KS3 Curriculum Content

Mathematics

Year 7	Half Term 1 September - October	Half Term 2 October - December	Half Term 3 January – February
	Topic: Week 1 to 2 Exploring Sequences **Knowledge/skills** Exploring sequences in detail, using both diagrams and list of numbers. Technology is used to produce graphs so students can appreciate and use the words "linear" and "non linear" linking to the patterns they have spotted. Calculators are used throughout so number skills are not a barrier to finding the changes between terms or subsequent terms. **Topic: Week 3 to 4 Understanding and using Algebraic Notation** **Knowledge/skills** Developing a deep understanding of the basic algebraic forms. Function machines are used, alongside bar models and letter notation, with time invested in single functions and the links to inverse operations before moving on to series of two machines and substitution into short abstract expressions. **Topic: Week 5 to 6 Equality and Equivalence** **Knowledge/skills** Students are introduced to forming and solving one-step linear equations, building on their study of inverse operations. The equations met will mainly require the use of a calculator, both to develop their skills and to ensure understanding of how to solve equations rather	**Topic: Week 1 to 3 Place Value and Ordering** **Knowledge/skills** Explore integers up to one billion and decimals to hundredths. Using and understanding number lines is a key strategy explored in depth, and will be useful for later work on scales for axes. Rounding to the nearest given positive power of ten is developed, alongside rounding to one significant figure. The median and range will be introduced, alongside placing numbers in order. Topics from last half term such as sequences and equations will interleave into this unit. **Topic: Week 4 to 6 Fraction, Decimal and Percentage Equivalence** **Knowledge/skills** Students are to gain a deep understanding of the links between fractions, decimals and percentages so that they can convert fluently between those commonly seen in real-life. The foundation strand will focus on multiples of one tenth and one quarter whilst the higher strand will look at complex conversions. Various forms of representation of any fraction will be studied, focusing on equivalence and further applying this alongside percentages in the context of pie charts. The focus is very much on a secure understanding of the most common fractions under one, but fractions above one will be touched upon through looking at mixed and improper fractions.	**Topic: Week 1 to 2 Solving Problems with Addition and Subtraction** **Knowledge/skills** Building on the formal methods of addition and subtraction students have developed at Key Stage 2. Students will look at this in the context of interpreting and solving problems drawn from the contexts of perimeter, money, interpreting bar charts and tables and looking at frequency trees. Calculators should be used to check and/or support calculations, with significant figures and equations explicitly revisited. **Topic: Week 3 to 5 Solving Problems with Multiplication and Division** **Knowledge/skills** Explore multiplication by 10,100 and 1000 in the context of unit conversions. Revising and extending substitution and simplification, distinguishing between multiples and factors, and allowing the study of multiplication and division through the forming and solving of two-step equations both with and without a calculator. Again, emphasis will be on solving problems, particularly involving area of common shapes and the mean. Choosing the correct operation to solve a problem will be a focus. There will also be some exploration of order of operations. **Topic: Week 6 Fractions and percentages of amounts**

	than spotting solutions. The unit finishes with consideration of equivalence and the difference between this and equality, illustrated through collecting like terms.		**Knowledge/skills** Explore the link between fractions and percentages and converting between the two. Calculate fractions and percentages of quantities.
Vocabulary Links	Sequence,term,position,rule, table, graph, linear, axes, non-linear, difference, ascending,descending, constant, geometric, fibonacci, arithmetic, position, function, input, output, inverse, operation, square, estimate, bar model, variable, coefficient, commutative, expression, evaluate, substitute, order, bracket, scale,curve, equation, equality, equals, solve, solution, unknown, index, simplify, collect	Place value, digit, billion, place holder, integer, interval, scale, equal division, gaps, spaces, approximate, halfway, round, nearest, convention, compare, equal to, not equal to, greater than, less than, order, ascending, descending, range, greatest, least, difference, median, middle, average, tenth, hundreth, decimal point, decimal, significant figure, power, index, million, billion, standard form, negative, fraction, fifth, quarter, equivalent, thousandths, eighths, percent, shaded, percentage, out of one hundred, convert, half, three-quarters, pie chart, sector, denominator, numerator, whole, improper, mixed number, rational, recurring	Total, sum, number line, product, difference, inverse, bridging, partition, number bonds, count on, carrying, place value, column method, equivalence, place holder, subtraction, addition, multiplication, division, estimate, mental, length, edge, polygon, distance, units, finance, pounds, pence, profit, loss, balance, debit, credit, statement, change, row, column, hours, minutes, frequency, sum, axis, scale, multiple, power, standard form, significant figure, million, billion, factor, even, odd, venn diagram, factor, lowest common multiple, highest common factor, metric, milli- , kilo-, centi- , convert, litre, gram, metre, estimate, remainder, order, operation, priority, base, perpendicular height, triangle, parallel, parallelogram, trapezium, mean, average, median, range, expression, simplify, term, fraction, numerator, denominator, percentage, decimal
National Curriculum	National curriculum content covered: • Move freely between different numerical, algebraic, graphical and diagrammatic representations • Make and test conjectures about patterns and relationships • Use a calculator and other technologies to calculate results accurately and then interpret them appropriately • Generate terms of a sequence from a term to term rule • Recognise arithmetic sequences	National curriculum content covered: • Consolidate understanding of the number system and place value to include decimals, fractions • 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 real numbers; use the symbols ≤ ≥ ≠ = • Work interchangeably with terminating decimals and their corresponding fractions	National curriculum content covered: • Use formal written methods, applied to positive integers and decimals • Recognise and use relationships between operations including inverse operations • Derive and apply formulae to calculate and solve problems involving perimeter • Construct and interpret appropriate tables, charts and diagrams, including frequency tables, bar charts and pictograms for categorical data, and vertical line(or bar) charts for ungrouped numerical data.

