Curriculum Progression (Intent)

Long Term Intent Mathematics

Students will develop conceptual understanding, mathematical fluency and the ability to reason mathematically. They will be confident in applying their knowledge to solve complex problems and the appreciate the application of mathematics in the wider world.

	Higher		Foundation	
	Knowledge and Understanding	Skill	Knowledge and Understanding	Skill
Year 11	**Circle Theorems**	To understand and apply the circle theorems To prove circle theorems To solve algebraic examples involving circle theorems	**Fractions, Indices and Standard form**	To be able to multiply and divide fractions To understand and apply the laws of indices To express ordinary numbers using standard form To be able to complete calculations with numbers expressed in standard form
	Algebra	To re-arrange formulae to change the subject To simplify algebraic fractions To understand and apply rules relating to surds To be able to rationalise the denominator To be able to prove using algebra	**Similarity, Congruence and Vectors**	To be able to find missing side lengths with similar shapes To identify congruenct shapes and prove congruecy To use vector notation and complete basic calculations
	Vectors	To understand the use of vector notation To apply vector arithmetic To be able to show two vectors are parallel To solve complex geometric problems with vectors	**Algebra**	To be able to plot cubic, reciprocal and other non-linear functions To solve simultaneous equations graphically To be able to re-arrange equations and formulae
	Graphs & Proportion	To solve problems involving direct proportion To solve problems involving inverse proportion To be able to draw and interpret exponential	**Graphs**	To plot coordinates To plot linear graphs in the form y=a, x=b and y=mx+c To interpret real-life graphs To interpret distance-time graphs

		functions and other non-linear graphs To be able to translate graphs of functions To be able to reflect and sketch graphs of functions		
Year 10	**Graphs**	To be able to plot linear graphs in the form y=mx+c To be able to graph rates of change To plot and interpret real-life graphs To plot quadratic graphs and use them to identify roots, turning points and to solve To plot cubic and reciprocal graphs	**Transformations**	To be able to apply the following transformations to 2d shapes: - Reflect - Rotate - Translate - Enlarge (including positive and fractional scale factors with a centre of enlargement) To be able to describe transformations To be able to solve problems involving combinations of transformations
	Transformations and Constructions	To be able to apply the following transformations to 2d shapes: - Reflect - Rotate - Translate - Enlarge (including positive, negative and fractional scale factors with a centre of enlargement) To construct triangles accurately To construct angle/perpendicular bisectors To use knowledge of constructions to solve LOCI problems	**Right Angle Triangles**	To apply Pythagoras theorem to 2d problems To be able to understand and apply SOHCAHTOA to find missing side lengths and angles in right angle triangles

		To understand and apply bearings including examples with scale drawings		
	Solving Equations	To be able to solve quadratic equations through: - Identifying solutions on a graph - Using the quadratic formula - Factorising - Completing the square Solving linear simultaneous equations Solving simultaneous equations where one of the equations is non-linear	**Probability**	Expressing a probability as a fraction, decimal or percentage Calculating the probability of 2 events Using experimental probability Constructing and interpreting Venn diagrams Constructing and using tree diagrams to solve independent probability problems
	Probability	To understand the concept of mutually exclusive events To understand and apply experimental probability To draw and use tree diagrams to answer independent and conditional probability questions To use Venn diagrams and set notation	**Multiplicative Reasoning**	To work fluently with percentages To understand growth and decay To understand compound measures (e.g. speed, density and pressure) To be able to solve direct and inverse proportion questions
	Multiplicative Reasoning	To understand the concept of growth and decay To work with compound measures (such as speed, density and pressure) To solve ratio and proportion questions	**Constructions & Loci**	To recognise and sketch 3d shapes using plans and elevations To draw accurate plans and elevations given a 3d shape To use scale drawings To produce accurate scale drawings To construct triangles and bisectors using appropriate mathematical equipment To use these construction skills to solve LOCI questions To work with bearings

