression will help:

- **Class teachers** – for each topic, teachers will be able to see exactly what they are meant to cover in each year, what students have already covered in previous years and where the topic will be revisited and extended in the future. It also supports teachers to see links the between topics e.g. Multiplicative Relationships includes similarity, currency conversion and unit pricing ('best buys')

- **Maths subject leaders and senior leaders** – the progression provides an overview over the whole secondary phase so leaders can clearly see how topics are developed over time.

Why do some topics appear in more than one place?

As noted above there are many links between different areas of mathematics e.g. similarity could be seen as part of geometry or as part of ratio. Where appropriate, we have referenced some of the National Curriculum objectives in more than one place to highlight these links.

Are all 'revisits' to a topic referenced?

No, as it would be impractical to list all the places where, for example, multiplication appears in the curriculum. Within each strands you can see at a glance what aspect is introduced in each year group and the main areas where this is revisited or met in new context.

What are the subject content strands?

These are listed on the next page immediately before the progression pages for each strand.

How does this document link to the primary progression document?

This follows the same basic format as our primary progression document, but as the Key Stage 1 and 2 National Curriculum provides year-by-year content, this shows exactly which objective is covered in each year. The strands are also slightly different as the content of Key Stage 3 and 4 is very different to that of Key Stage 1 and 2. Nonetheless, taken together the two documents show the progression of mathematics through from Year 1 to Year 11.

How does the WRM scheme of learning prepare for future study of mathematics post-16?

Our long-term goal is to produce a coherent journey of mathematical learning from reception through to A level. The secondary plan contains all the material needed to attain GCSE Grade 5 following the Core material and Grade 9 following the Higher. We plan that our A level materials will start with the content that overlaps with GCSE to ease transition and make the progression explicit.

What about the "Working mathematically" objectives?

Developing fluency, reasoning and problem solving are embedded, throughout our schemes of learning rather than treated separately. At the end of this progression, following the subject strands, we have provided some examples of which strands cover each of the objectives listed under "Working mathematically" for both KS3 and KS4, together with some of the key teaching blocks where these are met. Again, this list cannot be exhaustive as it would be impractical to list every single occurrence of, for example, "solving a problem".

NC Subject Content Area	Strands
Number	• Number: Understand and represent number • Number: Calculations • Number: Understand fractions and decimals • Number: Percentages
Algebra	• Algebra: Understand Notation and Substitute • Algebra: Equivalence and Proof • Algebra: Solve Equations and Inequalities • Algebra: Linear Graphs • Algebra: Non-linear Graphs • Algebra: Sequences
Ratio, proportion and rates of change	• Ratio, Proportion, Rates of Change: Multiplicative Relationships • Ratio, Proportion, Rates of Change: Ratio & Rates
Geometry and measures	• Geometry and Measures: Perimeter, Area and Volume • Geometry and Measures: Construct and Transform Geometric Figures • Geometry and Measures: Shape properties • Geometry and Measures: Angles • Geometry and Measures: Pythagoras and Trigonometry • Geometry : Geometrical Proof
Probability	• Probability
Statistics	• Statistics: Represent and Interpret Data • Statistics: Statistical Measures • Statistics: Bivariate Data

	Year 7	Year 8	Year 9	Year 10	Year 11
Number: Understand & Represent	**Autumn block 4** • Understand and use place value • Compare and order numbers • Round to powers of 10 and 1sf Additional Higher content • **Write 1sf numbers in standard form** **Spring block 2** • Use factors and multiples **Spring block 4** • Order directed number **Summer block 5** • Prime factorisation • HCF and LCM	**Spring block 5** • Revisit Y7 comparing and ordering • Write numbers of any size in standard form Additional Higher content • **Use negative and fractional indices** **Spring block 6** • Revisit Y7 rounding • Round to given numbers of dp and sf	**Spring block 1** • Revisit and extend Y7/8 content including: ➢ Types of number ➢ Standard form ➢ HCF and LCM • Rational and real numbers **Summer block 6** • You could use the revision block to extend Y7/8 content including: ➢ Standard form ➢ Prime factorisation	**Summer block 2** • Revise and extend KS3 content: Rounding and limits of accuracy Higher tier content • Upper and lower bounds • Converting recurring decimals **Summer block 3** • Revise and extend KS3 content including: factors, multiples and primes **Summer block 4** • Revise and extend KS3 content including standard form	**Spring block 5** • Making ordered lists Higher tier content • Product rule for counting **Spring block 6** • Proving equivalence of different forms of number **Summer block 1** • Revision

KS3 National Curriculum				KS4 National Curriculum	
• understand and use place value for decimals, measures and integers of any size • order positive and negative integers, decimals and fractions; use the number line as a model for ordering of the real numbers; use the symbols $=, \neq, <, >, \leq, \geq$ • use the concepts and vocabulary of prime numbers, factors (or divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation property • interpret and compare numbers in standard form $A \times 10^n, 1 \leq n < 10$ where n is a positive or negative integer or zero • round numbers and measures to an appropriate degree of accuracy [for example, to a number of decimal places or significant figures] • appreciate the infinite nature of the sets of integers, real and rational numbers.				In addition to consolidating subject content from key stage 3, pupils should be taught to: • apply systematic listing strategies, **{including use of the product rule for counting}** • **{change recurring decimals into their corresponding fractions and vice versa}** • apply and interpret limits of accuracy when rounding or truncating, **{including upper and lower bounds}**	

	Year 7	Year 8	Year 9	Year 10	Year 11
Number: Calculations	**Spring blocks 1/2** • Use the four operations with positive integers and decimals • Use a calculator • Multiply and divide by positive powers of 10 • Order of operations Additional Higher content • **Multiply by 0.1 and 0.01** **Spring block 4** • Use the four operations with directed number **Spring block 5** • Add and subtract fractions including mixed numbers **Summer block 3** • Use known facts	**Autumn block 3** • Multiply and divide fractions Additional Higher content • Multiply and divide mixed numbers **Spring block 6** • Revisit and extend Y7 work including: ➤ Convert between units of time ➤ Order of operations • Calculate with money • Use estimation Additional Higher content • **Convert metric units of length and area** • Use error interval notation	**Spring block 1** • Revisit fraction arithmetic **Spring block 3** • Revisit and extend Y7/8 work in the context of financial mathematics	**Summer block 2** • Revisit and extend KS3 number work • Work with exact answers Higher tier content • Calculate with surds **Summer block 4** • Work with powers and roots • Calculate with standard form Higher tier content • Calculate with surds	**Spring block 1** • Revisit and extend KS3 number work **Summer block 1** • Revision