	- Recognise geometric sequences and appreciate other sequences that arise
	- Use algebra to generalise the structure of arithmetic, including to formulate mathematical relationships.
	- Recognise and use relationships between operations including inverse operations
	- Model situations or procedures by translating them into algebraic expressions
	- Substitute values into expressions, rearrange and simplify expressions
	- 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 $a \div b$
	- Generate terms of a sequence from a term to term rule
	- Produce graphs of linear functions of one variable
	- Simplify and manipulate algebraic expressions to maintain equivalence by collecting like terms
	- Use approximation through rounding to estimate answers
	- Use algebraic methods to solve linear equations in one variable
		- Round numbers to an appropriate degree of accuracy
		- Describe , interpret and compare observed distributions of a single variable through the median and the range
		- Interpret and compare numbers in standard form
		- Move freely between numerical representations
		- Extend understanding of the number system; make connections between number relationships
		- Express one quantity as a fraction of another, where the fraction is less than 1 and greater than 1
		- Define percentage as "number of parts per hundred", interpret percentages as a fraction or a decimal
		- Compare two quantities using percentages
		- Work with percentages greater than 100%
		- Interpret pie charts
			- Select and use appropriate calculation strategies to solve increasingly complex problems
			- Use the concepts and vocabulary factors (or divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple
			- Change freely between related standard units; time, length, area, volume, capacity, mass
			- Derive and apply formulae to calculate and solve problems involving perimeter and area or triangles, parallelograms and trapezia
			- Substitute numerical values into formulae and expressions, including scientific formulae
			- Use algebraic methods to solve linear equations in one variable
			- Describe, interpret and compare observed distributions of a single variable through the mean
			- Use the four operations, including formal written methods, applied to integers, decimals, proper and improper fractions
			- Interpret fractions and percentages as operators

Year 7	Half Term 4 February – March	Half Term 5 April - May	Half Term 6 June - July
	Topic: Week 1 to 3 Directed Numbers **Knowledge/skills**	**Topic: Week 1 to 3 Construction, Measurement and Notation**	**Topic: Week 1 to 2 Developing Number Sense** **Knowledge/skills**

	Extend and deepen understanding of directed number. Multiple representations and contexts enable students to appreciate the meaning behind operations with negative integers rather than relying on a series of "rules". This block provides valuable opportunities for revising and extending earlier topics, notably algebraic areas such as substitution and the solution of two-step equations. **Topic: Week 4 to 6 Fractional Thinking** **Knowledge/skills** Building on the autumn term study of "key" fractions, decimals and percentages, this unit provides more experience of equivalence of fractions with any denominators, leading to the introduction of addition and subtraction of fractions. Bar models and concrete representations will be used extensively to support this. Adding fractions with the same denominators will lead to further exploration of fractions greater than one, and using different denominators where one is a multiple of the other.	**Knowledge/skills** Students will build upon their KS2 skills using rulers, protractors and other measuring equipment to construct and measure increasingly complex diagrams using correct mathematical notation. This will include three letter notation for angles, the use of hatch marks to indicate equality and the use of arrows to indicate parallel lines. Pie charts will be studies here to gain further practice at drawing and measuring angles. **Topic: Week 4 to 6 Geometric Reasoning** **Knowledge/skills** Students will develop basic geometric language, names and properties of types of triangles and quadrilaterals, and the names of other polygons. Angle rules will be introduced and used to form short chains of reasoning, taking this further by investigating and using parallel line rules.	Students will review and extend their mental strategies with a focus on using a known fact to find other facts. Strategies for simplifying complex calculations will be explored. The skills gained in working with number facts will be extended to known algebraic facts. **Topic: Week 3 to 4 Sets and Probability** **Knowledge/skills** FDP equivalence will be revisited in the study of probability, where students will also learn about sets, set notation and systematic listing strategies. **Topic: Week 5 to 6 Prime Numbers and Proof** **Knowledge/skills** Factors and multiples will be revisited to introduce the concept of prime numbers, linking to Venn diagrams to solve more complex HCF and LCM problems. Odd, even, square, prime and triangular numbers will be used as the basis of forming and testing conjectures.
Vocabulary Links	Square, square root, subtract, congruent, sequence, simplify, like terms, collect, Place value, digit, billion, place holder, integer, interval, scale, equal division, gaps, spaces, approximate, halfway, round, nearest, convention, compare, equal to, not equal to, greater than, less than, order, ascending, descending, range, greatest, least, difference, tenth, hundreth, decimal point, decimal, significant figure, power, index, million, billion, standard form, positive, negative, fraction, fifth, quarter, equivalent, thousandths, eighths, convert, half, three-quarters, sector,	Line, segment, geometric, parallel, perpendicular, protractor, ruler, notation, polygon, triangle, quadrilateral, angle, vertices, height, width, length, degrees, rotation, full turn, quarter turn, half turn, acute, obtuse, right angle, reflex, interior, exterior, degrees, sum, measure, construct, intersect, equilateral, isosceles, scalene, square, rectangle, kite, rhombus, parallelogram, edges, equal, decagon, vertex, pair of compasses, regular, diagonal, compound, frequency, fraction, sector, sum, adjacent, vertically opposite, convex, concave, transversal, alternate, cointerior, corresponding, proof	Number line, addition, subtraction, partition, multiply, divide, factors, multiples, Venn diagrams, HCF and LCM, Odd, even, square, prime and triangular numbers, inclusive, set, union, mutually exclusive, intersection, OR, AND, both, impossible, likely, unlikely, chance, even, bias, random, Place value, digit, billion, place holder, integer, sample space, possibilities, fair, outcomes, interval, scale, equal division, gaps, spaces, approximate, round, nearest, convention, compare, equal to, not equal to, greater than, less than, order, ascending, descending, range, greatest, least, difference, tenth, hundreth,