	Similarity and Congruence	To understand the conditions for congruency To prove congruency To understand and apply knowledge of similar shapes To work with similar 3d solids and use the scale factors to calculate surface area and volume	**Quadratic Equations and Graphs**	To be able to expand double brackets To be able to plot quadratic graphs To factorise quadratics To solve quadratic equations by factorising and using the graph
	Graphs of Trig Functions	To be able to graph the Sine, Cosine and Tangent function To be able to calculate the area of a triangle using 1/2abSinC To apply the sine rule to find missing sides and angles in triangles To apply the cosine rule to find missing sides and angles in triangles To be able to solve trigonometric problems in 3 dimensions To transform trigonometric graphs		
	Data	To understand different sampling techniques To plot and interpret cumulative frequency graphs To construct and interpret box plots To construct and interpret histograms To be able to make comparisons of populations		

	Quadratics	To be able to solve simultaneous equations graphically To represent inequalities graphically To plot quadratic functions To plot cubic functions		
Year 9	**Number**	To understand place value To estimate the answer to calculations To find the HCF and LCM and use this to solve problems To understand and apply the laws of indices To express ordinary numbers using standard form and to be able to complete calculations with numbers written in standard form	**Perimeter, Area and Volume**	To be able to find the circumference and area of a circle To be able to find the perimeter and area of sectors of a circle (e.g. a quarter of a circle) To find the surface area and volume of prisms, cones and cylinders
	Algebra	To expand and factorise single and double brackets To form and solve linear equations To substitute values into complex formulae To find the next term, term to term rule and nth term of a linear sequence To work with non-linear sequences	**Factors, Multiples & Prime Numbers**	To work fluently with decimals To understand place value To be able to find factors and multiples To understand square and cube numbers and be able to find roots To use index notation To express numbers as a product of their prime factors
	Interpreting and Representing Data	To interpret time-series graphs To plot and interpret scatter graphs To use the line of best fit To find different averages and understand when one	**Substitution in Expression & Formulae**	To use algebraic notation correctly To be able to simplify algebraic expressions To be able to substitute into equations and formulae To expand single brackets To factorise a single bracket To be able to understand and use expressions and formulae

		average is more appropriate than another		
	Fractions, ratio and percentages	To be able to add, subtract, multiply and divide with fractions To be able to simplify and solve problems using ratio To understand and solve problems involving percentages To be able to work fluently with FDP	**Expanding & Factorising Single Brackets**	To construct and interpret two-way tables To construct time-series graphs To construct and interpret stem and leaf diagrams To constuct and interpret pie charts To plot scatter graphs (including a line of best fit) To use scatter graphs to identify correlation between two variables and use the line of best fit to make estimations
	Angles and trigonometry	To be able to find missing interior angles of triangles and quadrilaterals To find the sum of interior angles of polygons To find missing exterior angles of polygons To apply pythagoras theorem to 2d problems To consider pythagoras in 3d To apply SOHCAHTOA to find missing sides and angles in triangles	**Using Expressions and Formulae**	To be able to apply the four operations with fractions (including mixed numbers) To understand the equivalence between FDP To be able to calculate a percentage of an amount (with and without a calculator)
	Area and Volume	To understand the concept of perimeter and area and use this to find the perimeter and area of 2d shapes To be able to find the circumference and area of a circle To be able to find the perimeter and area of a sector of a circle To be able to calculate the volume and surface area of	**Equations, inequalities and Sequences**	Solving linear equations Solving linear equations with brackets To understand inequalities and solve inequalities To be able to use and apply different formulae To be able to generate a sequence and to find the nth term of a linear sequence