KS3 National Curriculum	KS4 National Curriculum
• use the four operations, including formal written methods, applied to integers, decimals, proper and improper fractions, and mixed numbers, all both positive and negative • use conventional notation for the priority of operations, including brackets, powers, roots • use standard units of time • recognise and use relationships between operations including inverse operations • use integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5 and distinguish between exact representations of roots and their decimal approximations • use approximation through rounding to estimate answers and calculate possible resulting errors expressed using inequality notation $a < x \leq b$ • use a calculator and other technologies to calculate results accurately and then interpret them appropriately	In addition to consolidating subject content from key stage 3, pupils should be taught to: • **{estimate powers and roots of any given positive number}** • calculate with roots, and with integer **{and fractional}** indices • calculate exactly with fractions, **{surds}** and multiples of π; **{simplify surd expressions involving squares [for example $\sqrt{12} = \sqrt{4 \times 3} = \sqrt{4} \times \sqrt{3} = 2\sqrt{3}$] and rationalise denominators}** • calculate with numbers in standard form $A \times 10^n, 1 \leq n < 10$ and n is an integer

		Year 7	Year 8	Year 9	Year 10	Year 11
Number: Understand Fractions and Decimals		**Autumn block 5** • Interchange between fractions and decimals below 1 Additional Higher content • Explore fractions above 1 **Spring block 3** • Find fractions of an amount (up to 1) Additional Higher content • Solve problems with fractions greater than 1	**Spring block 4** • Revise and extend Y7 coverage • Express one number as a fraction of another • Explore calculator and non-calculator methods	**Spring block 1**: • Revise and extend Y7/8 coverage	**Spring block 4** • Working with ratios and fractions **Spring block 5** • Revise and extend KS3 conversions **Spring block 5** • Revisit converting fractions and decimals	**Spring block 1** • Review multiplicative change including fractions and decimals **Spring block 6** • Proving equivalence **Summer block 1** • Revision
		KS3 National Curriculum			**KS4 National Curriculum**	
		• work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and $\frac{7}{2}$ or 0.375 and $\frac{3}{8}$) • interpret fractions and percentages as operators • express one quantity as a fraction of another, where the fraction is less than 1 and greater than 1			In addition to consolidating subject content from key stage 3, pupils should be taught to: • identify and work with fractions in ratio problems	

	Year 7	Year 8	Year 9	Year 10	Year 11
Number: Percentages	**Autumn block 5** • Interchange between fractions, decimals and percentages up to 100% Additional Higher content • Explore over 100% **Spring block 3** • Find percentage of amount using mental and calculator methods (up to 100%) Additional Higher content • Explore over 100%	**Spring block 4** • Revise and extend Y7 coverage • Percentage increase and decrease • Using multipliers • Express one quantity as a percentage of another, compare two quantities using percentages • Work with percentages greater than 100% Additional Higher content • Finding the original after percentage change	**Spring blocks 2/3** • Revise and extend Y7/8 coverage • Reverse percentages • Financial maths Additional Higher content • Repeated percentage change	**Spring block 5** • Revise and extend KS3 content • Simple and compound interest • Finding original values • Repeated percentage change **Summer block 2** • Revisit conversions and non-calculator methods	**Spring block 6** • "Show that" problems with percentages **Summer block 1** • Revision
	KS3 National Curriculum			**KS4 National Curriculum**	
	• Define percentage as 'number of parts per hundred', interpret percentage changes as a fraction or a decimal, interpret these multiplicatively, express one quantity as a percentage of another, compare two quantities using percentages, and work with percentages greater than 100% • interpret fractions and percentages as operators • solve problems involving percentage change, including: percentage increase, decrease and original value problems and simple interest in financial mathematics			In addition to consolidating subject content from key stage 3, pupils should be taught to: • set up, solve and interpret the answers in growth and decay problems, including compound interest	

Algebra: Understand Notation and Substitute

Year 7	Year 8	Year 9	Year 10	Year 11
Autumn block 2 • Function machines • Algebraic notation • Substitute into expressions **Spring block 4** • Revisit notation and substitution in the context of directed number **Spring block 5** Additional Higher content • Simple algebraic fractions **Summer 3** • Explore related algebraic expressions	**Spring block 1** • Revise and extend Y7 coverage to include more complex expressions **Spring block 3** • Work with indices Additional Higher content • Explore powers of powers	**Autumn blocks 1/2/3** • Revise and extend Y7/8 coverage **Summer block 5** • Revise algebraic representation	**Autumn block 3/4** • Revise and extend KS3 content **Summer block 4** • Work with powers and roots	**Autumn block 6** • Substitute in kinematics formulae • Functions Higher tier content • Composite and inverse functions

KS3 National Curriculum			KS4 National Curriculum	

• use and interpret algebraic notation, including:
  ab in place of $a \times b$
  $3y$ in place of $y + y + y$ and $3 \times y$
  a^2 in place of $a \times a$
  ab in place of $a \times b$
  $\frac{a}{b}$ in place of $a \div b$
  coefficients written as fractions rather than decimals
  brackets
• substitute values into formulae expressions, rearrange and simplify expressions
• understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors
			In addition to consolidating subject content from key stage 3, pupils should be taught to:
			• simplifying expressions involving sums, products and powers, including the laws of indices
			• where appropriate, interpret simple expressions as functions with inputs and outputs; **{interpret the reverse process as the 'inverse function'; interpret the succession of two functions as a 'composite function'}**	

	Year 7	Year 8	Year 9	Year 10	Year 11
Algebra: Equivalence and Proof	**Autumn block 3** • Understand the difference between equality and equivalence • Collecting like terms **Spring block 4** • Revisit collecting like terms in the context of directed number **Spring block 5** Additional Higher content • Simple algebraic fractions **Summer 3** • Explore related algebraic expressions	**Spring block 1** • Expand over a single bracket • Simplify expressions involving brackets • Identify and use formulae, expressions, identities and equations Additional Higher content • Expand a pair of binomials	**Autumn blocks 1/2/3** • Revise and extend Y7/8 coverage • Rearranging to the form $y = mx + c$ • Change the subject of a formula • Testing algebraic conjectures • Expand a pair of binomials Additional Higher content • Change the subject of a more complex formula **Summer block 5** • Revise algebraic representation	**Autumn block 3** • Revise and extend KS3 content Higher tier content • Factorising quadratics of the form $x^2 + bx + c$ **Summer block 4** • Maintain equivalence using the rules of indices	**Autumn block 4** • Factorising quadratics of the form $x^2 + bx + c$ Higher tier content • Completing the square **Autumn block 5** • Change the subject of a formula Higher tier content • Change the subject of a formula where the subject appears more than once **Spring block 3** • Review and extend previous content Higher tier content • Algebraic proof
	KS3 National Curriculum			**KS4 National Curriculum**	
	• simplify and manipulate algebraic expressions to maintain equivalence by: ➢ multiplying a single term over a bracket ➢ taking out common factors ➢ expanding products of two or more binomials • understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors			In addition to consolidating subject content from key stage 3, pupils should be taught to: • know the difference between an equation and an identity; argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments **{and proofs}** • simplify and manipulate algebraic expressions (including those involving surds **{and algebraic fractions}**) by: factorising quadratic expressions of the form $x^2 + bx + c$, including the difference of two squares; **{factorising quadratic expressions of the form $ax^2 + bx + c$}**	

