Autumn 1

During this half term we begin with sequences. We look to explore and reinforce the understanding of pattern and rules that students will have gained at KS2. We consider linear and nonlinear sequences, identifying mathematically significant number progressions. We look at recognising and continuing sequences and establishing the term to term rules for building sequences.

We move onto algebra. This is deliberately placed early in the scheme of learning to introduce students to a topic that they are less familiar with – to engage their interest, stimulate their mathematical thinking and enable us to interleave algebra throughout subsequent units to build students' fluency with the concept. We consider function machines as an introduction to inverse functions and we also consider substitution of numerical values into formulae and expressions.

Finally in this half term we look at equality and equivalence - introducing the correct notation and discussing the difference between the 2 concepts. We explore the difference via solving simple equations and collecting like terms.

Throughout this half term, bar modelling is encouraged, with students expected to illustrate problems and thus support their problem solving skills.

Higher attaining students will be stretched through depth. Every lesson has a range of extension tasks designed to encourage mathematical thinking and problem solving.

Autumn 2

The topics covered this half term will be familiar to all students, but we are looking to improve the fluency and confidence with which they apply number operations. The work on place value and ordering numbers considers both integers and decimals and is intended to reinforce KS1/KS2 topics and to improve students' numeracy to support their learning through the rest of the year - thus reducing cognitive load and freeing up working memory. Calculations of range and median put these concepts into context.

Higher attaining students will consider powers of 10 and be introduced to standard form - including negative indices.

For the second unit of this half term, we consider frac/ dec/ perc equivalence. We focus on gaining fluency and understanding via the conversion of more familiar fractions - halves, quarters etc, before expanding the concept to include all frac/ dec/ perc conversion. We apply these concepts via the use and interpretation of pie charts, We also explore the representation of fractions as a diagram, on a number line and as a division. We address the misconception that fractions and percentages are always less than one.

The concept of irrational numbers may be studied by our higher attaining students.

Spring 1

We continue our study of number operations – looking to embed our students' understanding of and ability to accurately add and subtract and then to multiply and divide integers and decimals. Once again we are looking to promote mental strategies and the concept of efficient practice. There is a focus on applying and understanding the correct language. We study perimeter within our work on addition/ subtraction and within the unit on multiplication, we apply multiplicative skills to study the area of triangles and named quadrilaterals. We will also consider calculations involving time/ timetables and financial maths. The application of multiplication and division to algebraic expressions will also be explored.

Students present at KS3 with a range of different methods of multiplication. We will encourage and support the accurate and efficient application of whichever method is preferred by the individual.

Higher attaining students will be encouraged to explore multiplication and division within different number systems to help them generalise and deepen their understanding. They will also be encouraged to practise and assess the

efficacy of a range of different multiplication methods. They may be introduced to the concept of applying number operations to standard form.

We revisit frac/ dec/ perc to find fractions and percentages of amounts - considering the suitability of different approaches with and without the use of a calculator. We extend this to find frac/ perc greater than 100%.

Spring 2

At this stage we extend our work on number operations and ordering to apply them to directed numbers. We also revisit substitution introducing directed numbers and extend our equation solving skills.

Higher attaining students will consider the roots of positive numbers and explore higher powers and roots.

For the final unit this half term, we return to fractions. Generally speaking, students show a weakness in their understanding of this topic. They may be familiar with the process, but they often lack a real grasp of the fundamental concepts involved. A strong initial emphasis is placed on identifying exactly what a fraction can represent and addressing common misconceptions, building understanding and confidence in adding and subtracting fractions via a coherent, scaffolded sequence of lessons. Conversion between improper fractions and mixed numbers are considered as a tool to aid these operations.
Higher attaining students will consider the use of fraction in an algebraic context - including addition and subtraction.

Summer 1

We turn to work on angles - securing a familiarity with standard angle notation, before classifying angle types. We move onto the accurate drawing and measuring of angles and extend this to the construction of triangles and may extend this to more complex polygons for our higher attaining students.. We also identify and categorise polygons up to a decagon. Included in our work on angles and applying the skills learnt, is the construction and interpretation of pie charts.

