

Year 7 and Year 8

Unit 1 : Numbers and the Number System

We start the year with 'Number and Calculations' with both Year 7 and Year 8 as these principles underpin all other strands of mathematics. In Year 7 and 8 it is important that, after a summer break, we check, reaffirm and then develop and deepen understanding of number work covered previously before moving on to tackle more difficult concepts of other mathematical strands.

	Learning Outcomes	7 Support	7 Core 8 Support	8 Core
Place Value, Types of Numbers, Standard Form	<ul style="list-style-type: none"> Understand (order, write, read) place value in numbers with up to eight digits (including decimal places) Multiply whole numbers by 10 (100, 1000) Divide whole numbers by 10 (100, 1000) when the answer is a whole number Multiply (divide) numbers with up to three decimal places by 10 (100, 1000) Understand and use negative numbers in simple contexts Make the connection between squares and square roots (and cubes and cube roots) Recall the first 15 square numbers Recall the first 5 cube numbers 			
	<ul style="list-style-type: none"> Understand and use the notation for powers Know the meaning of the square root symbol ($\sqrt{\quad}$) Identify the first 10 triangular numbers Place a set of negative numbers in order Place a set of mixed positive and negative numbers in order Use inequality symbols to compare numbers Make correct use of the symbols = and \neq 			
	<ul style="list-style-type: none"> Write large and small numbers in standard form Interpret large and small numbers written in standard form 			
Factors, Multiples and Primes	<ul style="list-style-type: none"> To be able to list factors To be able to list multiples To know what a prime number is. Recall primes up to 20 			
	<ul style="list-style-type: none"> Know the meaning of a common multiple of two numbers Know the meaning of a common factor of two numbers Identify common multiples of two numbers Identify common factors of two numbers Recall prime numbers up to 100 			
	<ul style="list-style-type: none"> Understand the meaning of prime factor Write a number as a product of its prime factors Use a Venn diagram to sort information Use prime factorisations to find the highest common factor of two number Use prime factorisations to find the lowest common multiple of two numbers 			

Rounding, Accuracy and Estimation	<ul style="list-style-type: none"> • Approximate any number by rounding to the nearest whole, 10, 100, 1000 ... 1 000 000 • Approximate any number by rounding to a specified degree of accuracy; e.g. nearest 20, 50 • Estimate multiplication calculations that involve multiplying up to four-digit numbers by a two-digit number • Estimate division calculations that involve dividing up to a four-digit number by a two-digit number 			
	<ul style="list-style-type: none"> • Approximate by rounding to any number of decimal places • Know how to identify the first significant figure in any number • Approximate by rounding to the first significant figure in any number • Understand estimating as the process of finding a rough value of an answer or calculation • Estimate multiplication calculations that involve multiplying numbers with up to two decimal places by whole numbers 			
	<ul style="list-style-type: none"> • Know how to identify any significant figure in any number • Approximate by rounding to any significant figure in any number • Estimate calculations by rounding numbers to one significant figure • Use cancellation to simplify calculations • Use inverse operations to check solutions to calculations 			
Mental and written Calculations	<ul style="list-style-type: none"> • Use column addition and subtraction for larger numbers • Add a three-digit number to a two-digit number (when bridging of hundreds is required) • Multiply a two-digit number by a single-digit number • Multiply a three-digit number by a two-digit number • Multiply a four-digit number by a two-digit number using a written method • Use an appropriate method of division to divide up to a 4-digit number by a single digit number • Write the remainder from a division question as "remainder" / fraction / decimal 			
	<ul style="list-style-type: none"> • Be fluent when using the method of short division • Use an appropriate method of division to divide up to a 4-digit number by a two-digit number • Interpret a remainder when carrying out division • Extend beyond the decimal point to write the remainder as a decimal • Calculations involving negative numbers 			
	<ul style="list-style-type: none"> • Be fluent when completing calculations involving negative numbers • Know how to square (or cube) a negative number 			
Decimal Calculations	<ul style="list-style-type: none"> • Use knowledge of place value to complete addition and subtraction calculations with decimals. • Use knowledge of place value to multiply with decimals (simple numbers) 			
	<ul style="list-style-type: none"> • Use knowledge of place value to multiply with decimals • Use knowledge of place value to divide a decimal • Use knowledge of place value to divide by a decimal 			
	<ul style="list-style-type: none"> • Use knowledge of place value (and BIDMAS/BODMAS) to perform multi-step calculations involving decimals. 			
Order of Operations	<ul style="list-style-type: none"> • Know that addition and subtraction have equal priority • Know that multiplication and division have equal priority • Know that multiplication and division take priority over addition and subtraction • BIDMAS / BODMAS (no brackets or powers) 			
	<ul style="list-style-type: none"> • BIDMAS / BODMAS (including brackets but no powers) 			
	<ul style="list-style-type: none"> • BIDMAS / BODMAS (including brackets and powers) 			