			decimal point, decimal, significant figure, power, index, million, billion, standard form, positive, negative, fraction, denominator, numerator, whole, improper, mixed number, rational, recurring
denominator, numerator, whole, improper, mixed number, rational, recurring			
National Curriculum	National curriculum content covered: • Select and use appropriate calculation strategies to solve increasingly complex problems • Use the four operations, including formal written methods, applied to integers, both positive and negative. • Recognise and use relationship between operations including inverse operations • Use square and square roots • Substitute numerical values into formulae and expressions, including scientific formulae. • Understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors • Simplify and manipulate algebraic expressions to maintain equivalence • Understand and use standard mathematical formulae • Consolidate understanding of the number system and place value to include decimals, fractions • 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 real numbers; use the symbols ≤ ≥ ≠ = • Move freely between numerical representations	National curriculum content covered: • Use language and properties precisely to analyse 2D shapes • Begin to reason deductively in geometry including geometrical constructions • Draw and measure line segments and angles in geometric figures, including interpreting scale drawings • 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 • Use the standard conventions for labelling sides and angles • Construct and interpret pie charts for categorical, ungrouped and grouped numerical data • Identify and construct triangles • Derive and illustrate properties of triangles, quadrilaterals, circles and other plane figures using appropriate language and technologies • Apply the properties of angles at a point, angles on a straight line, vertically opposite angles • Apply angles facts, triangle similarity and properties of quadrilaterals to derive results about angles and sides and use known results to obtain simple proofs	National curriculum content covered: • Consolidate numerical and mathematical capability form key stage 2 and extend understanding of the number system and place value to include decimals, fractions, powers and roots • Select and use appropriate calculation strategies to solve increasingly complex problems • Begin to reason deductively in number and algebra • 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 and mutually exclusive outcomes and use these to calculate theoretical probabilities • Appreciate the infinite nature of the sets of integers, real and rational numbers • Use the concepts and vocabulary of prime numbers, factors, multiples, common factors, common multiples, highest

• Extend understanding of the number system; make connections between number relationships • Express one quantity as a fraction of another, where the fraction is less than 1 and greater than 1 • Work interchangeably with terminating decimals and their corresponding fractions	• 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 the properties of regular polygons.	common factor, lowest common multiple, prime factorisation, including using product notation and he unique factorisation property • Use integer powers and associated real roots (squares, cubes), recognise powers of 2,3,4,5 • Make and test conjectures about patterns and relationships; look for proofs or counterexamples

Year 8	Half Term 1 September - October	Half Term 2 October - December	Half Term 3 January - February
	Topic: Week 1 to 2 Ratio and Scale **Knowledge/skills** This unit focuses initially on the meaning of ratio and the various models that can be used to represent ratios. Based on this understanding students move onto sharing in a ratio given the whole or one of the parts, and how to use bar models to ensure the correct approach to solving a problem. Pupils deepen their understanding of Simplifying ratios and equivalent ratios rather than "cancelling" purely as a procedure. The links between ratio and fractions are further explored, leading to the use of π as the ratio of the circumference of a circle to its diameter. **Topic: Week 3 to 4 Multiplicative Change** **Knowledge/skills**	**Topic: Week 1 to 3 Working in the Cartesian Plane** **Knowledge/skills** Students will look formally at algebraic rules for straight lines, starting with lines parallel to the axes and moving on to the more general form. The focus will be on using equations to produce lines and then move onto exploring the notions of gradients and intercepts. Appreciating the similarities and difference between sequences, lists of coordinate and lines will then move onto exploring non-linear graphs and midpoints of line segments. **Topic: Week 4 to 5 Representing Data** **Knowledge/skills**	**Topic: Week 1 to 4 Brackets, Equations & Inequalities** **Knowledge/skills** Students will explore expanding over a single bracket and factorising by taking out common factors. Expanding two binomials will provide challenge. Students will revisit and extend their knowledge of solving equations, now to those with brackets and with unknowns on both sides. For the first time students will learn how to solve formal inequalities, learning the meaning of a solution set and exploring the similarities and differences compared to solving equations. **Topic: Week 5 Sequences** **Knowledge/skills**

