SUNNYDOWN SCHOOL
MATHEMATICS CURRICULUM PLAN

Subject	Mathematics (KS4)	Year group	11 Pathway 1
Subject Intent	Y11 pathway 11 students will be reinforcing and extending on all topics taught and learnt in Y10. There is an increased focus on solving problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps. Our intention is to consolidate learning in Y10 by exposing them to exam style questions and techniques. There will be opportunities for both extension activities and bespoke support where needed. We take into consideration the particular needs of our students and encourage them to feel confident with the fundamental mathematical concepts they will need to make them numerate and competitive in an increasingly demanding world. Teaching will enable students to know more and remember more in areas including: calculating, using the number system, accuracy, algebra, fraction, properties of shapes, percentages, sequences, ratio and proportion, units and scales, measuring shapes, number properties, functionals and graphs, constructions, transformations.		

Term	Topic	Core learning	Key concepts	Sequencing
Autumn 1	Calculating	- Add and subtract whole numbers - Multiply whole numbers - Add and subtract decimals - Divide whole numbers - Add and subtract negative numbers - Multiply and divide negative numbers	• Apply addition, subtraction, multiplication and division, including formal written methods, to positive and negative integers • Use addition and subtraction, including formal written methods, applied to decimals	Building on….. Students ability to calculate with the four operations taught in Y7 Autumn 1. Also building on students ability to use a calculator, which is taught in every topic where a calculator may be relevant. As well as checking the use of the bus stop method. Building towards…

				Including more complex notation to use in calculations, especially brackets and roots and powers and a combination of all of them seen in order of operations questions.
Autumn 1	Using the number system	- Using whole numbers - Understanding decimals - Multiplying and dividing by powers - Negative numbers	• Apply multiplication, including formal written methods, to decimals • Apply division, including formal written methods, to decimals • Understand and use place value for integers and decimals of any size • Order positive and negative integers and decimals • Use the symbols =, ≠, <, >, ≤, ≥ • Use the number line as a model for ordering of the real numbers • Order positive and negative integers	Building on….. Taking students basic knowledge of notation, including less than, greater than and equal to and checking they are able to implement this. As well as their ability to multiply and divide by powers of 10. Taught in Y7 Autumn 2. Building towards… Converting numbers to and from standard form and basic calculating with standard form focussing on multiplying and dividing.
Autumn 1	Accuracy	- Rounding to the nearest 10, 100 - Rounding large numbers - Rounding decimals to the nearest integer - Rounding to 2 decimal places	Rounding. to the nearest 10, 100; Rounding large numbers; Rounding decimals to the nearest integer; Rounding to 2 decimal places • Round numbers and measures to an appropriate degree of accuracy, including nearest whole number, power of ten and number of decimal places	Building on….. Students' ability to round to various degrees of accuracy. E.g. 1-3 d.p. And 1-3 as taught in Y7 Autumn 2. Building towards… Rounding to significant figures and some contextual problems.
Autumn 1	3D shapes	Properties of 3D	• Identify properties of the	Building on…..

		shapes ● Understanding nets ● Volume and surface area of cuboids ● 2D representations of 3D shapes	faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres • Use conventional terms and notations: vertices, edges, planes • Use standard units of measure and related concepts (length, area, volume) Volume and surface area of cuboids • Know and apply formula to calculate volumes of cuboids 2D representations of 3D shapes • Interpret plans and elevations of 3D shapes	Properties of 3D shapes, defining a prism, volume/surface area of cuboids and nets of 3D shapes as taught in Y8 Autumn 1 and 2 and Y9 Autumn 1. Building towards... Finding volume of compound/composite 3D shapes and constructing plans and nets of simple 3D shapes.
Autumn 2	Starting algebra	● Making and using word formulae ● Using letters ● Combining variables ● Working with formulae ● Setting up and solving simple equations ● Using brackets	• Substitute numerical values into formulae and expressions, including scientific formulae • Understand and use the concept and vocabulary of terms, expressions, factors, equations and formulae • Understand and use standard mathematical formulae • Rearrange formulae to change the subject • Use and interpret algebraic manipulation including: ab in place of $a \times b$ $3y$ in place of $y + y + y$ and $3 \times y$ a^2 in place of $a \times a$, $2ab$ in place of $a \times a \times b$	Building on….. Understanding algebraic terminology and students ability to collect like terms and multiply various terms taught in Y9 Autumn 2. Also building on students ability to take a sentence expressing something that can then be formed into either an expression or equation taught in Y7 Summer 2. Building towards… Rearranging basic to complex formulae, solving complex equations involving combinations of BIDMAS and simplifying expressions using laws of Indices.

