KS3

	Autumn		Spring		Summer	
	Half Term 1	**HT2**	**HT3**	**HT4**	**HT5**	**HT6**
Y7	**Sequences:** Pupils begin their time at secondary school by studying sequences. The goal is not to leap to nth term expressions immediately, but to formalise ideas around sequences that will have been developed at primary school, and lay the groundwork for algebraic generalisation later in the half term. **Algebraic Notation:** Pupils use function machines and bar models to scaffold their understanding of the language of algebra. Once they have mastered basic algebraic notation, the idea of variables taking specific values is introduced as they substitute into expressions. They then return to the previous units work on sequences to make a link to algebraic	**Place Value:** Pupils review work from primary school on place value. They use ideas from unit 1 to work with number lines in preparation for drawing axes later, then use work on comparing and ordering numbers using place value in finding the median and range of sets of data. Finally, they apply their understanding of place value to rounding integers, including via the language of significant figures. **Fraction decimal and percentage equivalence:** After reviewing what fractions are, how they can be represented, and equivalence between fractions, pupils are taught to convert fluently between fractions, decimals, and percentages. They begin by focussing on	**Addition and subtraction:** This unit builds upon the work pupils have done with addition and subtraction at primary school. Many will be secure in this knowledge already, so will progress quickly to learning formal language to describe their understanding, and solving more complex problems in various contexts. **Multiplication and division:** Again, many pupils will be comfortable with written methods for multiplication and division already, so they review this briefly, then extend it by using more formal language, and by applying these ideas to more complex problems, and other contexts such as area and the mean. The order of operations is	**Directed number:** Directed number is not covered fully at primary school, so this unit reviews what has been taught and extends it to using all for operations, with representations used to support understanding before pupils move to abstract rules. They then link this back to earlier work on algebra to consolidate what they have learned. Two-step equations are introduced for the first time to support this. **Addition and subtraction of fractions:** Pupils' work on adding and subtracting fractions from primary school is extended to include any pair of fractions, with most studying mixed numbers too. Bar models are used extensively to support pupils' understanding of the	**Number sense:** Pupils are explicitly taught a variety of strategies for mental calculation using integers, fractions, and decimals. They then apply their knowledge of significant figures to estimation, and draw upon their work on place value to derive results from known calculation facts. **Construction and geometric notation**: Pupils will develop their skills in using drawing equipment to construct increasingly complex diagrams. They will learn and employ formal mathematical notation for lines and angles. **Geometric reasoning**: Pupils consolidate their knowledge of 2D shapes and angle facts from KS2. They extend this by using the angles facts	**Sets and Probability**: Pupils learn about the notion of sets and the related notation. This understanding is then applied to understanding Venn diagrams, which will have been used extensively but less formally in primary school. They then look at probability, with a particular focus on accurate use of language to describe this. **Prime Numbers and** **Proof:** Pupils end the year by studying special classes of numbers. They revisit the ideas of factors and multiples through prime factorisation, linking back to Venn diagrams to find HCFs and LCMs. Finally, their new knowledge is used in a

	generalisation. **Equality and equivalence:** Pupils are introduced to the idea of equality, drawing upon their knowledge of function machines and substitution. The equations they solve mainly involve the use of a calculator in order to force a focus on solving equations rather than spotting solutions. They then study the idea of equivalence of expressions by collecting like terms	multiples of tenths and eighths, before they consider more general conversion. Within this, they refer back to the number lines used previously, and briefly consider the use of fractions in pie charts.	introduced both as a context to review substitution and a precursor to later teaching of two-step equations. **Percentage of an amount:** This is a short unit in which pupils consolidate their knowledge of finding fractions and percentages of amounts. They work both forwards and backwards and begin to use the language of part and whole.	mathematical structure underlying this procedure.	more formally, constructing chains of reasoning using a more rigorous structure and clear mathematical notation.	first introduction to the ideas of mathematical argument, conjecture and proof.
Y8	**Working in the cartesian plane:** Pupils study the use of algebra to define linear graphs. They begin by focussing on the simplest case, horizontal and vertical lines, before progressing to more complex equations. At all stages, the focus is more on the interpretation of the equation as a rule	**Ratio and scale:** Pupils are introduced to the language of ratio for the first time at secondary school. They spend time exploring the meaning of ratio as a comparison of quantities before looking at equivalent ratios and simplification. They then begin to use bar models as a way to understand the idea of	**Multiplying and dividing fractions:** Pupils limited experience of multiplying and dividing fractions from primary school is extended by studying the mathematical structure underlying the algorithms. Diagrams are used to illustrate this, starting with the simplest case of	**Standard Form:** Pupils study standard form for the first time in this unit, building upon their work last half term. The use of context is important to help students make sense of the need for this notation. **Angles in parallel lines and polygons:**	**Area:** After reviewing their work on the area of rectangles, triangles, and parallelograms, pupils extend their knowledge of area to encompass trapezia and circles. They apply this new understanding to compound shapes and problems in context.	**Reflection:** Pupils revisit the idea of probability, this time with a focus on using diagrams to represent situations. They start by considering sample space diagrams and two way tables , before revisiting the set notation and Venn dagrams they studied in Year 7 in this context.