	Students work with the link between ratio and scaling, including the idea of direct proportion, linking various forms including graphs and using context, such as conversion of currencies and conversion graphs, provides rich opportunities for problem solving. Links are also made with maps and scales, and the use of scale factors to find missing lengths in pairs of similar shapes. **Topic: Week 5 to 6 Multiplying and Dividing Fractions** **Knowledge/skills** Students will have had a little experience of multiplying and dividing fractions in year 6; by looking at multiple representations this understanding will deepen. Multiplication and division by both integers and fractions are covered, with an emphasis on the understanding of the reciprocal and its uses. This is extended by multiplying and dividing with mixed numbers and improper fractions. Links between fractions and decimals are also revisited.	Students are introduced formally to bivariate data and the idea of linear correlation. They extend their knowledge of graphs and charts from Key Stage 2 to deal with both discrete and continuous data. **Topic: Week 6 Tables and Probability** **Knowledge/skills** Students build upon the unit from year 7, looking at sample spaces and using tables to represent ideas and calculate probabilities.	Students reinforce sequences learning from the start of Year 7, extending to sequences with more complex algebraic rules, allowing students to be more familiar with a wider range of notation. Objects and images to understand the meaning of rules will lead to students finding a rule for the nth term for a linear sequence. **Topic: Week 6 Indices** **Knowledge/skills** Students will use and interpret algebraic notation involving powers.
Vocabulary Links	Ratio, proportion, equal parts, divide, relationship, order, multiply, share, label, factors, simplify, equivalent, compare, scale, units, fraction, numerator, denominator, perimeter, circumference, pi, diameter, constant	Venn diagrams, HCF and LCM, inclusive, set, union, mutually exclusive, intersection, OR, AND, both, impossible, likely, unlikely, chance, even, bias, random, integer, sample space, possibilities, fair, outcomes, interval, scale, approximate,quadrant, coordinates, horizontal,vertical, axis, origin, parallel, straight line, graph, scale, diagonal, substitute, steep, linear, table, gradient, input, output, intercept, midpoint, equidistant	Simplify, expand, factorise, term, expression, coefficient, substitute, equivalent, positive, negative, solve, inequality, product, bracket, multiply out, factor, common factor, HCF, binomial, quadratic, solution, unknown, form, solution set, greater than, less than, equal to, balance, variable, formula, subject
National Curriculum	National curriculum content covered: • Make connections between number relationships and their algebraic and graphical representations	National curriculum content covered: • Move freely between different numerical, algebraic, graphical and diagrammatic representations	National curriculum content covered: • Identify variables and express relationships between variables algebraically

	- Use scale factors, scale diagrams and maps - Understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction - Divide a given quantity into two parts in a given part:part or part:whole ratio, expression the division of a quantity into two parts as a ratio - Solve problems using direct and inverse proportion - Extend and formalise their knowledge of ratio and proportion in working with measures and in formulating proportional relations algebraically - Interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning. - Consolidate numerical and mathematical capability from KS2 and extend understanding of the number system and place value to include decimals and fractions - Select and use appropriate calculation strategies to solve increasingly complex problems - Use the four operations, including formal written methods, applied to integers, decimals, proper and improper fractions, and mixed numbers, all both positive and negative.	- Develop algebraic and graphical fluency, including understanding linear (and simple quadratic) functions - Make connections between number relationships and their algebraic and graphical representations - Substitute numerical values into formulae and expressions - Recognise, sketch and produce graphs of linear functions of one variable with appropriate scaling using equations in x and y and the Cartesian plane. - 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, barcharts, piecharts, and pictograms for categorical data, and vertical line (or bar) charts for ungrouped and grouped data. - Describe simple mathematical relationships between two variables (bivariate data) in observational and experimental contexts and illustrate using scatter graphs - Use language and properties precisely to analyse probability and statistics - 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.	- Begin to model situations mathematically and express the results using a range of formal mathematical representations - Substitute numerical values into formulae and expressions, including scientific formulae - 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 -multiplying a single term over a bracket -taking out common factors -expanding products of two or more binomials - Understand and use standard mathematical formulae - Use algebraic methods to solve linear equations in one variable - Generate terms of a sequence from either a term to term or position to term rule - Recognise arithmetic sequences and find the nth term - Recognise geometric sequences

		- Understand that the probabilities of all possible outcomes sum to 1 - Generate theoretical sample spaces for single and combined events with equally likely and mutually exclusive outcomes and use these to calculate theoretical probabilities	
Year 8	Half Term 4 February – March	Half Term 5 April - May	Half Term 6 June - July
	Topic: Week 1 to 2 Fractions and Percentages **Knowledge/skills** Building on the autumn term, students focus on the relationships between fractions and percentages, including decimal equivalents and using these to work out percentage increase and decrease. Students also explore expressing one number as a fraction and percentage of another before moving onto finding the original value given a percentage or after a percentage change. Financial maths is developed through the contexts of profit, loss and interest. **Topic: Week 3 to 4 Standard Index Form** **Knowledge/skills** Building on work briefly covered in year 7, students will extend their earlier work on indices and understand standard form notation and its uses. Students will be introduced to negative and fractional indices. **Topic: Week 5 to 6 Number Sense** **Knowledge/skills**	**Topic: Week 1 to 2 Angles in parallel lines and polygons** **Knowledge/skills** This block builds on KS2 and Year 7 understanding of angle notation and relationships, extending all students to explore angles in parallel lines and thus solve increasingly complex missing angle problems. Links are made to the closely connected properties of polygons and quadrilaterals. Students following the higher strand will also develop their understanding of the idea of proof. Students will start to explore constructions with rulers and pairs of compasses. **Topic: Week 3 to 4 Area trapezia and circles** **Knowledge/skills** Students following the higher strand will have met the formulae for the area of a trapezium in year 7; this knowledge is now extended to all students, along with the formula for the area of a circle. A key aspect of the unit is choosing and using the correct formula for the correct shape, reinforcing recognising the shapes, their	**Topic: Week 1 to 4 The data handling cycle** **Knowledge/skills** Much of the statistics content at Key Stage 3 is a continuation of that studied at primary schools, and many of the charts and graphs in this block have been used in year 7 and earlier in year 8. A particular focus is using charts to compare different distributions. We will explore when graphs may be misleading, an important real-life consideration. Collection of data is also covered, including designing and criticising questionnaires. Through an extended project, students become aware of the pitfalls and difficulties of data collection and interpretation as well as the procedural production of graphs and charts. **Topic: Week 5 to 6 Measures of location** **Knowledge/skills** Students have already met the median and the mean earlier in KS3. This block introduces the mode and when and why each average should be used. Students following the higher strand will look at the mean from grouped and ungrouped frequency tables. We will consider outliers, considering what effect these have on all the measures studied, and