		prisms, cones and cylinders		
			Angles	To find missing angles in parallel lines and use the correct geometric language to reason To find missing interior angles in triangles To find interior and exterior angles of polygons To be able to solve geometric problems involving angles
			Averages and the range	To find the mean, median, mode and range from a list of data and from data that has been grouped To find an estimate of the mean To understand what is meant by a sample
Year 8	Names of units from WRM		Knowledge and Understanding	Skill
Ratio and Scale				• make connections between number relationships, and their algebraic and graphical representations • use scale factors, scale diagrams and maps • understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction • divide a given quantity into two parts in a given part : part or part : whole ratio; express the division of a quantity into two parts as a ratio • solve problems involving direct and inverse proportion
Multiplicative Change				• extend and formalise their knowledge of ratio and proportion in working with measures and in formulating proportional relations algebraically • interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning • use scale factors, scale diagrams and maps • solve problems involving direct and inverse proportion, including graphical and algebraic representations • move freely between different numerical, algebraic, graphical and diagrammatic representations
Multiplying and Dividing Fractions				• consolidate their numerical and mathematical capability from key stage 2 and extend their understanding of the number system and place value to include decimals and fractions • select and use appropriate calculation strategies to solve increasingly complex problems • use the four operations, including formal written methods, applied to integers, decimals, proper and improper fractions, and mixed numbers, all both positive and negative

Graphs	• move freely between different numerical, algebraic, graphical and diagrammatic representations • develop algebraic and graphical fluency, including understanding linear (and simple quadratic) functions • make connections between number relationships, and their algebraic and graphical representations • substitute numerical values into formulae and expressions • recognise, sketch and produce graphs of linear functions of one variable with appropriate scaling, using equations in x and y and the Cartesian plane
Representing Data	• construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms for categorical data, and vertical line (or bar) charts for ungrouped and grouped numerical data • describe simple mathematical relationships between two variables (bivariate data) in observational and experimental contexts and illustrate using scatter graphs • use language and properties precisely to analyse probability and statistics
Tables & Probability	• record, describe and analyse the frequency of outcomes of simple probability experiments involving randomness, fairness, equally and unequally likely outcomes, using appropriate language and the 0-1 probability scale • generate theoretical sample spaces for single and combined events with equally likely, mutually exclusive outcomes and use these to calculate theoretical probabilities • use language and properties precisely to analyse probability and statistics

Brackets, Equations and Inequalities	• identify variables and express relationships between variables algebraically
	• begin to model situations mathematically and express the results using a range of formal mathematical representations
	• substitute numerical values into formulae and expressions, including scientific formulae
	• understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors
	• simplify and manipulate algebraic expressions to maintain equivalence by:
	  • collecting like terms
	  • multiplying a single term over a bracket
	  • taking out common factors
	  • expanding products of two or more binomials
	• understand and use standard mathematical formulae
	• use algebraic methods to solve linear equations in one variable

Sequences	• generate terms of a sequence from either a term-to-term or a position-to-term rule • recognise arithmetic sequences and find the n^{th} term • recognise geometric sequences and appreciate other sequences that arise
Indices	• use and interpret algebraic notation, including a^3 in place of $a \times a \times a$; a^2b in place of $a \times a \times b$ • use language and properties precisely to analyse algebraic expressions • begin to model situations mathematically and express the results using a range of formal mathematical representations • substitute values in expressions, rearrange and simplify expressions, and solve equations

