Year 8 Mastery Scheme of Learning 2021-22

Autumn 1

Students will begin the year looking at multiplicative relationships. Bar modelling is used extensively throughout this unit as a dual coding tool to help illustrate the principles involved and help students scaffold problems to deepen their understanding. We look at representations of ratio, problem solving involving ratio and comparing ratios and fractions. Within this unit we also look at direct proportion and to put this into context we consider different conversion graphs. We also look at mathematical similarity, scale diagrams and scale factors - including map scales.

Higher attaining students may look at understanding pi as a ratio.

In the second part of this half term, we revisit fractions - specifically multiplication and division. This sequence of lessons breaks into a coherent progression of the fundamental principles involved. Once again, representations are used widely throughout this unit to illustrate the principles of fraction multiplication and division and to support students in understanding the concepts, rather than merely memorising a process.

Autumn 2

The second half term focuses on representations - starting with the Cartesian plane. We again progress through a well structured, step by step approach to consider lines on a grid, $y = x$, generaling to $y = kx$, $y = x + a$ and finally $y = mx + c$. We study the key similarities and differences between linear graphs and graphical representations of sequences. We explore non linear graphs as a precursor to work covered in year 9.

The next topic in representations is the representation of data. We study scatter graphs, correlation and lines of best fit. We also look at non linear relationships. Within this unit we consider different data types and how to organise this data using grouped and ungrouped frequency tables for discrete and continuous data.

Finally we look at representations within probability - sample spaces, two way tables and Venn diagrams.

Spring 1

The first half of this term revisits algebra. Time will be spent formulating and evaluating expressions algebraically and distinguishing between 'like' and 'unlike' terms, and coefficients. We study factorising and expanding single brackets and binomials. We also study solving equations and inequations, using bar models to illustrate solution techniques. As part of this unit we take a look at building sequences from algebraic rules, with students using their prior algebraic knowledge to help them find the n^{th} term.

Higher attaining students will spend more time exploring sequences and research non-linear sequences.

To complete this unit we study indices, focusing on establishing addition and subtraction laws.

Spring 2

Students spend this half term developing their number skills. The second half of the term is split into fractions and percentages, standard form and unit conversions. The work previously covered with number, and in particular fractions, will aid the students in their conversions between fractions, decimals and percentages. There will be a lot of comparison of quantities using percentages and students will study how to increase and decrease by a given percentage. This will enable students to access real-world problems involving percentages and reverse percentages. We consider the efficiency of various methods including calculator/ non-calculator use.

Standard index form is the next topic where we express numbers in standard and normal form - both for very large and small numbers. We progress to calculating with standard form, (both calculator and non-calculator) and look at multiplying/ dividing and adding and subtracting using standard form. As always, there are problem solving extension tasks available at each step to challenge our higher attaining students.

The last topic considered this half term is rounding of numbers to specified decimal places and significant figures and the application of this to estimate calculations. We also look at unit conversions, considering money, time, length capacity etc.

Summer 1

Students visit geometry in the Summer term where we consider angles in parallel lines and quadrilaterals. We also look at angles in polygons - interior and exterior. Within this unit, we study the construction of triangles and quadrilaterals and also angle and line bisectors.

The next topic covered is the area of triangles, rectangles, trapezia and parallelograms. This extends to investigate the formula for the area of a circle - with and without a calculator. We also look at the perimeter and area of compound shapes.

Finally this half term we look at reflection - involving increasingly complicated shapes.

Summer 2

The last term of the school year will see students focus on statistics and data handling. We study setting up a statistical enquiry, designing and critiquing questionnaires. We look at displaying data via pictograms, bar charts and pie charts, assessing the most appropriate diagrams for data and representation of grouped data. Progressing from prior knowledge on averages, students will learn how to calculate the mean, median, mode and range from raw data. They will then explore comparing data by classifying and tabulating, before analysing and interpreting graphs. There are many opportunities to relate this to the outside world and students will be encouraged to utilise their analytical skills to compare real-life data.

Students who require further stretch and challenge will study different misleading graphs and be introduced to histograms. There will also be a plethora of investigative opportunities where students will be asked to conduct statistical investigations using primary and secondary data.