	This block provides a timely opportunity to revisit basic numeracy skills in a wide variety of contexts. Estimation is a key focus and the use of mental strategies will therefore be embedded throughout. The conversion of metric units will allow multiplying and dividing by 10,100 and 1000 to be revisited in context. This will be extended to look at conversions between metric units and conversions between area and volume units.	properties and names and looking explicitly at compound shapes. **Topic: Week 5 to 6 Line symmetry and reflection** **Knowledge/skills** The teaching of reflection is split from that of rotation and translation to try and ensure students attain a deeper understanding and avoid mixing up the different concepts, allowing them to build confidence with shapes and lines in different orientations. Students can revisit and enhance their knowledge of special triangles and quadrilaterals and focus on key vocabulary such as object, image and congruent. Rotation and translation will be further explored in Year 9.	whether they should be included or excluded in our calculations.
Vocabulary Links	Percentage, fraction, increase, decrease, numerator, denominator, out of 100, change, original, standard form, index, power, decimal, mass, length, time, cm, mm, m, kilo, centi, area, volume, negative, fractional, terminating, rounding, estimate, equivalent, tenth, hundredth, reduce, multiplier, growth, factor, express, round, integer, profit, loss, original, invest, reverse	Adjacent, angles at a point, vertically opposite, obtuse, reflex, acute, straight, right angle, compass, ruler, polygon, parallel, alternate, corresponding, intersect, transversal, supplementary, co-interior, isosceles, equilateral, scalene, rhombus, parallelogram, kite, trapezium, bisect, perpendicular, exterior, interior, regular, irregular, sum, total, pentagon, hexagon, justify, proof, demonstration, bisector, formula, area, triangle, area, height, compound, circle, sector, estimate , pi, radius, diameter, calculate, substitute, significant figure, line symmetry, rotation, reflect, object, image, congruent, vertical, horizontal, vertex	Hypothesis, process, investigation, primary, secondary, data, sample, enquiry, questionnaire, bias, design, multiple choice, response, pictogram, bar chart, line chart, tally chart, frequency, scale, axes, comparison, key, full turn, pie chart, fraction, proportion, change, scatter diagram, bivariate, grouped, intervals, continuous, discrete, range, spread, average, consistent, distribution, scale, mislead, describe, interpret, variable, mean, mode, median, range, outlier

National Curriculum	National curriculum content covered:
	   • Develop use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics
		National curriculum content covered:
		   • Apply the properties of angles at a point, angles on a straight line, vertically opposite angles
			National curriculum content covered:
			   • Describe, interpret and compare observed distributions of a single variable through appropriate graphical representation involving discrete, continuous and grouped

- Work interchangeably with terminating decimals and their corresponding fractions
- Define percentage as "number of parts", interpret percentages and 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
- Use integer powers and associated real roots (square, cubes and higher), recognise powers of 2,3,4,5, and distinguish between exact representations of roots and their decimal approximations
- Interpret and compare numbers in standard form where n is a positive or negative integer or zero

  $A \times 10^n, 1 \leq A < 10,$

- Use standard units of mass, length, time, money and other measures, including with decimal quantities
- Round numbers and measures to an appropriate degree of accuracy
- Use approximation through rounding to estimate answers and calculate the possible resulting errors expressed using inequality notation

- Understand and use the relationship between parallel lines and alternate and corresponding lines
- Derive and use the sum of angles in a triangle and use it to deduce the angle sum in any polygon and to derive the properties of regular polygons
- Use the standard conventions for labelling sides and angles of triangle ABC
- Derive and illustrate the properties of triangles, quadrilaterals, circles and other plane figures using appropriate language and technologies
- Derive and use the standard ruler and compass constructions (H higher)
- Derive and apply formulae to calculate and solve problems involving perimeter and area of triangles, parallelograms, trapezia
- Calculate and solve problems involving perimeters of 2D shapes, areas of circles and composite shapes
- Describe, sketch and draw using conventional terms and notations : points, lines, parallel lines, perpendicular lines, right angles, regular polygons and other polygons that re reflectively and rotationally symmetric
- Identify properties of, and describe the results of reflections applied to figures

data; and appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers)
- Construct and interpret appropriate tables, charts and diagrams, including frequency tables. Bar charts, pie charts and pictograms for categorical data and vertical charts for ungrouped or grouped numerical data

KS3 Curriculum Content

Mathematics

Year 9 Foundation Level

(scroll down for Higher level)