	Year 7	Year 8	Year 9	Year 10	Year 11
Algebra: Solve Equations and Inequalities	**Autumn block 3** • Form and solve one-step equations **Spring block 4** • Form and solve two-step equations	**Spring block 1** • Revise and extend Y7 coverage • Solve inequalities • Form and solve equations with brackets • Identify and use formulae, expressions, identities and equations Additional Higher content • Form and solve equations and inequalities with unknowns on both sides	**Autumn block 2** • Revise and extend Y7/8 coverage • Form and solve equations and inequalities with unknowns on both sides **Summer block 5** • Representing inequalities	**Autumn block 3** • Revise and extend KS3 content • Represent solutions to inequalities on number lines **Autumn block 4** • Form and solve linear simultaneous equations Higher tier content • Solve quadratic equations and inequalities by factorising • Solve simultaneous equations, one linear and one quadratic	**Autumn block 4** • Form and solve quadratic equations by factorising Higher tier content • Solve quadratic equations using the formula and completing the square **Summer 1** • Revision

KS3 National Curriculum	KS4 National Curriculum
• understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors • simplify and manipulate algebraic expressions to maintain equivalence by collecting like terms • understand and use standard mathematical formulae; rearrange formulae to change the subject • use algebraic methods to solve linear equations in one variable (including all forms that require rearrangement)	In addition to consolidating subject content from key stage 3, pupils should be taught to: • know the difference between an equation and an identity; solve quadratic equations **{including those that require rearrangement}** algebraically by factorising, **{by completing the square and by using the quadratic formula}** • identify and interpret roots; deduce roots algebraically **{and turning points by completing the square}** • solve two simultaneous equations in two variables (linear/linear **{or linear/quadratic}**) algebraically; find approximate solutions using a graph • translate simple situations or procedures into algebraic expressions or formulae; derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution • solve linear inequalities in one **{or two}** variable**{s}**, **{and quadratic inequalities in one variable}**; represent the solution set on a number line, **{using set notation and on a graph}**

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	Year 7	Year 8	Year 9	Year 10	Year 11
Algebra: Linear Graphs	**Autumn block 2** • Represent functions graphically	**Autumn block 2** • Conversion graphs Additional Higher content • Direct proportion graphs **Autumn block 4** • Using coordinates • Plotting graphs: ➢ $y = k, x = k$ ➢ $y = kx$ ➢ $y = x + a$ ➢ $y = mx + c$ Additional Higher content • Exploring gradient • Exploring non-linear graphs	**Autumn block 1** • Revise and extend Y7/8 coverage • Simplify, use and interpret $y = mx + c$ • Parallel lines Additional Higher content • Solve simultaneous equations graphically • Explore perpendicular lines **Summer block 5** • Interpret graphs in various forms including piece-wise linear	**Autumn block 3** • Revise and extend KS3 content **Autumn block 4** • Solve linear simultaneous equations graphically	**Autumn block 1** • Revise and extend KS3 and Y10 content Higher tier content • Perpendicular lines **Autumn block 2** Higher tier content • Equation of the tangent to a circle

KS3 National Curriculum	KS4 National Curriculum
• model situations or procedures by translating them into algebraic expressions or formulae and by using graphs • work with coordinates in all four quadrants • recognise, sketch and produce graphs of linear functions of one variable with appropriate scaling, using equations in x and y and the Cartesian plane • interpret mathematical relationships both algebraically and graphically • reduce a given linear equation in two variables to the standard form $y = mx + c$ • calculate and interpret gradients and intercepts of graphs of such linear equations numerically, graphically and algebraically • use linear graphs to estimate values of y for given values of x and vice versa and to find approximate solutions of simultaneous linear equations • find approximate solutions to contextual problems from given graphs of a variety of functions, including piece-wise linear	In addition to consolidating subject content from key stage 3, pupils should be taught to: • use the form $y = mx + c$ to identify parallel **{and perpendicular}** lines; find the equation of the line through two given points, or through one point with a given gradient • recognise, sketch and interpret graphs of linear functions • plot and interpret graphs • find approximate solutions using a graph (simultaneous equations) • **{find the equation of a tangent to a circle at a given point}**

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	Year 7	Year 8	Year 9	Year 10	Year 11
Algebra: Non-linear Graphs	**Autumn block 2** • Represent functions graphically	**Autumn block 4** • Using coordinates Additional Higher content • Exploring gradient • Exploring non-linear graphs	**Summer block 5** • Interpret graphs in various forms (including quadratic, piece-wise, exponential, speed/distance/time)	**Autumn block 4** Higher tier content • Solve linear and quadratic simultaneous equations graphically	**Autumn block 2** • Roots, quadratic, cubic and reciprocal graphs Higher tier content • Equations of circles **Autumn block 2** • Real-life graphs including speed/distance/time **Spring block 4** Higher tier content • Trig graphs • Transforming graphs

KS3 National Curriculum	KS4 National Curriculum
• model situations or procedures by translating them into algebraic expressions or formulae and by using graphs • work with coordinates in all four quadrants • recognise, sketch and produce graphs of quadratic functions of one variable with appropriate scaling, using equations in x and y and the Cartesian plane • interpret mathematical relationships both algebraically and graphically • use quadratic graphs to estimate values of y for given values of x and vice versa • find approximate solutions to contextual problems from given graphs of a variety of functions, including piece-wise linear, exponential and reciprocal graphs	In addition to consolidating subject content from key stage 3, pupils should be taught to: • identify and interpret roots, intercepts and turning points of quadratic functions graphically • recognise, sketch and interpret graphs of quadratic functions, simple cubic functions, the reciprocal function $y = \frac{1}{x}$ with $x \neq 0$ **{the exponential function $y = k^x$ for positive values of k, and the trigonometric functions (with arguments in degrees) for angles of any size}** • **{sketch translations and reflections of the graph of a given function}** • plot and interpret graphs (including reciprocal graphs **{and exponential graphs}**) and graphs of non-standard functions in real contexts, to find approximate solutions to problems **{calculate or estimate gradients of graphs and areas under graphs (including quadratic and other non-linear graphs), and interpret results in cases such as distance–time graphs, velocity–time graphs and graphs in financial contexts}** • **{recognise and use the equation of a circle with centre at the origin}** • find approximate solutions using a graph (quadratic equations and simultaneous equations)