Half Term 2

Unit 3 : Algebraic Proficiency				
At this stage of the year we move onto 'Algebra' as there are strong links between algebra and number work. It is important that algebra is completed at this stage as thinking algebraically is vital for all students to improve their ability to solve mathematical problems.				
	Learning Outcomes	7 Support	7 Core 8 Support	8 Core
Notation, simplify, expand, factorise and functions	<ul style="list-style-type: none"> Know the meaning of expression, term, formula, equation, function Know basic algebraic notation (the rules of algebra) Use letters to represent variables Identify like terms in an expression Simplify an expression by collecting like terms (simple) Use a mapping diagram (function machine) to represent a function 			
	<ul style="list-style-type: none"> Know the meaning of expression, term, formula, equation, function Simplify an expression by collecting like terms (more complex) Know how to multiply a (positive) single term over a bracket (the distributive law) Given a function, establish outputs from given inputs Given a function, establish inputs from given outputs Use an expression to represent a function Use the order of operations correctly in algebraic situations Know how to write products algebraically Factorise an expression by taking out common factors (simple) 			
	<ul style="list-style-type: none"> Know the meaning of expression, term, formula, equation, function Expand double brackets Factorise an expression by taking out common factors (more complex) Simplify an expression involving terms with combinations of variables (e.g. $3a^2b + 4ab^2 + 2a^2 - a^2b$) Know the multiplication (division, power, zero) law of indices Understand that negative powers can arise 			
Formulae	<ul style="list-style-type: none"> Recognise a simple formula written in words Interpret the information given in a written formula Substitute numbers into a one-step and two-step formula written in words Interpret the information that results from substituting into a formula Substitute positive numbers into expressions and formulae Create a one-step and two-step formula from given information 			
	<ul style="list-style-type: none"> Substitute positive and negative numbers into formulae Know the meaning of the 'subject' of a formula Change the subject of a formula when one step is required 			
	<ul style="list-style-type: none"> Substitute positive, negative, fractions and decimal numbers into formulae Know the meaning of the 'subject' of a formula Change the subject of a formula when one step is required Change the subject of a formula when two steps are required 			