Year 9	Half Term 1 September - October	Half Term 2 October - December	Half Term 3 January – February
	Topic: F4 Basic Algebra **Knowledge/skills** Use and interpret algebraic notation, including •ab in place of a x b •3y in place of y + y + y and 3 x y •a^2 in place of a x a, a3 in place of a x a x a, a^2b in place of a x a x b •in place of a ÷ b •coefficients written as fractions rather than decimals •Understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors Simplify and manipulate algebraic expressions (including those involving surds) by: •collecting like terms •multiplying a single term over a bracket •taking out common factors •expanding products of two binomials •factorising quadratic expressions of the form x^2 + bx + c, including the difference of two squares •simplifying expressions involving sums, products and powers, including the laws of indices. 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	**Topic: F15 Number work** **Knowledge/skills** Use the concepts and vocabulary of prime numbers, factors (divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation theorem Use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5 Calculate with roots and with integer indices **Topic: F6 Basic Decimals** **Knowledge/skills** Order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, >, ⩽, ⩾ Apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers - all both positive and negative; understand and use place value (eg when working with very large or very small numbers, and when calculating with decimals) Round numbers and measures to an appropriate degree of accuracy (eg to a specified number of decimal places or significant figures); use inequality notation to specify simple error intervals due to truncation or rounding	**Topic:F3 Statistics** **Knowledge/skills** 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, tables and line graphs for time series data and know their appropriate use Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: •appropriate graphical representation involving discrete data •appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers) **Topic: F11 Averages** **Knowledge/skills** •appropriate graphical representation involving discrete, continuous and grouped data •appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers)

Topic: F12 Negative Numbers **Knowledge/skills** Apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers - all both positive and negative; understand and use place value (eg when working with very large or very small numbers, and when calculating with decimals) **Topic: F8 Equations** **Knowledge/skills** Where appropriate, interpret simple expressions as functions with inputs and outputs Solve linear equations in one unknown algebraically (including those with the unknown on both sides of the equation); find approximate solutions using a graph **Topic: F16 Graphs** **Knowledge/skills** Work with coordinates in all four quadrants Identify and interpret gradients and intercepts of linear functions graphically and algebraically Solve geometrical problems on coordinate axes **Topic: F1 Basic Number** **Knowledge/skills** Order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, >, ≤, ≥	**Topic: Maths and Science month** **Knowledge/skills** Understand and use standard mathematical formulae; rearrange formulae to change the subject Substitute numerical values into formulae and expressions, including scientific formulae Calculate with and interpret standard form $A \square 10^n$, where $1 \leqslant A < 10$ and n is an integer Pupils apply all of the skills learned in this topic in a science context and practice science exam questions. **Assessment Point 1** **2 X 45 min Exam paper** **Non Calculator**	**Topic: H44 Venn Diagrams** **Knowledge/skills** Enumerate sets and combinations of sets systematically, using tables, grids, Venn diagrams

	Apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers - all both positive and negative; understand and use place value (eg when working with very large or very small numbers, and when calculating with decimals) Recognise and use relationships between operations, including inverse operations (eg cancellation to simplify calculations and expressions); use conventional notation for priority of operations, including brackets, powers, roots and reciprocals		
Vocabulary Links	Interpret,coefficients,expressions, equations, formulae,identity,inequality,terms,factors, simplify, manipulate,common,expanding, products, binomial,indices,integers, decimals,functions, inputs, outputs, solve,quadrants,gradients,functions, order, positive,negative, integer, inverse, cancel,brackets, powers,roots,reciprocals	Prime,, factor,divisor, multiple, common factor, common multiple, factorisation, product,integer,powers,roots indices Order,positive,negative,decimals,fractions, Round, accuracy, decimal places,significant figures, inequality,error intervals,formulae; rearrange,the subject, substitute,	Interpret,frequency,pictogram,vertical,hprizontal, Discrete,data, analyse,compare,distribution, median, mean, mode,modal,spread,range,outlier
National Curriculum	A1,A2,A4,A6,N1,N2,A7,A17,A8,A10,G11,A14, N1,N2,N3	N7,N6,N4,N1,N2,N15 N1,N2,N3,N8, N12,N10,R16, R9,R3, A5,A2,N9	S2,S4,P6,

Year 9	Half Term 4 February – March	Half Term 5 April - May	Half Term 6 June - July
	Topic: F10 Symmetry **Knowledge/skills** Use conventional terms and notations: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and / or rotation symmetries; use the standard conventions for labelling and referring to the sides and angles of triangles; draw diagrams from written description **Topic: F9 Angles** **Knowledge/skills** Apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles; understand and use alternate and corresponding angles on parallel lines; derive and use the sum of angles in a triangle Derive and 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 Measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings **Topic: F14 Perimeter and Area** **Knowledge/skills** Identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids,	**Topic: F7 Basic Percentages** **Knowledge/skills** Interpret fractions and percentages as operators Define percentage as 'number of parts per 100'; interpret percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively; express one quantity as a percentage of another; compare two quantities using percentages; work with percentages greater than 100%; solve problems involving percentage change, including percentage increase / decrease and original value problems, and simple interest including in financial mathematics **Topic: F2 Fractions Review** **Knowledge/skills** Order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, >, ⩽, ⩾ Apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers - all both positive and negative; understand and use place value Calculate exactly with fractions Work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and or 0.375 and) **Topic: F5 Probability** **Knowledge/skills** Apply systematic listing strategies	**Topic: H17 Ratios** **Knowledge/skills** 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; apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations) Understand and use proportion as equality of ratios **Round up of year** **Review topics as necessary** **Assessment Point 3** **90 min Exam paper** **Non Calculator** **90 min Exam paper** **Calculator**