	linking x- and y-coordinates, rather than purely on the procedure of creating a table of values (though this is still explicitly taught). Pupils may be encouraged to notice patterns in the results they get, but gradient, y-intercept, and y=mx+c are left for Year 9. **Indices:** Pupils prepare for their study of standard form next term by studying the index laws in algebra. They have encountered these in very simple ways before when studying expressions and like terms, but now go into greater depth. **Brackets, equations and inequalities:** Pupils consolidate their understanding of equality and equations from Year 7 by broadening it to incorporate new ideas.	sharing into a ratio, then use them as an aid in tackling more complex problems. **Multiplicative change:** Pupils build upon their understanding of ratio by exploring proportionality in various contexts, such as currency conversion, recipes, best value, and scale diagrams. They use a 'box model' to support this understanding. **Number sense:** This block provides a timely opportunity to revisit a lot of basic skills in a wide variety of contexts. Estimation is a key focus and the use of mental strategies will therefore be embedded throughout. Pupils also look explicitly at solving problems using the time and calendar as this area is sometimes neglected. Some will revisit their study of	multiplying a fraction by an integer, then multiplying and dividing fractions, before finally building towards abstraction. **Fractions and percentages:** The relationships between fractions and percentages, introduced in Year 7, are explored more fully in this unit. Pupils apply what they already know to questions in contexts such as financial maths and also consider percentage increases and decreases.	Pupils build on their work on angle facts and notation in Year 7 to explore the patterns for angles in parallel lines. They then generalise their understanding of the angles sums of triangles and quadrilaterals to all polygons.	**Tables and probability:** Pupils revisit the idea of probability, this time with a focus on using diagrams to represent situations. They start by considering sample space diagrams and two way tables , before revisiting the set notation and Venn dagrams they studied in Year 7 in this context.	**Data handling cycle:** Pupils cover the data handling cycle from start to finish, including designing and criticising questionnaires. A particular focus is using charts to compare different distributions. We also explore when graphs may be misleading, an important real-life consideration. **Measures of** **location:** Pupils revisit the median and mean (introduced in Year 7) and study the mode for the first time. They consider when each average should be used and how they can help to compare distributions. Finally, they use frequency tables to calculate the mean.

	They begin by expanding and factorising single brackets, which prompts review of equations (now featuring brackets). They then work on solving equations with unknowns on both sides. Finally, they are introduced to the idea of inequalities, comparing and contrasting these to equations. **Sequences:** Pupils studied simple nth term expressions at the start of Year 7. They now revisit this, using more complex rules. They then proceed to find nth term expressions for linear sequences and use this to solve problems.	inequalities in writing error intervals.				
Y9	**Linear graphs:** Pupils build on their work on plotting linear graphs in Year 8 by exploring the idea of gradient and its role in the equation of a line.	**3D shapes:** Pupils encounter 3D shapes for the first time at KS3 here, so are first reminded of the vocabulary they will have learned at primary	**Using percentages:** Pupils review learning on percentages from Year 8 on percentages, focussing particularly on the use of multipliers,	**Rotation and translations:** Pupils build on their work on reflection in Year 8 to explore two further transformations.	**Enlargement and similarity:** Pupils expand their knowledge of transformations further to include enlargement. They will enlarge with	**Rates:** Pupils use their work on proportion as an introduction to compound measures, including speed,

