Programme of study for Year 8

Autumn (1st term)	Autumn (2nd term)	Spring (1st term)	Spring (2nd Term)	Summer (1st term)	Summer (2nd term)
Other timescale: From: September To: October	Other timescale: From: October To: December	Other timescale: From: January To: February	Other timescale: From: February To: April	Other timescale: From: April To: May	Other timescale: From: June To: July
Topic / Key Question: • **Rounding and estimation** • **Sequences**	**Topic / Key Question:** • **Solving Linear Equations** • **Multiplicative relationship (Fractions)**	**Topic / Key Question:** • **Multiplicative relationship** - **Ratio** - **Percentage**	**Topic / Key Question:** • **Statistical representation and measure** • **Perimeter, Area and Volume**	**Topic / Key Question:** • **Geometrical Properties**: **Polygons**	**Topic / Key Question:** • **Construction**
Key Learning Outcomes: **Leaners will:** **Rounding and estimation:** Round numbers to any number of decimal places Understand the concept of significant figures Round integers to a required number of significant figures Round decimals to a required number of significant figures	**Key Learning Outcomes:** **Leaners will:** **Solving Linear Equations:** Recognise that there are many different types of equations of which linear is one type Understand that in an equation the two sides of the 'equals' sign balance Understand that a solution is a value that makes the two sides of an equation balance	**Key Learning Outcomes:** **Leaners will:** **Multiplicative relationship:** Be able to divide a quantity into a given ratio Be able to determine the whole, given one part and the ratio Be able to determine one part, given the other part and the ratio Use ratio to describe rates (e.g. exchange rates, conversions, cogs, etc.)	**Key Learning Outcomes:** **Leaners will:** **Statistical representation and measure** Understand what the mean is measuring, how it is measuring it and calculate the mean from data presented in a range of different ways Understand what the median is measuring, how it is measuring it and find the median from data presented in a range of different ways	**Key Learning Outcomes:** **Leaners will:** **Geometrical Properties** Use correctly the vocabulary, notation and labelling conventions for lines, angles and shapes Identify parallel and perpendicular lines; know the sum of angles at a point, on a straight line and in a triangle; recognise vertically opposite angles Solve geometrical problems using side and	**Key Learning Outcomes:** **Learners will**: **Construction** Understand a circle as the locus of a point equidistant from a fixed point Use intersecting circles to construct triangles and rhombuses from given lengths Be aware that the diagonals of a rhombus bisect one another at right angles

Understand what is meant by a sensible degree of accuracy Estimate numerical calculations Estimate and check if solutions to problems are of the correct magnitude Determine whether calculations using rounding will give an underestimate or overestimate Understand the impact of rounding errors when using a calculator, and the way that these can be compounded to result in large inaccuracies Calculate possible errors expressed using inequality notation $a < x \leq b$ Sequences: Appreciate that a sequence is a succession of terms formed according to a rule Understand that a sequence can be generated and described using term-to-term approaches Understand that a sequence can be	Understand that a family of linear equations can all have the same solution Solve a linear equation requiring a single additive step Solve a linear equation requiring a single multiplicative step Understand that an equation needs to be in a format to be 'ready' to be solved, through collecting like terms on each side of the equation Know that when an additive step and a multiplicative step are required, the order of operations will not affect the solution Recognise that equations with unknowns on both sides of the equation can be manipulated so that the unknowns are on one side Solve complex linear equations, including those involving reciprocals Appreciate the significance of the bracket in an equation Recognise that there is more than one way to remove a bracket when solving an equation Solve equations involving brackets where	Describe one number as a percentage of another Find a percentage of a quantity using a multiplier Calculate percentage changes (increases and decreases) Calculate the original value, given the final value after a stated percentage increase or decrease Find the percentage increase or decrease, given start and finish quantities Understand the connection between multiplicative relationships and direct proportion Recognise direct proportion and use in a range of contexts including compound measures Recognise and use inverse proportionality in a range of contexts	Understand what the mode is measuring, how it is measuring it and identify the mode from data presented in a range of different ways Understand what the range is measuring, how it is measuring it and calculate the range from data presented in a range of different ways Construct bar charts from data presented in a number of different ways Construct pie charts from data presented in a number of different ways Construct pictograms from data presented in a number of different ways Construct scatter graphs from data presented in a number of different ways Perimeter, Area and Volume Understand the concept of surface area and find the surface area of 3D such cuboids and prisms in an efficient way Be aware that all prisms have two congruent polygonal parallel faces	angle properties of equilateral, isosceles and right- angled triangles and special quadrilaterals, explaining reasoning with diagrams and text, classify quadrilaterals by their geometrical properties know that if two 2-D shapes are congruent, corresponding sides and angles are equal. Learners to use a ruler and protractor to: measure and draw lines to the nearest millimetre and angles, including reflex angles, to the nearest degree. construct a triangle, given two sides and the included angle (SAS) or two angles and the included side (ASA) Use ICT to explore constructions. use ruler and protractor to construct simple nets of 3-D shapes, e.g. cuboid, regular tetrahedron, square-based pyramid, triangular prism	Be aware that the diagonals of a rhombus bisect the angles Use the properties of a rhombus to construct a perpendicular bisector of a line segment Use the properties of a rhombus to construct a perpendicular to a given line through a given point Use the properties of a rhombus to construct an angle bisector