	Year 7	Year 8	Year 9	Year 10	Year 11
Algebra: Sequences	**Autumn block 1** • Recognise linear and non-linear sequences **Autumn block 2** • Generate sequences from an algebraic rule	**Spring block 2** • Revise and extend Y7 coverage to include more complex rules Additional Higher content • Find the rule for the nth term of a linear sequence	**Autumn block 3** • Testing conjectures about sequences **Summer block 6** You could use the revision block to extend Y7/8 content including: ➢ Representing sequences ➢ Find the rule for the nth term of a linear sequence	**Summer block 3** • Revise and extend KS3 content, including names and types of sequences Higher tier content • Find the rule for the nth term of a quadratic sequence • Sequences with surds	**Spring block 3** • Review KS3 and Y10 coverage

KS3 National Curriculum	KS4 National Curriculum
• generate terms of a sequence from either a term-to-term or a position-to-term rule • recognise arithmetic sequences and find the nth term • recognise geometric sequences and appreciate other sequences that arise	In addition to consolidating subject content from key stage 3, pupils should be taught to: • recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions, Fibonacci type sequences, quadratic sequences, and simple geometric progressions (r^n where n is an integer, and r is a positive rational number **{or a surd}**) **{and other sequences}** • deduce expressions to calculate the nth term of linear **{and quadratic}** sequences

	Year 7	Year 8	Year 9	Year 10	Year 11
Ratio, Proportion, Rates of Change: Multiplicative Relationships	**Spring block 2** • Convert metric units **Summer block 3** • Use multiplicative relationships between known facts	**Autumn block 2** • Understand and use scale factors • Scale diagrams and maps • Currency conversions • Conversion graphs • Similar shapes Additional Higher content • Direct proportion graphs **Spring block 6** • Review and extend Y7 work on metric units Additional Higher content • Convert area and volume measures	**Autumn block 5** • Revisit scale drawings **Summer block 2** • Revisit conversion graphs • Solve direct proportion problems • Inverse proportion Additional Higher content • Inverse proportion graphs	**Autumn block 1** • Similar shapes • Enlargement Higher tier content • Area and volume similarity **Spring block 2** Higher tier content • Revisit area and volume similarity with cones etc. **Spring block 4** • Revise and extend KS3 content including: ➢ Unit prising ('best buys') ➢ Currency conversions Higher tier content • Revisit area and volume similarity	**Spring block 1** • Direct and inverse proportion numerically and graphically • Pressure and density Higher tier content • Variation with powers and roots

KS3 National Curriculum	KS4 National Curriculum
• change freely between related standard units [for example time, length, area, volume/capacity, mass] • use scale factors, scale diagrams and maps • understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction • solve problems involving direct and inverse proportion, including graphical and algebraic representations	In addition to consolidating subject content from key stage 3, pupils should be taught to: • compare lengths, areas and volumes using ratio notation and/or scale factors; make links to similarity (including trigonometric ratios) • understand that X is inversely proportional to Y is equivalent to X is proportional to $\frac{1}{Y}$ • {construct and} interpret equations that describe direct and inverse proportion • interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion

	Year 7	Year 8	Year 9	Year 10	Year 11
Ratio, Proportion, Rates of Change: Ratio and Rates		**Autumn block 1** • Understand and use ratio notation • Divide in a ratio • Work out parts and wholes • π as a ratio Additional Higher content • Use the form $1:n$ • Link gradient and ratio	**Spring block 2** • Revise and extend Y7/8 coverage Additional Higher content • Repeated percentage change **Summer block 3** • Speed, distance and time • Density • Compound units Additional Higher content • Converting compound measures **Summer block 2** • Unit pricing problems	**Spring block 4** • Ratios and fractions Higher tier content • Ratios in the context of area and volume **Spring block 5** • Repeated percentage change including compound interest • Growth and decay problems Higher tier content • Iterative processes	**Autumn block 2** Higher tier content • Gradients of curves • Estimate the area under a curve **Spring block 1** • Revisit KS3 and Y10 content • Pressure and density

KS3 National Curriculum		KS4 National Curriculum	
• use ratio notation, including reduction to simplest form • divide a given quantity into two parts in a given part : part or part : whole ratio; express the division of a quantity into two parts as a ratio • relate the language of ratios and the associated calculations to the arithmetic of fractions and to linear functions • use compound units such as speed, unit pricing and density to solve problems		In addition to consolidating subject content from key stage 3, pupils should be taught to: • convert between related compound units (speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts **{interpret the gradient at a point on a curve as the instantaneous rate of change};** • apply the concepts of instantaneous and average rate of change **(gradients of tangents and chords) in numerical, algebraic and graphical contexts}** • set up, solve and interpret the answers in growth and decay problems, including compound interest **{and work with general iterative processes}** • **{find approximate solutions to equations numerically using iteration}**	

	Year 7	Year 8	Year 9	Year 10	Year 11
Geometry and Measures: Perimeter, Area and Volume	**Spring block 1** • Solve perimeter problems **Spring block 2** • Areas of rectangles, parallelograms and triangles Additional Higher content • Area of a trapezium	**Autumn block 1** • Circumference of a circle **Summer block 2** • Area of a trapezium • Area of a circle • Area of compound shapes	**Autumn block 4** • Surface area of cuboids and cylinders • Volume of cuboids, cylinders and other prisms Additional Higher content • Explore volume of cones, spheres and compound shapes • Surface area of prisms	**Spring block 2** • Review area and circumference of a circle • Arc length • Area of a sector • Surface areas and volumes of cylinders, cones and spheres **Summer block 2** • Review KS3 and earlier Y10 content as a context for non-calculator methods	**Autumn block 5** • Review perimeter, area and volume formulae as a context for rearrangement • Volume of a pyramid **Summer block 1** • Revision
	KS3 National Curriculum			KS4 National Curriculum	
	• derive and apply formulae to calculate and solve problems involving: perimeter and area of triangles, parallelograms, trapezia, volume of cuboids (including cubes) and other prisms (including cylinders) • calculate and solve problems involving: perimeters of 2-D shapes (including circles), areas of circles and composite shapes			In addition to consolidating subject content from key stage 3, pupils should be taught to: • calculate arc lengths, angles and areas of sectors of circles • calculate surface areas and volumes of spheres, pyramids, cones and composite solids	