	prisms, cylinders, pyramids, cones and spheres Know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volumes of cuboids and other right prisms (including cylinders)	Relate relative expected frequencies to theoretical probability, using appropriate language and the 0 - 1 probability scale Apply the property that the probabilities of an exhaustive set of outcomes sum to 1; apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to 1	
Vocabulary Links	points, lines, veriex, vertices, edge, plane, parallel, perpendicula,polygons, regular reflection,rotation, symmetry,vertically opposite alternate,corresponding,quadrilateral,square, rectangle, parallelogram, trapezium, kite,rhombus,triangles,segments,bearing, faces, surface,cube, cuboid, prism, cylinder, pyramid, cone,sphere,area,volume **Assessment Point 2** **2 X 45 min Exam paper** **Non Calculator**	Operators,percentage,quantity,increase / decrease,original,interest,integers, decimals,simple fractions (proper and improper), Terminatin,relative,expected,theoretical probability,probability scale,exhaustive Outcome,mutually exclusive	Part,conversion,proportion,ratios
National Curriculum	G1,G3,G4,G15,G12,G16	N12,R9, N1,N2,N8,N10	R1,R4,R5,R7

KS3 Curriculum Content

Mathematics

Year 9 Higher Level

Year 9 Higher	Half Term 1 September - October	Half Term 2 October - December	Half Term 3 January – February
	Topic: H3 Algebra **Knowledge/skills** Substitute numerical values into formulae and expressions, including scientific formulae Simplify and manipulate algebraic expressions (including those involving surds) by: •collecting like terms •multiplying a single term over a bracket •taking out common factors •expanding products of two binomials •factorising quadratic expressions of the form $x^2 + bx + c$, including the difference of two squares •simplifying expressions involving sums, products and powers, including the laws of indices. **Topic: H6 Equations** **Knowledge/skills** Order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, >, ⩽, ⩾ Use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5 Use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5 estimate powers and roots of any given positive number	**Topic: H1 Fractions and Percentages** **Knowledge/skills** Order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, >, ⩽, ⩾ Apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers - all both positive and negative; understand and use place value (eg when working with very large or very small numbers, and when calculating with decimals) Recognise and use relationships between operations, including inverse operations (eg cancellation to simplify calculations and expressions); use conventional notation for priority of operations, including brackets, powers, roots and reciprocals Work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and or 0.375 and) Work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and or 0.375 and); change recurring decimals into their corresponding fractions and vice versa Interpret fractions and percentages as operators Express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1	**Topic: H2 Statistics** **Knowledge/skills** Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling 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, tables and line graphs for time series data and know their appropriate use 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 **Topic: H9 Averages** **Knowledge/skills** Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: • appropriate graphical representation involving discrete, continuous and grouped data **Topic: H15 Cumulative frequency** **Knowledge/skills** Construct and interpret diagrams for grouped discrete and continuous data, ie cumulative

Use and interpret algebraic notation, including
ab in place of a × b
3y in place of y + y + y and 3 × y
a2 in place of a × a, a3 in place of a × a × a,
a2b in place of a × a × b
$\dfrac{a}{b}$ in place of a ÷ b
Understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors
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

Topic: H12 Straight Line Graphs

Knowledge/skills
Work with coordinates in all four quadrants
Plot graphs of equations that correspond to straight-line graphs in the coordinate plane; use the form y = mx + c
to identify parallel lines; find the equation of the line through two given points, or through one point with a given gradient

Plot graphs of equations that correspond to straight-line graphs in the coordinate plane; use the form y = mx + c to identify parallel lines and perpendicular lines; find the equation of the line through two given points, or through one point with a given gradient

Define percentage as 'number of parts per 100'; interpret percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively; express one quantity as a percentage of another; compare two quantities using percentages; work with percentages greater than 100%; solve problems involving percentage change, including percentage increase / decrease and original value problems, and simple interest including in financial mathematics
Set up, solve and interpret the answers in growth and decay problems, including compound interest and work with general iterative processes

Topic: Maths in Science Month

Knowledge/skills
Understand and use standard mathematical formulae; rearrange formulae to change the subject
Substitute numerical values into formulae and expressions, including scientific formulae
Calculate with and interpret standard form A □ 10 n,
where 1 ⩽ A < 10 and n is an integer
Pupils apply all of the skills learned in this topic in a science context and practice science exam questions.

Assessment Point 1

2 X 45 min Exam paper
Non Calculator

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
•appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers, quartiles and inter-quartile range)

Topic: H25 Histograms

Knowledge/skills
Construct and interpret diagrams for grouped discrete and continuous data, ie histograms with equal and unequal class intervals and cumulative frequency graphs, and know their appropriate use