generated and described by a position-to-term rule Understand that any term in an arithmetic sequence can be expressed in terms of its position in the sequence (nth term) Determine whether a number is a term of a given arithmetic sequence	simplification is necessary first Multiplicative Relationships (Fractions) Use a scaling diagram to represent a multiplicative relationship and connect to other known representations Find a fraction of a given amount Given a fraction and the result, find the original amount Express one number as a fraction of another Be able to divide a quantity into a given ratio		(bases) with parallelogram faces joining the corresponding vertices of the bases Use the constant cross-sectional area property of prisms and cylinders to determine their volume		

End of term 1 assessment to cover:		**End of term 2 assessment to cover**:		**End of year assessment to cover:** End of year Exam	
Rationale for sequence: The elements here build on the work done in Year 7 autumn term and now include studying estimation and rounding. It is essential that students are aware of the general structure of the place-value system as being based on powers of ten and begin to see how this naturally extends to decimals. This learning will support students' work on significant figures and standard form, as students who can express numbers (including very large and very small numbers) in these different ways are more likely to have a feel for the size of such numbers and where they fit in the number system. It is also important to emphasise the use of measures in real-life contexts. This will support students in understanding that measuring is always to a certain degree of accuracy. This teaching will then support students' understanding of and facility with estimating and rounding – essential skills for working	**Rationale for sequence:** It is important for students to appreciate that number and algebra are connected. The solving of equations is essentially concerned with operations on as yet unknown numbers. At Key Stage 3, this work builds on students' introduction to the language of algebra at Key Stage 2 and at year 7 Autumn2. It explores how linear equations are effectively the formulation of a series of operations on unknown numbers, and how the solving of such equations is concerned with undoing these operations to find the value of the unknown. Building on Key Stage 2 experiences, this collection of key ideas explores how simple, one-step linear equations are the formulation of one operation on an unknown number, and how these equations can be solved by undoing the operation to find the value of the unknown. Similarly, students will be exploring In much more depth to linear equations that requires more then one step to do the "undoing".	**Rationale for sequence:** In the Autumn term students will have explored fractions and ratios and it is important that this is now connected to work focusing on percentages and proportionality so that students do not experience them as distinct topics with no obvious connections. Percentages, fractions, proportionality and ratio can all be considered as contexts in which multiplicative relationships are used and explored. Maintaining consistency with the vocabulary and imagery used in all contexts will support students in their understanding that the same mathematical principles are involved. In many cases, there will be several different possible representations that could be used to help understand the mathematical structure of a situation. An important aspect of work with students will be to consider the relative usefulness and efficiency of different representations and approaches. Exploring a range of real-life contexts (including use of	**Rationale for sequence:** At Key Stage 2, students encountered the concept of central tendency and learnt how to calculate the (arithmetic) mean. At Key Stage 3, they will develop their knowledge of calculating measures of central tendency to include the mode and median, work with grouped data, and be introduced to a measure of spread in statistics: range. This will enable students to engage in more sophisticated data analysis. Students will construct scatter graphs for the first time, building on the representations covered at Key Stage 2 – bar charts, pie charts and pictograms. Constructing pie charts at Key Stage 3 will involve students making connections with angles, fractions and percentages, and using rulers, protractors and angle measurers. Additionally, students should have opportunities to describe simple mathematical relationships between two variables (bivariate data) in	**Rationale for sequence:** Students will have had opportunities to develop their spatial awareness and geometrical intuition in Key Stage 2 through situations involving angles (angles meeting at a point, angles on a straight line, vertically opposite angles and angles in regular polygons) and similar shapes. They will be aware of the geometrical facts and properties inherent in these situations. An important development throughout Key Stage 3 is to be able to reason and construct proofs for why such facts and properties hold and begin to understand the nature of mathematical proof. In Key Stage 3, students will develop their understanding of what is meant by mathematical proof. This is likely to include understanding proof as a form of convincing argument based on logical deduction and an expression of generalisation, as opposed to checking against a few specific cases. Students are also developing an understanding about the conventions of	**Rationale for sequence:** In Key Stage 2, students will have learnt about the properties of certain geometric shapes and used these properties to compare and classify shapes. They will also have had experience of drawing certain shapes using a ruler and angle measurer. Developing this work in Key Stage 3, students will learn the ruler and compass constructions of: • triangles of given lengths • a perpendicular bisector of a line segment • a perpendicular to a given line through a given point • an angle bisector. An important awareness is that these constructions are based on the geometrical properties of a few key shapes (a circle, an isosceles triangle and a rhombus). A deep understanding and awareness of these geometrical properties will support students in gaining a conceptual overview of these constructions and guard against constructions being learnt mechanically as a set of procedural steps.