Geometry and Measures: Construct and Transform Geometric Figures

Year 7	Year 8	Year 9	Year 10	Year 11
Summer block 1 • Geometric notation • Draw lines, angles and simple shapes • Parallel and perpendicular lines • Name and construct polygons	**Autumn block 2** • Work with scale factors **Summer block 1** • Revise and extend Y7 notation **Summer block 3** • Recognise line symmetry • Reflect shapes in a given line Additional Higher content • Standard ruler and compass constructions	**Autumn block 5** • Standard ruler and compass constructions Additional Higher content • Loci **Spring block 5** • Revise Y7/8 coverage • Recognise rotational symmetry • Rotate points about a given point • Translate shapes and describe translations Additional Higher content • Perform a series of transformations	**Autumn block 1** • Similarity and enlargement Higher tier content • Negative scale factors of enlargement **Spring block 2** • Parts of a circle	**Spring block 4** • Revisit/extend KS3 and year 10 work • Loci **Spring block 5** • Plans and elevations

KS3 National Curriculum			KS4 National Curriculum	
• draw and measure line segments and angles in geometric figures, including interpreting scale drawings • derive and use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from/at a given point, bisecting a given angle); recognise and use the perpendicular distance from a point to a line as the shortest distance to the line • describe, sketch and draw using conventional terms and notations: points, lines, parallel lines, perpendicular lines, right angles, regular polygons, and other polygons that are reflectively and rotationally symmetric • identify properties of, and describe the results of, translations, rotations and reflections applied to given figures • use the standard conventions for labelling the sides and angles of triangle ABC • **identify and construct congruent triangles, and construct similar shapes by enlargement, with and without coordinate grids** • know and use the criteria for congruence of triangles			In addition to consolidating subject content from key stage 3, pupils should be taught to: • interpret and use fractional **{and negative}** scale factors for enlargements • **{describe the changes and invariance achieved by combinations of rotations, reflections and translations}** • construct and interpret plans and elevations of 3D shapes • describe translations as 2D vectors	

	Year 7	Year 8	Year 9	Year 10	Year 11
Geometry and Measures: Shape Properties	**Summer block 1** • Properties of triangles and quadrilaterals	**Summer blocks 1/2/3** • Revise and extend Y7 coverage **Additional Higher content** • Explore diagonals of quadrilaterals	**Autumn block 3** • Testing conjectures about shapes **Autumn block 4** • Properties of 3-D shapes • 2-D shapes in 3-D shapes	**Autumn block 1** • Revisit shape names and properties in the context of enlargement **Spring block 2** • Parts of a circle	**Spring block 2** • Revisit shape properties in the context of reasoning
	KS3 National Curriculum			**KS4 National Curriculum**	
	• derive and illustrate properties of triangles, quadrilaterals, circles, and other plane figures [for example, equal lengths and angles] using appropriate language and technologies • use the properties of faces, surfaces, edges and vertices of cubes, cuboids, prisms, cylinders, pyramids, cones and spheres to solve problems in 3-D			In addition to consolidating subject content from key stage 3, pupils should be taught to: • identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment	

	Year 7	Year 8	Year 9	Year 10	Year 11
Geometry and Measures: Angles	**Summer block 2** • Angles at a point • Adjacent angles on a straight line • Vertically opposite angles • Angles in triangles and quadrilaterals Additional Higher content • Angles in parallel lines • Simple angle proofs	**Summer block 1** • Revise Y7 coverage • Angles in parallel lines • Interior and exterior angles of polygons Additional Higher content • Angles formed by diagonals of quadrilaterals	**Spring block 4** • Revise and extend Y7/8 coverage • Chains of reasoning to find angles	**Spring block 1** • Review and extend KS3 coverage • Interpret and use bearings	**Spring block 2** • Review and extend KS3 and Year 10 coverage

	KS3 National Curriculum			KS4 National Curriculum	
	• apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles • understand and use the relationship between parallel lines and alternate and corresponding angles • derive and use the sum of angles in a triangle and use it to deduce the angle sum in any polygon, and to derive properties of regular polygons			In addition to consolidating subject content from key stage 3, pupils should be taught to: • interpret and use bearings	

White Rose Maths

	Year 7	Year 8	Year 9	Year 10	Year 11
Geometry and Measures: Pythagoras and Trigonometry			**Spring block 6** • Understand and use Pythagoras' theorem • Show that a triangle is right-angled Additional Higher content • Use Pythagoras' theorem in 3-D shapes **Summer block 1** Additional Higher content • Explore ratios in right-angled triangles	**Autumn block 2** • Revise Pythagoras' theorem • Use trigonometry to find missing sides and angles in right-angles triangles • Exact trig values Higher tier content • Using the sine and cosine rules • Area of a general triangle **Spring block 1** • Revisit Pythagoras and trigonometry in the context of bearings	**Autumn block 6** • Revisit trigonometry on the context of functions **Spring block 2** • Revisit Pythagoras and trigonometry **Spring block 4** Higher tier content • Revisit trigonometry when exploring trigonometric graphs and transformations of these

KS3 National Curriculum			KS4 National Curriculum		
• use Pythagoras' Theorem and trigonometric ratios in similar triangles to solve problems involving right-angled triangles			In addition to consolidating subject content from key stage 3, pupils should be taught to: • apply Pythagoras' Theorem and trigonometric ratios to find angles and lengths in right-angled triangles **{and, where possible, general triangles}** in two **{and three}** dimensional figures • know the exact values of $\sin\theta$, $\cos\theta$, $\tan\theta$ for required angles • **{know and apply the sine rule and cosine rule to find unknown lengths and angles}** • **{know and apply $A = \frac{1}{2}ab\sin C$ to calculate the area, sides or angles of any triangle}**		

	Year 7	Year 8	Year 9	Year 10	Year 11
Geometry and Measures: Geometric Proof	**Summer block 2** Additional Higher content • Simple angle proofs	**Summer block 1** • Find and prove simple geometric facts	**Autumn block 5** Explore congruency **Spring block 4** • Revise and extend Y7/8 coverage • Developing chains of reasoning Additional Higher content • Develop more complex geometrical proofs **Spring block 6** • Prove a triangle is/isn't right angled Additional Higher content • Explore proofs of Pythagoras' theorem	**Autumn block 1** • Revisit proof with angle rules • Prove shapes are similar • Congruent triangles • Proving triangles are congruent **Spring block 2** Higher tier content • Prove and use the first four circle theorems **Spring block 3** • Understand and use vectors Higher tier content • Geometric proof with vectors	**Spring block 2** • Revisit KS3 and Y10 proof Higher tier content • Prove and use the remaining circle theorems **Spring block 6** • Using correct language in 'show that'/proof questions Higher tier content • Revisit congruent triangle proofs

KS3 National Curriculum			KS4 National Curriculum		
• apply angle facts, triangle congruence, similarity and properties of quadrilaterals to derive results about angles and sides, including Pythagoras' Theorem, and use known results to obtain simple proofs • interpret mathematical relationships both algebraically and geometrically			In addition to consolidating subject content from key stage 3, pupils should be taught to: • **{apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results}** • apply the concepts of congruence and similarity, including the relationships between lengths, **{areas and volumes}** in similar figures • apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors; **{use vectors to construct geometric arguments and proofs}**		

