MATHEMATICS 2022-2023

Threshold Concepts		Milestone 1	Milestone 2	Milestone 3	Milestone 4	Milestone 5	Milestone 6	Milestone 7
		Y7	Y8	Y9	Y10	Y11	Y12	Y13
	Assessment	Mini reviews show cumulative knowledge build up and then open book assessments which focus on new learning and include recall of previous learning. Baseline assessment at the start of the year and then end	Mini reviews show cumulative knowledge build up and then open book assessments which focus on new learning and include recall of previous learning. Baseline assessment at the start of the year and then end of year full closed book exam.	Mini reviews show cumulative knowledge build up and then open book assessments which focus on new learning and include recall of previous learning. Baseline assessment at the start of the year and then end of year	Mini reviews show cumulative knowledge build up and then open book assessments which focus on new learning and include recall of previous learning. Baseline assessment at the start of the year and then end of year full closed book exam.	Open book assessments, mock exam in November and then in March which will assess cumulatively.	Ongoing assessment at the end of each topic area and then a closed book exam at the end of the year.	
Number	**Content**	Manipulate and use basic number skills involving the four operations. Add and subtract for decimals and negatives, multiply and divide for all ordinary numbers. Order of operations. Understand and use fractions and percentages. Understand and use powers and roots. Understand types of numbers and factors.	Manipulate and use basic number skills - negative numbers and multiplication and division including decimals. Understand prime factors. Understand and use fractions and equivalence. Convert between ordinary numbers and standard form. Understand rules of indices – first 3 basic laws. Understand and use percentages.	Manipulate and use all number skills including factors, rounding and significant figures. Understand and use fractions and equivalence. Fractional increase and decrease. Ordering FPD. Understand square numbers and square roots have two solutions – positive and negative. All four operations and their use in standard form. Understand rules of indices – power of 0, power of 1 (recap first three rules). Understand and use percentages – introduce the calculator methods with harder percentages (23%, 27%, 84%). HCF and LCM.	Apply systematic listing strategies, **including use of the product rule for counting**. **Estimate powers and roots of any given positive number.** Calculate with roots and with integer **{and fractional}** indices. Calculate exactly with fractions, {surds} and multiples of p; **simplify surd expressions involving squares.** Calculate with numbers in standard form A ´ 10n, where 1 ≤ A < 10 and n is an integer. **Change recurring decimals into their corresponding fractions and vice versa.** Identify and work with fractions in ratio problems. Apply and interpret limits of accuracy when rounding or truncating **{including upper and lower bounds}.**			
Algebra	**Content**	Understand linear sequences. Use algebraic methods with respect to expressions and equations (forming, solving, manipulating) Plotting coordinates in four quadrants – different scales.	Understand different types of sequences to include finding the nth term Use algebraic methods. Draw straight line graphs.	Understand different types of sequences including decreasing sequences. Use algebraic methods with respect to equations including fractional. Expanding binomial expressions with positive integers. Draw and interpret different types of graphs – distance/time/conversion. Draw and interpret straight line graphs – to know the intercept and gradient. Recognise the inequality signs. Use algebraic skills in other areas of maths e.g. Geometry and measure.	Simplify and manipulate algebraic expressions including those involving surds **and algebraic fractions.** Factorising linear and **quadratic expressions**. Understand the laws of indices **including fractional and negative**. Interpret simple expressions as functions with inputs and outputs; **interpret the reverse process as the 'inverse function'; interpret the succession of two functions as a 'composite function'**. Draw and interpret all graphs, identify and interpret roots **and turning points of quadratic functions graphically; deduce roots algebraically and turning points by completing the square, trigonometry graphs and equations of a circle.** **Find approximate solutions to equations numerically using iteration**. Translate simple situations or procedures into algebraic expressions or formulae; derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution. Solve linear inequalities in one, **and two,** variables **and quadratic in one variable:** represent the solution on a number line, **using set notation on a graph.** Deduce expressions to calcuate the nth term for linear and			

Geometry and measure	**Content**	Types of angles – basic facts, measure Understand properties of 2D shapes and angles. Understand area and perimeter of 2D shapes. Understand properties of 3D shapes. Understand different metric units.	Understand area and circumference of circles and compound shapes with rectangles Understand volume of 3D shapes- cylinders, prisms. Understand angles on parallel lines Draw and understand basic transformations.	Exterior and interior angles of polygons. Draw and understand transformations, including vectors for translation, reflection using the equation of the line, rotation using a centre of rotation. **Use Pythagoras to find missing sides.**	Interpret and use fractional, **and negative**, scale factors for enlargements. **Describe combinations of transformations**. Identify and apply circle definitions and to find area and circumference of circles and parts of a circle. **Apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results**. Construct and interpret plans and elevations of 3D shapes. Interpret and use bearings. Calculate surface areas and volumes of **spheres, pyramids, cones** and composite solids. Apply the concepts of congruence and similarity, including the relationships between lengths, **areas and volumes** in similar figures. Apply Pythagoras' Theorem and trigonometric ratios to find angles and lengths in right angled triangles **including 3-D.** **Understand trigonometry in non-right angled triangles**. **Know the exact values of sin**q **and cos**q **for** q = **0 0 , 300 , 450 , 600 and 900 ; know the exact value of tan**q **for** q = **0 0 , 300 , 450 and 600**. Describe translations as 2D vectors. Apply addition and subtraction of vectors, multiplication of vectors by a scalar, and		
Statistics	**Content**	Use different averages. Draw and understand different charts and graphs.	Use different averages. Frequency tables. Frequency trees. Two –way tables. Draw pie charts and composite bar charts.		Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling. Interpret and construct tables and line graphs for time series data. Construct and interpret diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and cumulative frequency graphs, and know their appropriate use. Interpret, analyse and compare the distributions of data sets from univariate empirical distributions applying appropriate statistical methods. Apply statistics to describe a population. Use and interpret scatter graphs of bivariate data; recognise correlation and know that it does not indicate causation; draw estimated lines of best fit; make predictions; interpolate and		
Ratio and Proportion	**Content**	Understand ratio and proportion – simplify ratios, share amounts, recipes and unitary method.	Understand ratio and proportion – best buys, equivalent ratios. Interpret distance/time graphs.	Finding missing amount, given 1 part and the ratio. 1:n and n:1. Express a ratio as a fraction.	Compare lengths, areas and volumes using ratio notation and/or scale factors; make links to similarity including trigonometric ratios. Convert between related compound units. Understand **and interpret** direct and inverse proportion. Interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion. **Interpret the gradient at a point on a curve as the instantaneous rate of change**. Set up, solve and interpret the answers in growth and decay problems,		

Probability	**Content**	Understand and use probability scales, know the language of probability, know that probabilities add up to 1, probability of an event not happening, single event probability and experimental probability.	Understand and use probability, sample space, listing outcomes/combinations, probability tree diagrams and Venn diagrams.	Calculate probability using a tree diagram. Understand relative frequency.	Apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one. Use a probability model to predict the outcomes of future experiments; understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size. Calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions. **Calculate and interpret conditional probabilities through representation using expected frequencies with two-way tables,**		