with real-life situations involving contextualised data. It is important for students to develop a strong sense of the size of numbers and be able to use various methods of rounding, especially when giving answers in context. Rounding large numbers is particularly useful when estimating (for example, crowds at a football match or winnings in a lottery). Students began to consider sequences in Key Stage 1, when step counting to learn times tables and when looking at the composition of numbers. In Key Stage 2, they were introduced to the use of symbols and letters to represent variables and unknowns in familiar mathematical situations and began to generalise number patterns. Students will have explored non-numerical (shape) and numerical sequences, noticed a pattern, described the pattern in words and found the next term in the sequence from the previous term. It is important that students have time to develop a full understanding of the connection between the notation and the sequence and come to see the nth	It is important that students do not just learn and blindly follow a set of procedural rules for solving equations without this sense of what a solution means. Deep, conceptual understanding allows students to be fluent and flexible problem solvers. Therefor the use of different representations will help secure solving linear equations which students can use in many other topics in KS4. In the summer term of Year 7 students will have explored fractions and ratios and it is important that this is now connected to work focusing further calculations with fractions and conceptualised how fraction calculation is done before moving on to ratio, percentages and proportionality so that students do not experience them as distinct topics with no obvious connections. Percentages, fractions, proportionality and ratio can all be considered as contexts in which multiplicative relationships are used and explored. Maintaining consistency with the vocabulary and imagery used in all contexts will support students in their understanding that the same mathematical principles are involved. In many cases, there will be several different	compound measures) will further support students' understanding of proportionality. Stressing the notion that, when one measure doubles (or trebles or is multiplied by any scale factor) so too does the other, can usefully highlight the terminology of 'direct' proportion and this can be contrasted with inverse proportion, which is a key idea to introduce at Key Stage 3.	observational and experimental contexts, and to illustrate such relationships using scatter graphs. This will be developed further in Key Stage 4, alongside more sophisticated measures of central tendency (including modal class) and spread (including quartiles and inter-quartile range). At Key Stage 2, students will have had the opportunity to measure the perimeter of simple 2D shapes; find the area by counting squares; and estimate volume by counting blocks. They should have calculated the area of rectangles, triangles and parallelograms, and the volume of cubes and cuboids using formulae. They will now build on this to learn about the perimeter (circumference) of circles and that the ratio between circumference and diameter is the same for all circles. When calculating areas, this will include students using their knowledge of area of circles and the surface area of prisms. Additionally, the concept of surface area will provide an ideal opportunity for students to make connections between two and three dimensions and	communicating proof, including the use of language such as 'if … then', 'therefore' and 'because', and correct and unambiguous use of mathematical symbolism.	Students can find it difficult to memorise the various steps in creating constructions when they do not link this work to other knowledge about geometrical properties. They will be helped considerably if they are aware that constructing a perpendicular bisector of a line segment is not an isolated concept but linked to the properties of circles and rhombuses.

term as a way of expressing the structure of every term in the sequence. Work on sequences both here and later in Key Stage 3 provides the foundation for exploring quadratic sequences and simple geometric progressions in Key Stage 4.	possible representations that could be used to help understand the mathematical structure of a situation.		apply and consolidate their understanding of the area and properties of 3D shapes from Key Stage 2. Students will be familiar with finding the volume of cubes and cuboids from Key Stage 2 and will have used the formula Volume = width × height × length (or similar) to calculate volumes. At Key Stage 3, these ideas are developed to include the volume of prisms more generally.		
Reading / literacy: Key words/LOs/ problem solving questions/ retention and recall and promoting cultural capital	**Reading / literacy:** Key words/LOs/ problem solving questions/ retention and recall and promoting cultural capital	**Reading / literacy:** Key words/LOs/ problem solving questions/ retention and recall and promoting cultural capital	**Reading / literacy:** Key words/LOs/ problem solving questions/ retention and recall and promoting cultural capital	**Reading / literacy:** Key words/LOs/ problem solving questions/ retention and recall and promoting cultural capital	**Reading / literacy:** Key words/LOs/ problem solving questions/ retention and recall and promoting cultural capital
Numeracy: Assessed throughout the lesson	**Numeracy:** Assessed throughout the lesson	**Numeracy:** Assessed throughout the lesson	**Numeracy:** Assessed throughout the lesson	**Numeracy:** Assessed throughout the lesson	**Numeracy:** Assessed throughout the lesson

Enrichment / opportunities to develop cultural capital (including careers, WRL and SMSC):

In maths lessons:

Spiritual growth is encouraged by students reflecting on their answers, reasoning and in class discussions

Learners are made aware of choices they make may results to different outcomes and consequences. Their **Moral** duty is to be able to make the right choices in terms of behaviour and to reach the correct answers/conclusions

Leaners **Social** developments is encouraged through discussions, sharing ideas, peer marking, articulating their thinking and group work

Leaners are exposed to different topics and their links to different **Culture** throughout the curriculum. This includes different multiplication methods from Egypt, Russia and China, Pythagoras' Theorem from Greece, algebra from the Middle East and debates as to where Trigonometry was first used. We try to develop an awareness of both the history of maths alongside the realisation that many topics we still learn today have travelled across the world and are used international