Year 8 Scheme of Work			
Autumn 1	**Proportional Reasoning**		
	Ratio and scale	**Multiplicative Change**	**Multiplying & Dividing fractions**
	Representations of ratio	Direct proportion	Represent multiplication of fractions
	Using ratio notation	Conversion graphs	Multiply fraction by integer
	Problems involving 1:n	Converting currencies	Product of unit fractions
	Problems involving m:n	Direct proportion graphs	Product of any fractions
	Divide in a given ratio	Similar shapes	Divide integer by fraction
	Simplify ratio	Scale factors	Divide fraction by unit fraction
	Express ratios in form 1:n	Scale diagrams	Understand and use reciprocal
	Compare ratios and fractions	Maps using scale factors	Divide any pair of fractions
	Understand pi as a ratio		Mult & divide improper and mixed
	Understand gradient as a ratio		Mult & divide algebraic fractions
Autumn 2	**Representations**		
	Working in the Cartesian plane	**Representing Data**	**Tables & Probability**
	Coordinates in 4 quadrants	Scatter graphs	Construct sample space
	Lines on a grid	Linear correlation	Probability from sample space
	Recognise and use y = x	Line of best fit	Probability from two way table
	Recognise and use y = kx	Non-linear relationships	Probability from Venn diagram
	Link y = kx to direct proportion	Different data types	Product rule
	Explore gradient of y = kx	Ungrouped frequency tables	
	Recognise and use y = x + a	Grouped frequency tables	
	Explore negative gradient	Grouped discrete data	
	Link graphs to sequences	Grouped continuous data	
	Plot y = mx + c	Two way tables	
	Explore non linear graphs		
	Midpoint of a line segment		

Spring 1	**Algebraic Techniques**		
	Brackets, Equations & Inequalities	**Sequences**	**Indices**
	Form algebraic expressions	Build sequence from rule in words	Add & subtract expressions with indices
	Directed number & algebra	Build sequence from algebraic rule	Simplify by multiplying indices
	Multiply out single bracket	Sequence from complex algebraic rule	Simplify by dividing indices
	Factorise into single bracket	Find nth term linear sequence	Addition law for indices
	Expand & simplify single brackets		Addn & subtraction law for indices
	Expand pair of binomials		Exploring powers of powers
	Solve equations		
	Form & solve equations with brackets		
	Understand and solve inequalities		
	Form and solve inequalities		
	Solve equations and ineq - unknowns both sides		
	Form & solve equations and ineq - unknowns both sides		
	Use formulae, expressions & identities		
Spring 2	**Developing Number**		
	Fractions and Percentages	**Standard index form**	**Number sense**
	Convert key f,d,p	Positive powers of 10	Round to powers of 10 and 1 sig fig
	Calculate key f,d,p without calculator	Numbers >10 in standard form	Round to specified decimal place
	Calculate key f,d,p with calculator	Negative powers of 10	Estimate calculations
	Convert dec/ perc > 100%	Numbers < 1 in standard form	Understand error interval notation

	% decrease with a multiplier	Compare and order standard form	Order of operations
	% increase with multiplier	Mental calcs with standard form	Calculate with money
	Express no as frac or % - no calc	Add & subtract standard form	Convert metric lengths
	Express no as frac or % - with calc	Multiply & divide standard form	Convert metric weight/ capacity
	% change	Use calculator with standard form	Convert metric area
	Solve % problems	Use negative indices	Convert metric volume
	Reverse % problems < 100%	Use fractional indices	Time and calendar problems
	Reverse % problems > 100%		
	Complex % problems		
	Developing Geometry		
	Angles in parallel lines & polygons	**Area of trapezia and circles**	**Line symmetry and reflection**
	Basic angle rules and notation	Area of triangles, rectangles and parallelograms	Recognise line symmetry
	Angles between parallel lines and the transversal	Area of trapezium	Reflect - touching mirror line
	Alternate and corresponding angles	Perimeter and area of compound shapes (1)	Reflect - not touching mirror line
	Co-interior, alternate and corresponding angles	Investigate area of a circle	Reflect - touching diagonal mirror line
Summer 1	Complex parallel line problems	Calculate area of circle without a calculator	Reflect - not touching diagonal mirror line
	Construct triangles and quadrilaterals	Calculate area of circle with a calculator	
	Investigate quadrilaterals	Perimeter and area of compound shapes (2)	
	Angle and side problems in quadrilaterals		
	Properties of diagonals in quadrilaterals		
	Sum of Exterior angles in polygons		

	Sum of Interior angles in polygons		
	Missing interior angles in regular polygons		
	Prove simple geometric facts		
	Construct angle bisector		
	Construct perpendicular bisector		
Summer 2	**Reasoning with Data**		
	Data handling cycle	**Measures of location**	
	Set up statistical enquiry	Mean, median and mode	
	Design and critique questionnaire	Choosing appropriate average	
	Pictograms, bar charts & vertical line graphs	Mean from ungrouped frequency	
	Multiple bar charts	Mean from grouped frequency	
	Pie charts	Identify outliers	
	Line graphs	Compare data using averages	
	Choosing appropriate diagrams for data		
	Represent grouped quantitative data		
	Range		
	Compare distributions		
	Misleading graphs		