White Rose Maths

	Year 7	Year 8	Year 9	Year 10	Year 11
Probability	**Summer block 4** • Use the language of probability • Calculate simple probabilities • Use the probability scale • Sample spaces • Understand and use set notation, including Venn diagrams • Know the sum of probabilities is 1 Additional Higher content • Complement of a set	**Autumn block 6** • Review and extend Y7 coverage • Construct sample spaces for more than one event • Use sample spaces to find probabilities • Use tables and Venn diagrams to find probabilities Additional Higher content • Use the product rule for finding total number of outcomes	**Summer block 4** • Review and extend Y7/8 coverage • Compare experimental and theoretical probability • Use frequency trees to find probabilities Additional Higher content • Simple tree diagrams	**Spring block 6** • Review and extend KS3 coverage • Effect of sample size on estimated probabilities • Use tree diagrams • Mutually exclusive and independent events Higher tier content • Conditional probabilities	**Spring block 5** • Review using sample spaces and probability rules **Summer block 1** • Revision

KS3 National Curriculum			KS4 National Curriculum		
• record, describe and analyse the frequency of outcomes of simple probability experiments involving randomness, fairness, equally and unequally likely outcomes, using appropriate language and the 0-1 probability scale • understand that the probabilities of all possible outcomes sum to 1 • enumerate sets and unions/intersections of sets systematically, using tables, grids and Venn diagrams • generate theoretical sample spaces for single and combined events with equally likely, mutually exclusive outcomes and use these to calculate theoretical probabilities			In addition to consolidating subject content from key stage 3, pupils should be taught to: • apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one • use a probability model to predict the outcomes of future experiments; understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size • calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions • **{calculate and interpret conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams and Venn diagrams}**		

	Year 7	Year 8	Year 9	Year 10	Year 11
Statistics: Represent and Interpret Data	**Spring block 1** • Solve problems with line charts and bar charts **Summer block 1** • Construct and interpret pie charts	**Autumn block 5** • Recognise different types of data • Construct and interpret frequency tables, grouped and ungrouped, and two-way tables **Summer block 4** • Revise and extend Y7 coverage • Collecting data • Multiple bar charts • Line graphs • Misleading graphs	**Summer block 4** • Revise Y7/8 coverage	**Summer block 1** • Revise and extend KS3 coverage • Comparing distributions using diagrams • Frequency polygons • Time series Higher tier content • Cumulative frequency diagrams • Box plots • Histograms	**Spring block 5** • Revisit comparing distributions using diagrams • Describing a population

KS3 National Curriculum		KS4 National Curriculum	
• describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete, continuous and grouped data • construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms for categorical data, and vertical line (or bar) charts for ungrouped and grouped numerical data		In addition to consolidating subject content from key stage 3, pupils should be taught to: • infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling • interpret and construct tables and line graphs for time series data • **{construct and interpret diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and cumulative frequency graphs, and know their appropriate use}** • interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate graphical representation involving discrete, continuous and grouped data, **{including box plots}** • apply statistics to describe a population	

	Year 7	Year 8	Year 9	Year 10	Year 11
Statistics: Statistical Measures	**Autumn block 4** • Find the median and the range **Spring block 2** • Find the mean	**Summer block 5** • Revise and extend Y7 coverage • Find the mode • Identify outliers • Compare distributions using statistical measures Additional Higher content • Find the mean from a grouped or ungrouped frequency table	**Summer block 6** You could use the revision block to extend Y7/8 content	**Summer block 1** • Revise and extend KS3 coverage • Find the modal class • Comparing distributions Higher tier content • Finding the median and quartiles from cumulative frequency diagrams	**Spring block 5** • Revisit comparing distributions using data • Describing a population

KS3 National Curriculum			KS4 National Curriculum		
• describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete, continuous and grouped data; and appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers)			In addition to consolidating subject content from key stage 3, pupils should be taught to: • interpret, analyse and compare the distributions of data sets from univariate empirical • distributions through appropriate measures of central tendency (including modal class) and spread **{including quartiles and inter-quartile range}**		

	Year 7	Year 8	Year 9	Year 10	Year 11
Statistics: Bivariate Data		**Autumn block 5** • Scatter graphs • Correlation • Lines of best fit	**Summer block 6** You could use the revision block to extend Y7/8 content	**Summer block 1** • Revise and extend KS3 coverage • Understand the risks of extrapolation	**Summer block 1** • Revision

KS3 National Curriculum	KS4 National Curriculum
• describe simple mathematical relationships between two variables (bivariate data) in observational and experimental contexts and illustrate using scatter graphs	In addition to consolidating subject content from key stage 3, pupils should be taught to: • use and interpret scatter graphs of bivariate data; recognise correlation and know that it does not indicate causation; draw estimated lines of best fit; make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing

	NC statement	Some key strands	Some key blocks
Develop Fluency – KS3	consolidate their numerical and mathematical capability from key stage 2 and extend their understanding of the number system and place value to include decimals, fractions, powers and roots	• Number: Understand and represent number • Number: Calculations • Number: Understand fractions and decimals	• Y7 Autumn 4 to 5 – Place Value & Proportion • Y8 Spring 4 to 6 – Developing Number • Y9 Spring 1 to 3 – Reasoning with Number
	select and use appropriate calculation strategies to solve increasingly complex problems	• Number: Calculations	• Y7 Spring 1 to 3 – Application of Number • Y8 Spring 4 to 6 – Developing Number • Y9 Spring 1 to 3 – Reasoning with Number
	use algebra to generalise the structure of arithmetic, including to formulate mathematical relationships	• Algebra: Understand Notation and Substitute	• Y7 Autumn 1 to 3 – Algebraic Thinking • Y8 Spring 1 to 3 – Algebraic Techniques • Y9 Autumn 1 to 3 – Reasoning with Algebra
	substitute values in expressions, rearrange and simplify expressions, and solve equations	• Algebra: Understand Notation and Substitute • Algebra: Equivalence and Proof • Algebra: Solve Equations	• Y7 Autumn 1 to 3 – Algebraic Thinking • Y8 Spring 1 to 3 – Algebraic Techniques • Y9 Autumn 1 to 3 – Reasoning with Algebra
	move freely between different numerical, algebraic, graphical and diagrammatic representations [for example, equivalent fractions, fractions and decimals, and equations and graphs]	• Number: Understand fractions and decimals • Algebra: Linear Graphs • Algebra: Non-linear Graphs	• Y7 Spring 5 – Fractional Thinking • Y8 Autumn 4 to 6 – Representations • Y9 Autumn 1 to 3 – Reasoning with Algebra • Y9 Summer 5 – Algebraic Representations
	develop algebraic and graphical fluency, including understanding linear and simple quadratic functions	• Algebra: Linear Graphs • Algebra: Non-linear Graphs	• Y7 Autumn 1 to 3 – Algebraic Thinking • Y8 Autumn 4 – Working in the Cartesian Plane • Y9 Autumn 1 to 3 – Reasoning with Algebra
	use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics	• Number: Understand and represent number • Algebra: Understand Notation and Substitute • Geometry and Measures: Shape properties • Probability • Statistics: Represent and Interpret Data	• Y7 Summer 4 to 6 – Reasoning with Number • Y8 Summer 4 to 5 – Reasoning with Data • Y9 Summer 5 – Probability