	They consolidate their understanding by applying their learning to graphs in context. **Forming and solving equations:** Pupils build on their work on plotting linear graphs in Year 8 by exploring the idea of gradient and its role in the equation of a line. They consolidate their understanding by applying their learning to graphs in context. **Testing conjectures:** Pupils spend time developing their reasoning skills across various areas of maths that they have met before. They will be explicitly introduced to several common types of reasoning question to support this. They also learn to expand two binomials, which some will apply to constructing basic mathematical proofs.	school. They extend this to drawing plans and elevations of 3D shapes, before using their knowledge of area to find surface areas and volumes of cuboids, prisms, and cylinders. **Construction and congruence:** Pupils review and build upon the construction work they did in Year 7 by studying the standard compass constructions (angle and line bisectors, etc). They use these in drawing basic loci. **Number:** Students develop their understanding of the number system, meeting irrational numbers for the first time, and understanding the terms real and rational. All will be given time to con solidate their understanding of number from previous years and some will study the basics of surds.	before extending this to include 'reverse' percentages problems and repeated percentage change. The focus is on switching flexibly between types of percentage question, including in context. **Maths and money:** Pupils look at the use of money in various contexts. They will learn key vocabulary in financial mathematics and use the percentages work they have completed in this context, including simple and compound interest. **Deduction:** Pupils review their work on angles from Year 8, extending it to increasingly complex problems and some basic proof. This unit builds on some of the ideas encountered in the Testing Conjectures unit, but this time in a geometrical rather than algebraic context.	They begin with rotation, which links to work from primary school on rotational symmetry. They then progress to looking at translation, which offers their first encounter with vector form. **Pythagoras theorem:** Pupils explore the relationships between the sides of right-angled triangles. They will not only work out missing sides, but also use the converse of the theorem to prove that triangles are right-angled. They will also apply the theorem to a variety of contexts, including the coordinate grid and 3D problems.	and without a centre, using positive, fractional, and negative scale factors. **Ratio and proportion:** Pupils look again at proportion, which was studied in detail next year. They will consolidate this understanding, then extend it to inverse proportion questions in context.	density, and pressure. They extend this work to look at other context involving rates, such as flow problems including volume. Some pupils will consider conversion between compound units. **Probability:** Pupils use their work on probability from previous years in considering the ideas of relative frequency and independent events. They will represent these in various ways, including two way tables, Venn diagrams, sample space diagrams, and probability trees. **Trigonometry:** Trigonometry is introduced through similarity. From the outset, the meaning of the trigonometric functions is emphasised. This is facilitated by introducing them one by one, allowing time to develop understanding alongside procedural fluency.

						Types of graph: Pupils consider the representation of algebraic functions graphically, extending their work earlier on linear graphs to nonlinear functions such as quadratic, reciprocal, and exponential. The focus here is on the general shape and features of each type of graph as much as it is on plotting them.

KS4

	Autumn		Spring		Summer	
	Half Term 1	**HT2**	**HT3**	**HT4**	**HT5**	**HT6**
Y10	**Indices and roots:** Pupils review what they have learned about indices throughout their time at secondary school, including index laws and standard form. Higher tier pupils are likely to be familiar with all of this content, so focus on negative and fractional indices, the latter of which will be new content. **Non-calculator methods:** Pupils revise the number work they learned at KS3 as necessary, before progressing to work on the limits of accuracy. Higher tier pupils will extend this to upper and lower bounds calculations, then develop their basic understanding of surds from Year 9 to incorporate calculations	**Solutions of equations and inequalities:** Pupils have encountered equations and inequalities frequently in KS3. Here, they consolidate this understanding and extend it by looking more formally at the representation of solutions using graphs. Higher tier pupils will be introduced to simple quadratic equations; Foundation tier pupils will study this in Year 11. **Simultaneous equations:** Pupils will be introduced to simultaneous equations in this unit. The process is broken into small steps to support their understanding of what can be a daunting procedure. They use	**Congruence, similarity and enlargement:** Pupils review the work they have done on similarity and enlargement in Year 9, extending it to look more formality at how we can establish similarity between shapes. They review parallel lines rules before considering the idea of congruence. Higher tier pupils will encounter similarity in 3D shapes and explore more formal proof. **Trigonometry:** Trigonometry is introduced through similarity. From the outset, the meaning of the trigonometric functions is emphasised. This is facilitated by introducing them one by one, allowing time to	**Bearings:** Pupils will use the introduction of bearings as an opportunity to revisit a variety of other topics including: scale drawings, parallel lines rules, Pythagoras' theorem, trigonometry, and construction. **Working with circles:** Pupils again use new content as a vehicle to revisit prior learning. Arc length and sector area draw upon pupils' understanding of circles and fractions. Previous work on volume is supplemented with the formulae for spheres, pyramids and cones. Higher tier pupils also study the first four circle theorems; the rest are studied in Year 11.	**Collecting and representing data:** Pupils spend an extended unit looking in depth at the different ways in which data can be processed and displayed. This will review content from KS3, but now incorporating a greater focus on comparison between data sets and methods of representation. Higher tier pupils will spend most of their time on the new content of cumulative frequency, histograms, and quartiles. **Probability:** Pupils again revisit work from KS3 by finding probabilities from different diagrams. They then focus on building their understanding of tree diagrams. Higher tier pupils will focus	**Ratio and Fractions:** Pupils will review the work they have done previously on ratios, fractions, and the links between them. They will then consider more complex problems using these ideas, frequently encountering multi-step problems that draw together multiple areas of mathematics. They will also explore the links between ratio and proportion formulae. **Manipulating expressions:** Pupils review algebraic manipulation skills from previous units and years. Higher tier pupils then develop this into work with algebraic fractions and proof.