	Identify and interpret gradients and intercepts of linear functions graphically and algebraically Interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion Solve geometrical problems on coordinate axes **Topic: H22 Equations and Inequalities** **Knowledge/skills** Solve linear equations in one unknown algebraically (including those with the unknown on both sides of the equation); find approximate solutions using a graph Solve linear inequalities in one or two variables and quadratic inequalities in one variable; represent the solution set on a number line, using set notation and on a graph		
Vocabulary Links	Substitute,formulae,expressions,term, Factors,expanding,binomials,factorising, Positive,negative,integers,roots, expressions, equations, formulae, identities, inequalities, terms and factors quadrants,parallel,gradient,inverse, proportion	Order,positive,negative,ntegers,proper, improper,operations,inverse,roots, reciprocals,terminating,recurring,interest, compound,rearrange,subject,substitute, expressions,	Populations,distribution,sample,limitations, Interpret,charts,diagrams, frequency, pictograms,data, discrete, scatter, correlation prediction, interpolate,extrapolate,trend, continuous , cumulative,spread ,outliers, quartiles, inter-quartile, range
AQA Exam Board Specification Reference	A2,A4, N1,N6,A21,A1,A3,A8, R14,G11,A9,A10,A22,	N1,N2,N3,N8,N8H,N12,N10,N10H, R16,R16H,R9,R3, A5,A2,N9	S1,S2,S3,S3H,S4,S4H,S6

Year 9	Half Term 4 February – March	Half Term 5 April - May	Half Term 6 June - July
	Topic: H4 Probability **Knowledge/skills** 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 to calculate expected outcomes of multiple future experiments Relate relative expected frequencies to theoretical probability, using appropriate language and the 0 - 1 probability scale Apply the property that the probabilities of an exhaustive set of outcomes sum to 1; apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to 1 Understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size Construct theoretical possibility spaces for single and combined experiments with equally likely outcomes and use these to calculate theoretical probabilities Calculate and interpret conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams and Venn diagrams **Topic: H11 Area and Perimeter** **Knowledge/skills** Know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volumes of cuboids and other right prisms (including cylinders)	**Topic: H8 Surds** **Knowledge/skills** Calculate with roots and with integer indices and fractional indices Calculate exactly with fractions, surds, and multiples of π; simplify surd expressions involving squares (eg $\sqrt{12} = \sqrt{4 \times 3} = \sqrt{4} \times \sqrt{3}$ $= 2\sqrt{3}$) and rationalise denominators **Topic: H7 Geometry** **Knowledge/skills** Use conventional terms and notations: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and / or rotation symmetries; use the standard conventions for labelling and referring to the sides and angles of triangles; draw diagrams from written description Apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles; understand and use alternate and corresponding angles on parallel lines; derive and use the sum of angles in a triangle (eg to deduce and use the angle sum in any polygon, and to derive properties of regular polygons) Derive and apply the properties and definitions of: special types of quadrilaterals,	**Topic: F26 Trigonometry** **Knowledge/skills** Know the formulae for trigonometric ratios, sin☐ = , cos ☐ = and tan☐ = ; apply them to find angles and lengths in right-angled triangles in two dimensional figures **Topic: H13 Ratio** **Knowledge/skills** 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; apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations) Understand and use proportion as equality of ratios Use compound units such as speed, rates of pay, unit pricing, density and pressure Compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors Identify and work with fractions in ratio problems Use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate

	Know the formulae: circumference of a circle = 2πr = πd, area of a circle = πr2; calculate: perimeters of 2D shapes, including circles; areas of circles and composite shapes; surface area and volume of spheres, pyramids, cones and composite solids Calculate arc lengths, angles and areas of sectors of circles **Topic: H5 Limits of Accuracy** **Knowledge/skills** Estimate answers; check calculations using approximation and estimation, including answers obtained using technology Round numbers and measures to an appropriate degree of accuracy (eg to a specified number of decimal places or significant figures); use inequality notation to specify simple error intervals due to truncation or rounding Apply and interpret limits of accuracy Apply and interpret limits of accuracy including upper and lower bounds **Assessment Point 2** **2 X 45 min Exam paper** **Non Calculator**	including square, rectangle, parallelogram, trapezium, kite and rhombus; and triangles and other plane figures using appropriate language Apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides. Measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings **Topic: H27 Pythagoras Theorem** **Knowledge/skills** Know the formulae for: Pythagoras' theorem, $a^2 + b^2 = c^2$, apply them to find lengths in right-angled triangles in two dimensional figures	**Topic: H61 Quadratics** **Knowledge/skills** • expanding products of two or more binomials •factorising quadratic expressions of the form $x^2 + bx + c$, including the difference of two squares; factorising quadratic expressions of the form $ax^2 + bx + c$ **Round up of year** Review topics as necessary **Assessment Point 3** **90 min Exam paper** **Non Calculator** **90 min Exam paper** **Calculator**
Vocabulary Links	Record, describe, analyse, frequency, outcomes, random, fairness, exhaustive, mutually exclusive, vents, biased, sample, formulae triangles, parallelograms, trapezia, volume, cuboid cylinders circumference, perimeters spheres, pyramids, cones, composite, solids, arc,	Roots, integer, indices, fractional indices, surds, rationalise, denominators, vertex, edge, plane, parallel, perpendicular, polygon, reflection, rotation, symmetry, vertically opposite, alternate and corresponding, quadrilateral, parallelogram, trapezium, kite, rhombus, congruence, similarity, radius, chord, diameter,	Formulae, trigonometric, ratios, part, conversion, proportion ,speed, rates of pay, unit ,expanding, products, binomial, factorising,

	approximation ,estimation, error intervals, truncation ,limits of accuracy upper and lower bounds,	circumference, tangent, arc, sector and segment, scale bearings	
AQA Exam Board Specification Reference	P1,P2,P3,P4,P5,P7,P9H,G16,G17, G18,N14,N15,16,N16H	G1,G2,G3,G4,G6,G9,G15,G20	G20,N13,R1,R4,R5,R7,R11,R12, N11,N13,A4H