	NC statement	Some key strands	Some key blocks
Develop Fluency – KS4	consolidate their numerical and mathematical capability from key stage 3 and extend their understanding of the number system to include powers, roots **{and fractional indices}**	• Number: Understand and represent number • Number: Calculations • Number: Understand fractions and decimals	• Y10 Summer 2 to 4 – Using Number • Y11 Summer 1 – Revision
	select and use appropriate calculation strategies to solve increasingly complex problems, including exact calculations involving multiples of π **{and surds}**, use of standard form and application and interpretation of limits of accuracy	• Number: Understand and represent number • Number: Calculations • Number: Percentages • Geometry and Measures: Perimeter, Area and Volume • Geometry and Measures: Pythagoras and Trigonometry	• Year 10 Autumn 2 – Trigonometry • Year 10 Spring 2 – Working with Circles • Y10 Summer 2 to 4 – Using Number • Y11 Spring 1 – Multiplicative Reasoning • Y11 Summer 1 – Revision
	consolidate their algebraic capability from key stage 3 and extend their understanding of algebraic simplification and manipulation to include quadratic expressions, **{and expressions involving surds and algebraic fractions}**	• Algebra: Understand Notation and Substitute • Algebra: Equivalence and Proof • Number: Percentages • Algebra: Linear Graphs • Algebra: Non-linear Graphs	• Y10 Autumn 3 and 4 – Developing Algebra • Y11 Autumn 3 to 5 –Algebra • Year 11 Spring 3 – Algebraic Reasoning
	extend fluency with expressions and equations from key stage 3, to include quadratic equations, simultaneous equations and inequalities	• Algebra: Equivalence and Proof • Algebra: Solve Equations & Inequalities	• Y10 Autumn 3 and 4 – Developing Algebra • Y11 Autumn 3 to 5 –Algebra • Y11 Spring 3 – Algebraic Reasoning
	move freely between different numerical, algebraic, graphical and diagrammatic representations, including of linear, quadratic, reciprocal, **{exponential and trigonometric}** functions	• Algebra: Linear Graphs • Algebra: Non-linear Graphs • Geometry and Measures: Pythagoras and Trigonometry	• Y10 Autumn 3 and 4 – Developing Algebra • Y11 Autumn 1 to 3 –Graphs
	use mathematical language and properties precisely	• Geometry and Measures: Shape properties • Geometry and Measures: Pythagoras and Trigonometry • Statistics: Represent and Interpret Data	• Y10 Spring 1 to 3 – Geometry • Y10 Summer 1 – Delving into Data • Y11 Spring 4 to 6 – Revision and Communication

	NC statement	Some key strands	Some key blocks
Reason mathematically– KS3	extend their understanding of the number system; make connections between number relationships, and their algebraic and graphical representations	• Number: Understand and represent number • Algebra: Understand Notation and Substitute • Algebra: Linear Graphs • Algebra: Non-linear Graphs	• Y7 Autumn 4 to 5 – Place Value & Proportion • Y7 Autumn 1 to 3 – Algebraic Thinking • Y8 Autumn 4– Working in the Cartesian Plane • Y9 Autumn 1 to 3 – Reasoning with Algebra
	extend and formalise their knowledge of ratio and proportion in working with measures and geometry, and in formulating proportional relations algebraically	• Ratio, Proportion, Rates of Change: Multiplicative Relationships • Geometry and Measures: Construct and Transform Geometric Figures	• Y8 Autumn 1 to 3 – Proportional Reasoning • Y9 Summer 1 to 3 – Reasoning with Proportion
	identify variables and express relations between variables algebraically and graphically	• Algebra: Solve Equations and Inequalities • Algebra: Linear Graphs • Algebra: Non-linear Graphs • Algebra: Sequences	• Y7 Autumn 1 to 3 – Algebraic Thinking • Y8 Spring 1 to 3 – Algebraic Techniques • Y9 Autumn 1 to 3 – Reasoning with Algebra
	make and test conjectures about patterns and relationships; look for proofs or counterexamples	• Algebra: Equivalence and Proof • Algebra: Sequences	• Y7 Summer 4 to 6 – Reasoning with Number • Y8 Summer 1 – Angles in parallel lines and polygons • Y9 Autumn 1 to 3 – Reasoning with Algebra
	begin to reason deductively in geometry, number and algebra, including using geometrical constructions	• Geometry and Measures: Construct and Transform Geometric Figures • Geometry and Measures: Shape properties • Geometry : Geometrical Proof	• Y7 Summer 2 – Geometric Reasoning • Y8 Summer 1 to 3 – Developing Geometry • Y9 Spring 4 to 6 – Reasoning with Geometry
	interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning	• Number: Calculations • Ratio, Proportion, Rates of Change: Multiplicative Relationships • Ratio, Proportion, Rates of Change: Ratio & Rates	• Y7 Spring 1 to 3 – Application of Number • Y8 Autumn 1 to 3 – Proportional Reasoning • Y9 Summer 1 to 3 – Reasoning with Proportion
	explore what can and cannot be inferred in statistical and probabilistic settings, and begin to express their arguments formally	• Statistics: Represent and Interpret Data • Statistics: Statistical Measures • Probability	• Y7 Summer 4 – Sets & Probability • Y8 Autumn 5 – Representing Data • Y8 Summer 4 to 5 – Reasoning with Data • Y9 Summer 6– Revision