Sequences	<ul style="list-style-type: none"> • Recognise a linear sequence • Describe a number sequence • Find the next term in a linear sequence • Find a missing term in a linear sequence • Generate a linear sequence from its description 			
	<ul style="list-style-type: none"> • Use a term-to-term rule to generate a linear sequence • Use a term-to-term rule to generate a non-linear sequence • Find the term-to-term rule for a sequence • Use a position-to-term rule to generate a sequence • Describe a number sequence • Generate and describe sequences involving diagrams 			
	<ul style="list-style-type: none"> • Generate a sequence from a term-to-term rule • Understand the meaning of a position-to-term rule • Use a position-to-term rule to generate a sequence • Find the position-to-term rule for a given sequence • Use algebra to describe the position-to-term rule of a linear sequence (the nth term) • Use the nth term of a sequence to deduce if a given number is in a sequence 			
Solving equations	<ul style="list-style-type: none"> • Find all combinations of two variables that solve a missing number problem with two unknowns • Express missing number problems algebraically • Solve missing number problems expressed in words • Solve missing number problems expressed algebraically • Choose the required inverse operation when solving an equation • Identify the correct order of undoing the operations in an equation • Solve one-step equations when the solution is a whole number • Check the solution to an equation by substitution 			
	<ul style="list-style-type: none"> • Solve one-step equations when the solution is a whole number or a fraction • Solve two-step equations (including the use of brackets) when the solution is a whole number • Solve two-step equations (including the use of brackets) when the solution is a fraction • Solve three-step equations (including the use of brackets) when the solution is a whole number • Solve three-step equations (including the use of brackets) when the solution is a fraction • Solve linear equations with the unknown on one side when the solution is a negative number • Check the solution to an equation by substitution 			
	<ul style="list-style-type: none"> • Identify the correct order of undoing the operations in an equation • Solve linear equations with the unknown on both sides when the solution is a whole number • Solve linear equations with the unknown on both sides when the solution is a fraction • Solve linear equations with the unknown on both sides when the solution is a negative number • Solve linear equations with the unknown on both sides when the equation involves brackets • Recognise that the point of intersection of two graphs corresponds to the solution of a connected equation • Check the solution to an equation by substitution 			

Half term 3

Shape, Space and Measure				
This unit is where a lot of the number and algebra work covered in previous half terms is put to use.				
	Learning Outcomes	7 Support	7 Core 8 Support	8 Core
Properties of shapes	<ul style="list-style-type: none"> • Use squared paper to guide construction of 2D shapes • Know the names of common 3D shapes • Use mathematical language to describe 3D shapes • Construct 3D shapes from given nets • Draw accurate nets for common 3D shapes • Find all the nets for a cube • Know the meaning of faces, edges and vertices • Use a net to visualise the edges (vertices) that will meet when folded • Know the definitions of special triangles • Know the definitions of special quadrilaterals • Classify 2D shapes using given categories; e.g. number of sides, symmetry • Name parts of a circle and know that the diameter is twice the radius 			
	<ul style="list-style-type: none"> • Know the meaning of faces, edges and vertices • Use notation for parallel lines • Know the meaning of 'perpendicular' and identify perpendicular lines • Know the meaning of 'regular' polygons • Use AB notation for describing lengths • Use $\angle ABC$ notation for describing angles • Know the vocabulary of 3D shapes • Know the connection between faces, edges and vertices in 3D shapes • Visualise a 3D shape from its net • Recall the names and shapes of special triangles and quadrilaterals • Know the meaning of a diagonal of a polygon • Know the properties of the special quadrilaterals (including diagonals) • Apply the properties of triangles to solve problems • Apply the properties of quadrilaterals to solve problems 			
	<ul style="list-style-type: none"> • Review 7 Core using more complicated shapes 			

Angles

<ul style="list-style-type: none"> • Identify angles that meet at a point (and calculate missing angles) • Identify angles that meet at a point on a line (and calculate missing angles) • Identify vertically opposite angles and know that vertically opposite angles are equal • Use known facts to find missing angles and explain reasoning • Know the angle sum of a triangle • Know the angle sum of a quadrilateral • Know how to find the angle sum of any polygon • Use the angle sum of a triangle to find missing angles • Find the missing angle in an isosceles triangle when only one angle is known • Use the angle sum of a quadrilateral to find missing angles • Know how to find the size of one angle in any regular polygon 			
<ul style="list-style-type: none"> • Identify fluently angles at a point, angles at a point on a line and vertically opposite angles • Identify known angle facts in more complex geometrical diagrams • Use knowledge of angles to calculate missing angles in geometrical diagrams • Know that angles in a triangles total 180° • Find missing angles in triangles • Find missing angles in isosceles triangles • Explain reasoning using vocabulary of angles 			
<ul style="list-style-type: none"> • Identify alternate angles and know that they are equal • Identify corresponding angles and know that they are equal • Use knowledge of alternate and corresponding angles to calculate missing angles in geometrical diagrams • Establish the fact that angles in a triangle must total 180° (Use alternate angles to prove this) • Use the fact that angles in a triangle total 180° to work out the total of the angles in any polygon • Establish the size of an interior angle in a regular polygon • Know the total of the exterior angles in any polygon • Establish the size of an exterior angle in a regular polygon 			