Fractions & Percentages	• develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics • work interchangeably with terminating decimals and their corresponding fractions • define percentage as 'number of parts per hundred', interpret percentages and percentage changes as a fraction or a decimal, interpret these multiplicatively, express one quantity as a percentage of another, compare two quantities using percentages, and work with percentages greater than 100% • interpret fractions and percentages as operators
Standard Form	• use integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5 and distinguish between exact representations of roots and their decimal approximations • interpret and compare numbers in standard form $A \times 10^n$, $1 \leq A < 10$, where n is a positive or negative integer or zero
Angles in parallel lines & Polygons	• apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles • understand and use the relationship between parallel lines and alternate and corresponding angles • derive and use the sum of angles in a triangle and use it to deduce the angle sum in any polygon, and to derive properties of regular polygons • use the standard conventions for labelling the sides and angles of triangle ABC • derive and illustrate properties of triangles, quadrilaterals, circles, and other plane figures [for example, equal lengths and angles] using appropriate language and technologies • derive and use the standard ruler and compass constructions (H only)
Area of Trapezia and Circles	• derive and apply formulae to calculate and solve problems involving: perimeter and area of triangles, parallelograms, trapezia • calculate and solve problems involving: perimeters of 2-D shapes (including circles), areas of circles and composite shapes
Line Symmetry and Reflection	• describe, sketch and draw using conventional terms and notations: points, lines, parallel lines, perpendicular lines, right angles, regular polygons, and other polygons that are reflectively and rotationally symmetric • identify properties of, and describe the results of reflections applied to given figures

Data Handling Cycle			• describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete, continuous and grouped data; and appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers) • construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms for categorical data, and vertical line (or bar) charts for ungrouped and grouped numerical data
Measures of Location			• describe, interpret and compare observed distributions of a single variable through appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers)
Year 7	Names of units from Sparx SOL	**Knowledge and Understanding**	Skill
Number Sense and Calculations			To be able to add and subtract. To be able to multiply To be able to divide To be able to calculate with negative numbers. To be able to apply the order of operations
Expressions & Equations			To understand algebraic notation To be able to form expressions. To be able to simplify expressions. To be able to substitute with one/ multiple operations. To be able to substitute into algebraic and real-life formulae. To be able to solve 1 and 2 step equations
Time and Measures			To be able to convert the units of time. To be able to use clocks. To be able to calculate with time. To be able to use timetables. To be able to use calendars. To be able to read and plot coordinates. To be able to solve shape problems involving coordinates. Estimating and measuring length, mass and capacity. Converting units of length, mass and capacity. Using appropriate units.
2D – Shapes			To be able to deduce, use and understand line properties. To be able to deduce, use and understand shape properties. To be able to understand symmetry .

Perimeter and Area	To be able to find perimeters using grids. To be able to find the perimeter of rectangles and simple shapes . To be able to find the perimeter of compound shapes. To be able to Find areas using grids. To be able to find the area of rectangles To be able to Find the area of compound shapes To be able to Find the area of triangles To be able to Find the area of compound shapes containing triangles
Coordinates	To be able to read and plot coordinates To be able to solve shape problems involving coordinates
Factors, Multiples and Primes	To be able to Find the lowest common multiple To be able to Find factors and using divisibility tests To be able to Find the highest common factor To be able to Find prime numbers To be able to do Prime factor decomposition
Fractions	To be able to Find fractions of shapes. To be able to Construct fractions To be able to Find equivalent fractions To be able to Find equivalent fractions To be able to Simplify fractions To be able to Order fractions To be able to Convert between mixed numbers and improper fractions To be able to add and subtract fractions including mixed numbers
Brackets	To be able to distributive law To be able to expand and simplify single brackets To be able to factorise into one bracket
Angles	To be able to recognise types of angles To be able to estimate, measure and draw angles
Handling data and statistical diagrams	To be able to calculate the mean, median and range. To be able to find the mode. To be able to draw and interpret frequency tables, tally charts, two way tables, pictograms, bar charts. To be able to collect and record data To be able to present data and make conclusions To be able to find averages from frequency tables To be able to choose suitable averages and solve problems
Proportion	To be able to solve proportion problems
Fractions, Decimals and Percentages	To be able to multiply and divide fractions including mixed numbers. To be able to find fractions of amounts with and without a calculator

	To be able to convert between FDP To be able to order and convert between FDP To be able to write numbers as percentages of other numbers
Probability	To be able to use probability phrases To be able to write probabilities as FDP To be able to understand mutually exclusive events To be able to create and use sample space diagrams.