	and simplification. **Percentages and interest:** Find percentages and percentage changes Find one number as a percentage of another Calculate simple and compound interest Calculate reverse percentages	what they have learned about graphical representations in the previous unit to support their understanding. Higher tier pupils will also consider solving simultaneous equations including a quadratic.	develop understanding alongside procedural fluency.		primarily on extending this to conditional probability.	
Y11	**Gradients and lines:** Pupils begin Year 11 by reviewing algebra, starting with graphs of various types. This unit on linear graphs allows pupils an opportunity to review their work in Years 8 and 9. The only entirely new content is equations of perpendicular graphs, which is only necessary at the Higher tier. They will use this to find equations of tangents to circles in the next unit.	**Expanding and factorizing:** Pupils review previous work on expanding and factorising single and double brackets. Foundation pupils encounter quadratic factorisation and its use in solving equations for the first time. Higher tier pupils go on to complete their understanding of the GCSE specification on quadratics, looking at completing the square, the quadratic formula, and quadratic inequalities. Links to other topics are made throughout, such as area and Pythagoras.	**Geometric reasoning:** Students are given an opportunity to review previous work on angle facts from previous years. They also consolidate their work on Pythagoras and Trigonometry from Years 9 and 10. Higher tier pupils are also introduced to the final four circle theorems, which were not taught previously. **Multiplicative reasoning:** Pupils revise and develop their multiplicative reasoning in a variety of contexts,	**Listing and describing:** **Transforming and constructing**	**Revision**	**Exams**

	Non-linear graphs: Students develop their knowledge of nonlinear graphs, which have been studied in passing in earlier years. All pupils will learn to recognise the shapes of different types of graph and identify the roots of quadratic graphs. Higher tier pupils will go into further detail by looking at exponential graphs and, equations of circles and instantaneous rates of change. Note that both turning points of quadratics and equations of tangents are covered later. **Using graphs:** Pupils look at a range of graphs in real world contexts. For Foundation pupils, this means reviewing conversion graphs and an introduction to distance-time graphs and their interpretation.	**Changing the subject:** Pupils consolidate the work they did on formulae in Year 9 before extending it to more complex cases, including those requiring factorisation for Higher tier pupils. They use both known and unknown formulae to support this (and use the former to consolidate previous learning on area and volume). Higher tier pupils study iteration to finish the unit. **Functions (H):** Pupils are nearing the end of their study of algebra at GCSE. They formalise their knowledge of substitution and recent study of rearranging formulae using function notation (through composite and inverse functions respectively. This idea is fundamental to A Level study, so is high priority for those	including pressure and density. There is also an opportunity to revise ratio. Higher tier pupils will look at forming equations for direct and inverse proportion problems. **Algebraic reasoning:** Pupils spend time developing their algebra skills from previous years in preparation for their upcoming exams. Topics including manipulation, sequences, linear equations, and simultaneous equations. Higher tier pupils are introduced to formal algebraic proof, which is the only genuine new content in the unit. Foundation classes may spend less time on this unit as they have already studied algebra extensively this year and their time might be better spent revising other content.			

	For Higher pupils, the focus is on the application of their previous study of the gradient of a curve (and new study of area under a curve) to velocity-time graphs.	intending to continue their study of the subject. The unit also builds on recent study of quadratics and their graphs. **Vectors:** Pupils revisit their work on vectors in the context of translation before extending this to the more formal context of vector arithmetic. They switch between the different notations and representations of vectors to support their understanding of this. Higher tier pupils will apply this to building geometric proofs that draw on their understanding of parallel lines and ratio.				

KS5

	Autumn		Spring		Summer	
	Half Term 1	**HT2**	**HT3**	**HT4**	**HT5**	**HT6**
Y12	**Algebraic expressions** **Quadratics** **Equations and inequalities** **Graphs and transformations** **Data collection** **Measures of location and spread** **Representations of data**	**Straight line graphs** **Circles** **Algebraic methods** **Binomial expansion** **Correlation** **Probability** **Statistical distributions**	**Trigonometrical ratios** **Trigonometry identities and equations** **Hypothesis testing**	**Vectors** **Differentiation** **Modelling in mechanics** **Constant acceleration**	**Integration** **Exponentials and logarithms** **Forces and motion** **Variable acceleration**	**Algebraic methods** **Functions and modelling** **Regression** **Probability**
Y13	**Sequences and series** **Binomial expansion** **Radians** **Normal distribution**	**Trigonometric functions** **Trigonometry and modelling** **Moments** **Forces and friction**	**Parametric equations** **Differentiation** **Numerical methods** **Application of forces**	**Integration** **Vectors** **Further kinematics**	**Revision**	**Exams**

		Projectiles				