Units, Perimeter, Area and Volume	<ul style="list-style-type: none"> Convert between adjacent and non-adjacent metric units; e.g. kilometres and centimetres Use decimal notation up to three decimal places when converting metric units Convert between Imperial units; e.g. feet and inches, pounds and ounces, pints and gallons Solve problems involving converting between measures and state conclusions using the correct notation and units Recognise that shapes with the same areas can have different perimeters and vice versa Know that the area of a parallelogram is given by the formula area = base × height Know that the area of a triangle is given by the formula area = $\frac{1}{2} \times \text{base} \times \text{height} = \text{base} \times \text{height} \div 2 = \frac{bh}{2}$ Know that the volume of a cuboid is given by the formula volume = length × width × height Calculate the area of a parallelogram (triangle) Estimate the volume of cubes and cuboids Choose appropriate units of volume Calculate the volume of a cuboid Convert between metric units of area in simple cases Convert between metric units of volume in simple cases 			
	<ul style="list-style-type: none"> Convert fluently between metric units of length, mass, volume / capacity Convert fluently between units of time and money Solve practical problems that involve converting between units and state conclusions clearly using the units correctly Recognise that the value of the perimeter can equal the value of area Use standard formulae for area and volume Find missing lengths in 2D shapes when the area is known Know that the area of a trapezium is given by the formula area = $\frac{1}{2} \times (a + b) \times h = \left(\frac{a+b}{2}\right)h = \frac{(a+b)h}{2}$ Calculate the area of a trapezium Understand the meaning of surface area Find the surface area of cuboids (including cubes) when lengths are known Find missing lengths in 3D shapes when the volume or surface area is known 			
	<ul style="list-style-type: none"> Know the vocabulary of circles Know that the number π (pi) = 3.1415926535... Recall π to two decimal places Know the formula circumference of a circle = $2\pi r = \pi d$ Calculate the circumference of a circle when radius (diameter) is given Calculate the radius (diameter) of a circle when the circumference is known Calculate the perimeter of composite shapes that include sections of a circle Know the formula area of a circle = πr^2 Calculate the area of a circle when radius (diameter) is given Calculate the radius (diameter) of a circle when the area is known Calculate the area of composite shapes that include sections of a circle Know the formula for finding the volume of a right prism (cylinder) Calculate the volume of a right prism (cylinder) 			