We move on to establish and use angle facts - at a point/ on a line, in a triangle etc. before applying these to solving complex angle problems. We will extend this topic to consider angles in polygons and parallel lines. Our higher attaining students may consider angle problems expressed algebraically, and may look at constructing simple angle proofs.

Summer 2

In the final half term we return to reasoning with numbers - applying mental strategies to number operations for integers, fractions and decimals. We will use strategies such as factorising to simplify calculations and we will build estimation skills to assess accuracy. We will encourage students to use number facts and algebraic facts to derive other facts.

We then move on to consider sets and probability, creating and interpreting Venn diagrams and introducing set notation. We will focus on the language of probability and use of the probability scale. We will extend students' skills to create sample spaces to aid the calculation of a single event.

The final topic of the year is the consideration of prime numbers and proof. We will extend work on factors, multiples and primes to consider prime factors and the uses of Venn diagrams to find HCF and LCM using prime factor decomposition.

Higher attaining students will be encouraged to assess the use of different number types to make and test conjecture and to use counter-examples to disprove a conjecture.

| Year 7 Scheme of Work |

	Algebraic Thinking		
	Sequences	**Understand and Use algebraic notation**	**Equality and Equivalence**
Autumn 1	Describe and continue sequences	Find the output of a single function machine	Understand the meaning of equality
	Predict and check next term(s)	Find the input given the output	Understand and use fact families
	Sequences in a table and graphically	Generalise number operations	Solve 1-step linear equations involving +/-
	Linear and non-linear sequences	Use diagrams & letters with function machines	Solve 1-step linear equations involving x/÷
	Continue linear sequences	Find function machine given a simple expression	Understand the meaning of like terms
	Continue non-linear sequences	Substitution into single operation expressions	Understand the meaning of equivalence
	Explain the term-to-term rule	Inputs and outputs for two function machines	Collect like terms, using the ≡ symbol
	Find missing terms (H)	Use diagrams and letters two function machines	
		Find function machine given 2-step expression	
		Substitute values into two-step expressions	
		Generate sequences given an algebraic rule	
		Represent 1- and 2-step functions graphically	
	Place Value and Proportion		
	Place value and ordering numbers	**Frac, dec, perc equivalence**	
Autumn 2	Recognise place value up to one billion	Tenths and hundredths as diagrams	
	Write integers up to one billion	Tenths and hundredths on number line	
	Work out intervals on a number line	Swap between frac and dec number lines	
	Position integers on a number line	Convert frac/ dec - tenths and hundredths	
	Round integers to the nearest power of ten	Convert fra/ dec - fifths and quarters	
	Compare two numbers using =, ≠, <, >, ≤, ≥	Convert frac/ dec - eighths and thousandths	
	Order a list of integers	Understand meaning of percentage	
	Find the range of a set of numbers	Convert between simple frac/ dec/ perc	
	Find the median of a set of numbers	Use and interpret pie charts	

	Understand place value for decimals	Represent any fraction as a diagram	
	Position decimals on a number line	Represent fractions on number lines	
	Compare and order numbers up to one billion	Identify and use simple equivalent fractions	
	Round a number to 1 significant figure	Understand fractions as division	
	Write 10, 100, 1000 etc. as powers of 10 (H)	Convert between simple frac/ dec/ perc II	
	Write positive integers in the form Ax10n (H)	Explore frac/ dec/ perc > 1	
	Investigate negative powers of ten (H)		
	Write decimals in the form Ax10n (H)		

Applications of number

	Addition and Subtraction	**Multiplication and division**	**Frac and Perc of an amount**
	Properties of addition and subtraction	Properties of multiplication & division	Find a fraction of a given amount
	Mental strategies for addition and subtraction	Understand and use factors	Find the whole/or other fractions
	Use formal methods for addition of integers	Understand and use multiples	Find perc using mental methods
	Use formal methods for addition of decimals	Multiply, divide integers & dec by powers of 10	Find a perc using a calculator
	Use formal methods for subtraction of integers	Multiply by 0.1 and 0.01 (H)	Frac/ perc greater than 100% (H)
Spring 1	Use formal methods for subtraction of decimals	Convert metric units	
	Most appropriate method: mental, written or calc	Use fomal methods to multiply integers	
	Solve problems in the context of perimeter	Use formal methods to multiply decimals	
	Solve financial maths problems	Use formal methods to divide integers	
	Solve problems involving tables and timetables	Use formal methods to divide decimals	
	Solve problems with frequency trees	Understand and use order of operations	
	Solve problems with bar charts and line charts	Area of rectangles and parallelograms	
	Add and subtract numbers in standard form (H)	Solve problems using the area of triangles	
		Solve problems using the area of trapezia (H)	