	NC statement	Some key strands	Some key blocks
Reason mathematically– KS4	extend and formalise their knowledge of ratio and proportion, including trigonometric ratios, in working with measures and geometry, and in working with proportional relations algebraically and graphically	• Ratio, Proportion, Rates of Change: Multiplicative Relationships • Geometry and Measures: Pythagoras and Trigonometry • Algebra: Linear Graphs	• Y10 Autumn 2 – Trigonometry • Y10 Spring 4 to 6– Proportions and Proportional Change • Y11 Spring 1 to 3 – Reasoning
	extend their ability to identify variables and express relations between variables algebraically and graphically	• Algebra: Solve Equations and Inequalities • Algebra: Linear Graphs • Algebra: Non-linear Graphs • Algebra: Sequences	• Y10 Autumn 3 and 4 – Developing Algebra • Y11 Autumn 3 to 5 –Algebra • Y11 Spring 3 – Algebraic Reasoning
	make and test conjectures about the generalisations that underlie patterns and relationships; look for proofs or counter-examples; begin to use algebra to support and construct arguments {and proofs}	• Algebra: Sequences • Algebra: Equivalence and Proof	• Y10 Autumn 3 and 4 – Developing Algebra • Y11 Spring 1 to 3 – Reasoning • Y11 Spring 6 – Show that…
	reason deductively in geometry, number and algebra, including using geometrical constructions	• Geometry and Measures: Construct and Transform Geometric Figures • Geometry : Geometrical Proof • Algebra: Equivalence and Proof	• Y10 Spring 1 to 3 – Geometry • Y11 Spring 1 to 3 – Reasoning • Y11 Spring 4 – Transforming & Constructing • Y11 Spring 6 – Show that…
	interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning	• Number: Calculations • Ratio, Proportion, Rates of Change: Multiplicative Relationships • Ratio, Proportion, Rates of Change: Ratio & Rates	• Y10 Spring 4 to 6– Proportions and Proportional Change • Y10 Summer 2 – Using Number • Y11 Spring 1 to 3 – Reasoning
	explore what can and cannot be inferred in statistical and probabilistic settings, and express their arguments formally	• Statistics: Represent and Interpret Data • Statistics: Statistical Measures • Probability	• Y10 Summer 1 – Delving into Data • Y11 Spring 5 – Listing & Describing
	assess the validity of an argument and the accuracy of a given way of presenting information	• Statistics: Represent and Interpret Data • Statistics: Statistical Measures • Geometry : Geometrical Proof • Algebra: Equivalence and Proof	• Y10 Summer 1 – Delving into Data • Y11 Spring 1 to 3 – Reasoning • Y11 Spring 5 – Listing & Describing

	NC statement	Some key strands	Some key blocks
Solve problems – KS3	develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems	• Number: Calculations • Number: Percentages • Algebra: Solve Equations and Inequalities • Geometry and Measures: Perimeter, Area and Volume • Geometry and Measures: Angles	• Y7 Spring 1 to 3 – Application of Number • Y7 Spring 4 – Directed Number • Y7 Summer 2 – Geometric Reasoning • Y8 Spring 4 to 6 – Developing Number • Y9 Spring 4 to 6 – Reasoning with Geometry
	develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics	• Number: Calculations • Number: Percentages • Geometry : Geometrical Proof • Algebra: Equivalence and Proof • Probability	• Y7 Spring 1 to 3 – Application of Number • Y7 Summer 2 – Geometric Reasoning • Y8 Spring 4 to 6 – Developing Number • Y9 Spring 1 to 3 – Reasoning with Number
	begin to model situations mathematically and express the results using a range of formal mathematical representations	• Algebra: Solve Equations and Inequalities • Ratio, Proportion, Rates of Change: Multiplicative Relationships • Ratio, Proportion, Rates of Change: Ratio & Rates • Algebra: Linear Graphs • Algebra: Non-linear Graphs	• Y7 Autumn 1 to 3 – Algebraic Thinking • Y8 Autumn 1 to 3 – Proportional Reasoning • Y8 Spring 1 to 3 – Algebraic Techniques • Y9 Autumn 1 to 3 – Reasoning with Algebra • Y9 Summer 5 – Algebraic Representation
	select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems; interpret their solution in the context of the given problem	• Number: Calculations • Number: Percentages • Algebra: Solve Equations and Inequalities • Probability • Statistics: Represent and Interpret Data • Statistics: Statistical Measures • Statistics: Bivariate Data	• Y7 Spring 1 to 3 – Application of Number • Y7 Summer 4 to 6 – Reasoning with Number • Y8 Spring 4 to 6 – Developing Number • Y8 Summer 4 and 5 – Reasoning with Data • Y9 Summer 1 to 3 – Reasoning with Proportion

	NC statement	Some key strands	Some key blocks
Solve problems – KS4	develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems	• Number: Calculations • Number: Percentages • Algebra: Solve Equations and Inequalities • Geometry and Measures: Perimeter, Area and Volume • Geometry and Measures: Angles	• Y10 Autumn 3 and 4 – Developing Algebra • Y10 Spring 4 to 6 – Proportions and Proportional Change • Y10 Summer 2 to 4 – Using Number • Y11 Autumn 4 to 6 – Algebra • Y11 Spring 1 to 3 – Reasoning
	develop their use of formal mathematical knowledge to interpret and solve problems, including in financial contexts	• Number: Calculations • Number: Percentages • Geometry : Geometrical Proof • Algebra: Equivalence and Proof • Probability	• Y10 Spring 4 to 6 – Proportions and Proportional Change • Y10 Summer 2 to 4 – Using Number • Y11 Autumn 1 to 3 – Graphs • Y11 Spring 1 to 3 – Reasoning
	make and use connections between different parts of mathematics to solve problems	• Number: Calculations • Number: Percentages • Algebra: Solve Equations and Inequalities • Ratio, Proportion, Rates of Change: Multiplicative Relationships	• Y10 Spring 4 to 6 – Proportions and Proportional Change • Y10 Summer 2 to 4 – Using Number • Y11 Spring 1 to 3 – Reasoning • Y11 Spring 4 to 6 – Revision and Communication
	model situations mathematically and express the results using a range of formal mathematical representations, reflecting on how their solutions may have been affected by any modelling assumptions	• Algebra: Solve Equations and Inequalities • Ratio, Proportion, Rates of Change: Multiplicative Relationships • Ratio, Proportion, Rates of Change: Ratio & Rates • Algebra: Linear Graphs • Algebra: Non-linear Graphs	• Y10 Autumn 3 and 4 – Developing Algebra • Y10 Spring 4 to 6 – Proportions and Proportional Change • Y11 Autumn 1 to 3 –Graphs • Y11 Spring 1 to 3 – Reasoning
	select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems; interpret their solution in the context of the given problem	• Number: Calculations • Number: Percentages • Algebra: Solve Equations and Inequalities • Probability • Statistics: Represent and Interpret Data • Statistics: Statistical Measures • Statistics: Bivariate Data	• Y10 Autumn 3 and 4 – Developing Algebra • Y10 Spring 4 to 6 – Proportions and Proportional Change • Y10 Summer 2 to 4 – Using Number • Y10 Summer 1 – Delving into Data • Y11 Spring 4 to 6 – Revision and Communication • Y11 Summer 1 – Revision