Fractions, Decimals and Percentages				
Fractions, decimals and percentages are taught as the next unit of work to allow our students regular access to number topics spread over the year. This topic is larger than ratio and thus needs a greater amount of time to be taught. Fractions, decimals and percentages are also used in non-calculator methods for shape, space and measure (our next unit of work). Having a strong understanding of fractions, decimals and percentages is important for pupils to be able to access more challenging number, algebra and problem solving work as they progress through KS3 and then into KS4.				
	Learning Outcomes	7 Support	7 Core 8 Support	8 Core
Fractions, Decimals and Percentages Equivalence	<ul style="list-style-type: none"> Understand that two fractions can be equivalent Identify a common factor of two numbers Simplify a fraction and write a fraction in its lowest terms Compare two fractions by considering diagrams Compare two fractions by considering equivalent fractions Understand that a fraction is also a way of representing a division Know standard fraction / decimal equivalences (e.g. $\frac{1}{2} = 0.5$, $\frac{1}{4} = 0.25$, $\frac{1}{10} = 0.1$) Work out the decimal and percentage equivalents of fifths, eighths and tenths Know standard fraction / decimal / percentage equivalences (e.g. 10%, 25%, 50%, 75%) 			
	<ul style="list-style-type: none"> Convert between mixed numbers and top-heavy fractions Identify a common denominator that can be used to order a set of fractions Order fractions where the denominators are not multiples of each other Order a set of numbers including a mixture of fractions, decimals and negative numbers Write one quantity as a fraction of another where the fraction is less than 1 Write one quantity as a fraction of another where the fraction is greater than 1 Write a fraction in its lowest terms by cancelling common factors Understand that a percentage means 'number of parts per hundred' Write a percentage as a fraction Write a quantity as a percentage of another 			
	<ul style="list-style-type: none"> Identify if a fraction is terminating or recurring Recall some decimal and fraction equivalents (e.g. tenths, fifths, eighths) Write a decimal as a fraction Write a fraction in its lowest terms by cancelling common factors Identify when a fraction can be scaled to tenths or hundredths Convert a fraction to a decimal by scaling (when possible) Use a calculator to change any fraction to a decimal Write a decimal as a percentage Write a fraction as a percentage 			

Calculations	<ul style="list-style-type: none"> • Add / subtract fractions with the same denominators • Add / subtract fractions with different denominators • Multiply a proper fraction by a proper fraction • Divide a proper fraction by a whole number • Simplify the answer to a calculation when appropriate • Multiply U.t by U • Multiply U.th by U • Find 10% of a quantity • Use non-calculator methods to find a percentage of an amount • Use decimal or fraction equivalents to find a percentage of an amount where appropriate 			
	<ul style="list-style-type: none"> • Apply addition to proper fractions, improper fractions and mixed numbers • Apply subtraction to proper fractions, improper fractions and mixed numbers • Multiply proper and improper fractions • Multiply mixed numbers • Divide a proper fraction by a proper fraction • Apply division to improper fractions and mixed numbers • Use calculators to find a percentage of an amount using multiplicative methods • Identify the multiplier for a percentage increase or decrease • Use calculators to increase (decrease) an amount by a percentage using multiplicative methods • Compare two quantities using percentages • Know that percentage change = actual change ÷ original amount • Calculate the percentage change in a given situation, including percentage increase / decrease 			
	<ul style="list-style-type: none"> • Recognise when a fraction (percentage) should be interpreted as a number • Recognise when a fraction (percentage) should be interpreted as an operator • Identify the multiplier for a percentage increase or decrease when the percentage is greater than 100% • Use calculators to increase an amount by a percentage greater than 100% • Calculate percentage change • Calculate the original value when working with percentages • Calculate using simple interest and compound interest • Understand the meaning of giving an exact solution 			