			a/b in place of *a ÷ b* coefficients written as fractions rather than decimals brackets
			• Recognise and use relationships between operations, including inverse operations
			• Solve linear equations in one unknown algebraically
			• Simplify and manipulate algebraic expressions by:
			  collecting like terms
			  simplifying expressions involving sums, products and powers
			  multiplying a single term over a bracket
			  taking out common factors	

Autumn 2	Algebraic methods	● Linear inequalities	• Use the symbols <, >, £, ³ • Solve linear inequalities in one variable; represent the solution set on a on a number line	Building on….. Working with inequalities and placing inequalities on a number line as taught in Y10 Summer 2 Building towards… Solving one and two step inequalities.
Autumn 2	Fractions	● Understanding fractions ● Finding equivalent fractions ● Multiplying fractions ● Adding and subtracting fractions	• Express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1 • Order positive and negative fractions; use the symbols =, ≠, <, > • Apply addition, subtraction and multiplication, including	Building on….. Students ability to simplify and find equivalent fractions. To apply four operations to fractions and order them using equal/not equal and less than/greater than symbols. Taught in Y9/Y8 Spring 1 and Y7 Autumn 2. Building towards…

			formal written methods, to simple fractions • Interpret fractions as operators	Converting improper fractions to mixed numbers and vice versa, Applying four operations to mixed numbers with focus on multiplication and division.
Autumn 2	Properties of shapes	● Line symmetry/rotational symmetry ● Angle facts & notation ● Angles in triangles and quadrilaterals ● Types of quadrilaterals ● Circle properties	• Use the reflection and rotational symmetry properties of polygons • Apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles • Draw diagrams from written descriptions • Measure line segments and angles in geometric figures • Use the standard conventions for labelling and referring to the sides and angles of triangles • Derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in a quadrilateral) • Identify, describe and construct congruent shapes • Use conventional terms and notations: vertices, edges, parallel lines, perpendicular lines, right angles, polygons, regular polygons • Derive and apply the properties and definitions of special types of quadrilaterals, including: square, rectangle, parallelogram, trapezium, kite and rhombus; and triangles and other plane figures using	Building on….. Understanding of basic angle facts and notation, such as the notation used to identify angles ($\angle ABC$) and how to find them. Understanding of properties of a circle. Taught in Y7 Spring 2. Building towards… Ability to find missing angles in parallel lines and polygons, recalling angle facts to use as proof and formulae.

			appropriate language • Identify circle definitions and properties, including: centre, radius, chord, diameter and circumference	
Autumn 2	Statistical measures	• Mode, median and range • Using mean, median, mode and range • Using frequency tables	• Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency (median, mean, mode) and spread (range)	Building on….. Students' knowledge of four averages and their fundamental differences, uses in different applications and pros and cons of each as taught in Y7 Summer 1 and Y8 Summer 2. Also building on students ability to use a simple frequency table as taught in Y7 Spring 1. Building towards… Application and extension of mean, median, mode and range to problems in a given context. E.g. Find unknown variables given mean and all but one value.
Spring 1	Percentages	• Understanding and using % • Calculating % of quantities • Convert fractions and decimals to %	• Define percentage as 'number of parts per hundred' • Express one quantity as a percentage of another • Compare two quantities using percentages • Interpret percentages as operators • Order decimals and fractions • Work interchangeably with terminating decimals and their corresponding fractions • Interpret percentages as a fraction or a decimal, interpret these multiplicatively	Building on….. To multiply and divide by powers of 10 (10, 100, 1000) etc. Taught in Y7 Autumn 2. To simplify, find equivalent and order fractions. Taught in Y9 Spring 1. Building towards… Applying percentage in problem solving questions, finding percentage of amounts both non-calculator and calculator.
Spring 1	Sequences	• What is a sequence?	Use various forms of a	Building on…..

			sequence to define and show progression of numbers and values.	Students ability to recognise patterns in visual and number sequences, including finding missing patterns/numbers and some exploration of the nth term of linear sequences. Taught in Y9 Autumn 2.
		● Generating sequences	• Generate terms of a sequence from a term-to-term rule or a position-to-term rule	Building towards… Finding the nth term of increasing and decreasing linear sequences and finding next terms of quadratic and Fibonacci sequences.
Spring 1	Ratio and proportion	● Understanding ratio notation	• Use ratio notation, including reduction to simplest form Relate ratios to fractions	Building on….. Interpreting the notation and meaning of ratios then simplify ratios and share a value amongst a given ratio. Taught in Y8 Summer 1 and Y9 Summer 2. Building towards… Reinforcing ability to share a value amongst a ratio and applying this to problems given in a context.
Spring 1	Functions and Graphs	● Real-life graphs ● Plotting graphs of linear functions	• Plot and interpret graphs of non-standard functions in real contexts to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration • Work with coordinates in all four quadrants • Plot graphs of equations that correspond to straight-line graphs in the coordinate plane	Building on….. Students ability to build scales on x-axis and y-axis. Evenly space them out with even distribution. Understanding the direct relationships between two variables and being familiar with variables that are commonly plotted on graphs. (E.g. distance and time, speed and time etc). Taught in Y9 Summer 1. Building towards…