		Solve problems using the mean	
		Multiplication, division in algebraic expressions	
Spring 2	**Directed Number**	**Fractional Thinking**	
	Operations with directed Numbers	**Addition and Subtraction of Fractions**	
	Representations of directed numbers	Understand representations of fractions	
	Order directed numbers using lines	Convert between mixed numbers and fractions	
	Perform calculations that cross zero	Add and subtract unit fractions with the same denominator	
	Add directed numbers	Add and subtract fractions with the same denominator	
	Subtract directed numbers	Add and subtract fractions from integers expressing the answer as a single fraction	
	Multiplication of directed numbers	Understand and use equivalent fractions	
	Multiplication/ division of directed numbers	Add and subtract fractions where denominators share a simple common multiple	
	Calculator for directed number calculations	Add and subtract fractions with any denominator	
	Algebraic expressions with directed number	Add and subtract improper fractions and mixed numbers	
	Introduction to two-step equations	Use fractions in algebraic contexts	
	Solve two-step equations	Use equivalence to add and subtract decimals and fractions	
	Order of operations with directed numbers	Add and subtract simple algebraic fractions (H)	
	Roots of positive numbers (H)		
	Explore higher powers and roots (H)		
Summer 1	**Lines and Angles**		
	Constructing, measuring, geometric notation	**Developing Geometrric Reasoning**	
	Labelling conventions incl for geometric figures	Use the sum of angles at a point	
	Draw and measure line segments	Use the sum of angles on a straight line	
	Understand angles as a measure of turn	Use the equality of vertically opposite angles	
	Classify angles	Know and apply the sum of angles in a triangle	

	Measure angles up to 180°	Apply the sum of angles in a quadrilateral	
	Draw angles up to 180°	Solve angle problems of triangles and quad	
	Draw and measure angles between 180° and 360°	Solve complex angle problems	
	Identify perpendicular and parallel lines	Find and use the angle sum of any polygon (H)	
	Recognise types of triangle	Investigate angles in parallel lines (H)	
	Recognise types of quadrilateral	Understand and use parallel line angles rules (H)	
	Identify polygons up to a decagon	Use known facts to obtain simple proofs (H)	
	Construct triangles using SSS		
	Construct triangles using SSS, SAS and ASA		
	Construct more complex polygons		
	Interpret simple pie charts using proportion		
	Interpret pie charts using a protractor		
	Draw pie charts		

Reasoning with Number

	Developing Number Sense	Sets and Probability	Prime numbers and Proof
	Mental addition and subtraction strategies	Identify and represent sets	Find and use multiples
	Mental multiplication and division strategies	Interpret and create Venn diagrams	Identify factors of numbers and expressions
	Mental arithmetic strategies for decimals	Understand and use the intersection of sets	Recognise and identify prime numbers
	Mental arithmetic strategies for fractions	Understand and use the union of sets	Recognise square and triangular numbers
Summer 2	Use factors to simplify calculations	Understand and use complement of a set (H)	Find common factors of a set of numbers including the HCF
	Estimation to check mental calculations	Know and use the vocabulary of probablity	Find common multiples of a set of numbers including the LCM
	Use number facts to derive other facts	Generate sample spaces for single events	Write a number as a product of its prime factors
	Use algebraic facts to derive other facts	Calculate the probability of a single event	Use a Venn diagram to calculate the HCF and LCM (H)
	When to use mental, formal, calc strategy	Understand and use the probability scale	Make and test conjectures

		Sum for all possible outcomes is 1	Use counter examples to disprove a conjecture