Half Term 5

Handling Data and Probability				
Handling data is a topic used across many other subject areas, especially Science and Geography, so it is vital that this is taught as early as possible. Skills in number and algebra are essential knowledge before completing this topic area so this is the earliest we could fit this in the year.				
	Learning Outcomes	7 Support	7 Core 8 Support	8 Core
Presentation of Data	<ul style="list-style-type: none"> Understand that pie charts are used to show proportions and make comments to compare Use a table of frequencies to work out the angle for a slice in a pie chart (the total frequency must be a factor of 360) Construct a pie chart by measuring angles Construct and interpret line graphs Answer two-step questions about data in line graphs (e.g. 'How much more?') 			
	<ul style="list-style-type: none"> Know the meaning of categorical and discrete data Interpret and construct frequency tables Construct and interpret pictograms, bar charts, comparative bar charts and know their appropriate use Interpret pie charts and know their appropriate use Construct pie charts when the total frequency is not a factor of 360 Choose appropriate graphs or charts to represent data 			
	<ul style="list-style-type: none"> Know the meaning of continuous data Interpret and construct a grouped frequency table for continuous data Interpret and construct histograms for grouped data with equal class intervals Plot a scatter diagram of bivariate data Understand the meaning of 'correlation' Interpret a scatter diagram using understanding of correlation 			
Measuring Data	<ul style="list-style-type: none"> Interpret the mean as a way of levelling the data Calculate the mean of a set of data Find the mode of set of data Find the median of a set of data Find the median of a set of data when there are an even number of numbers in the data set 			
	<ul style="list-style-type: none"> Use the mean to find a missing number in a set of data Review calculating the mean, mode and median of a set of data Calculate the mean, mode and median from a frequency table Understand the range as a measure of spread (or consistency) Calculate the range of a set of data Analyse and compare sets of data Appreciate the limitations of different statistics (mean, median, mode, range) 			
	<ul style="list-style-type: none"> Find the modal class of set of grouped data Find the class containing the median of a set of data Find the midpoint of a class Calculate an estimate of the mean from a grouped frequency table Estimate the range from a grouped frequency table Analyse and compare sets of data Appreciate the limitations of different statistics (mean, median, mode, range) Choose appropriate statistics to describe a set of data and justify the choice. 			

Probability	<ul style="list-style-type: none"> • Know that probability is a way of measuring likeliness • Know and use the vocabulary of probability • Understand the use of the 0-1 scale to measure probability • Assess likeliness and place events on a probability scale 			
	<ul style="list-style-type: none"> • List all the outcomes for an experiment • Identify equally likely outcomes • Work out theoretical probabilities for events with equally likely outcomes • Know how to represent a probability • Recognise when it is not possible to work out a theoretical probability for an event • Know that the sum of probabilities for all outcomes is 1 • Apply the fact that the sum of probabilities for all outcomes is 1 			
	<ul style="list-style-type: none"> • List all elements in a combination of sets using a Venn diagram • List outcomes of an event systematically • Use a table to list all outcomes of an event • List outcomes of an event using a grid (two-way table) • Use frequency trees to record outcomes of probability experiments • Make conclusions about probabilities based on frequency trees • Construct theoretical possibility spaces for combined experiments with equally likely outcomes • Calculate probabilities using a possibility space • Use theoretical probability to calculate expected outcomes • Use experimental probability to calculate expected outcomes 			

Ratio and Proportion				
The final topic area to be taught is Ratio and Proportion. This is the smallest topic area, and also one that builds on almost all the previous topics. Problem solving in Ratio and Proportion, especially as pupils develop understanding, often involves the use of Shape, Space and Measures topics as the progress into KS4.				
	Learning Outcomes	7 Support	7 Core 8 Support	8 Core
Ratio and Proportion	<ul style="list-style-type: none"> • Simplify a ratio (simple values – no mixed units) • Use a ratio to find one value when given another (e.g. ratio of cows to pigs 3:2, how many cows if 30 pigs?) • Understand the meaning of enlargement • Understand the meaning of scale factor • Recognise when one shape is an enlargement of another • Use a scale factor to complete an enlargement • Find the scale factor for a given enlargement 			
	<ul style="list-style-type: none"> • Describe a comparison of measurements or objects using the language 'a to b' and the notation a:b • Use ratio notation to describe a comparison of more than two measurements or objects • Convert between different units of measurement • State a ratio of measurements in the same units and different units • Simplify a ratio by cancelling common factors • Identify when a ratio is written in its lowest terms • Find the value of a 'unit' in a division in a ratio problem • Divide a quantity in two parts in a given part:part ratio • Divide a quantity in two parts in a given part:whole ratio 			
	<ul style="list-style-type: none"> • Identify ratio in a real-life context • Write a ratio to describe a situation • Identify proportion in a situation • Find a relevant multiplier in a situation involving proportion • Understand the connections between ratios and fractions • Know the connection between speed, distance and time • Solve problems involving speed • Identify when it is necessary to convert quantities in order to use a sensible unit of measure 			