			• Find approximate solutions to linear equations using a graph • Where appropriate, interpret simple expressions as functions with inputs and outputs	Interpreting information from real-life graphs, plotting linear graphs using equations.
Spring 2	Units and scales	● Length ● Mass ● Time ● Volume ● The metric system ● Metric and imperial conversions ● Interpreting scales ● Bearings	• Use standard units of measure for length, mass, volume and capacity, and related concepts using decimal quantities where appropriate • Change freely between related standard units in numerical contexts • Use scale diagrams and maps • Interpret maps and scale drawings and use bearings • Measure line segments and angles in geometric figures	Building on….. Students' ability to convert between units of length, mass and time. Taught in Y7 Spring 2. Building towards… Using bearings in maps. Working with compound units, such as Speed, density and pressure.
Spring 2	Measuring Shapes	● Understanding area ● Finding area and perimeter ● Circumference	• Use standard units of measure for length and area, and related concepts • Know and apply formula to calculate: area of triangles, parallelograms, trapezia • Calculate perimeters of 2D shapes • Identify and apply circle definitions and properties, including: centre, radii, diameter and circumference • Know the formulae: circumference of a circle = $2\pi r$ = πd • Calculate perimeters of 2D	Building on….. Students ability to calculate area and perimeter of regular polygons. Taught in Y9 Autumn 1. Students' ability to find the circumference of circles. Taught in Y9 Autumn 1. Building towards… Calculating the area of a circle. Introduction to Pythagoras theorem and its application in right triangles.

			shapes, including circles	
Spring 2	Number properties	• Multiples • Factors, primes and powers, divisibility tests • Index notation • Prime factorisation	• Recognise and use relationships between operations • Use the concepts and vocabulary of prime numbers, multiples and factors (divisors) • Use positive integer powers and associated real roots • Use positive integer powers and associated real roots (square, cube and higher) • Recognise powers of 2, 3, 4, 5 • Calculate with positive Integer indices	Building on….. Students ability to recall factors and multiples of numbers. Students' ability to recall prime numbers. Students' ability to recognise roots and powers of positive integers. Taught in Y7, 8 and 9 Spring 2. Building towards… Prime factorisation and the applications it has, including using products of primes to find the HCF/LCM. Learning the three basic laws of indices
Spring 2	Probability	• Introduction to probability • Single event probability	• Use appropriate language and the 0-1 probability scale • Apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future events • Record, describe and analyse the frequency of outcomes of probability experiments using tables • Apply the property that the probabilities of an exhaustive set of outcomes sum to one • Construct theoretical possibility spaces for single experiments with equally likely outcomes and use these to calculate theoretical probability	Building on….. Using appropriate language in probability, and recording probability statistics using appropriate tools (tables, scales, words). As taught in Y7, Y8 and Y9 Spring 1. Building towards... Applying the multiplication rule and the addition rule (AND/OR rules) to find probabilities of combined and mutually exclusive events respectively. Finding probability using probability trees.
Spring 2	Construction	• Construction with a	• Measure line segments and	Building on…..

	s	ruler and protractor	angles in geometric figures • Identify and construct congruent shapes	Basic constructions using ruler and protractor, meaning drawing 2D shapes accurately using angles and lengths with a protractor and ruler. Taught in Y8 Spring 2. Building towards… Using a ruler and protractor to identify and construct congruent shapes, particularly triangles as well as some common constructions using a compass.
Summer 1	Transformations	• Position and cartesian co-ordinates • Cartesian co-ordinates in 4 quadrants • Translation, Reflection, Rotation, Enlargement	• Solve geometric problems on coordinate axes Cartesian co-ordinates in 4 quadrants • Use conventional terms and notations: points, lines • Identify, describe and construct congruent and similar shapes, including on coordinate axes by considering rotation, reflection, translation and enlargement (including fractional scale factors) • Describe translations as 2D vectors • Use scale factors • Compare lengths and areas • Make links to scale factors	Building on….. Understanding on how to work with Cartesian coordinates in all four quadrants. Working with all four transformations. Taught in Y9 Autumn 2. Building towards… Reinforcing ability and confidence to transform shapes on a graph and recognise/describe transformations