Curriculum overview: Maths (foundation tier)

Key Stage 2	
Number and ratio	**Geometry**
- To have a good understand of place value and can round to nearest 10s. - To use mental and written methods to add, subtract, multiply and divide numbers - To solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why - To multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 - To identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers - To know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers - To establish whether a number up to 100 is prime and recall prime numbers up to 19 - To recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3}) - To compare and order fractions whose denominators are all multiples of the same number - To add and subtract fractions with the same denominator and denominators that are multiples of the same number - To multiply proper fractions and mixed numbers by whole numbers - To identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths - To read and write decimal numbers as fractions [for example, 0.71 = 71/100] - To write percentages as a fraction with denominator 100, and as a decimal - Use simple ratio and proportional reasoning to solve problems. - Solve problems involving similar shapes where the scale factor is known or can be found.	- To convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre) - To understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints - To measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres - To calculate and compare the area of rectangles (including squares) - To estimate volume - To solve problems involving converting between units of time - To identify 3-D shapes, including cubes and other cuboids, from 2-D representations - To use the properties of rectangles to deduce related facts and find missing lengths and angles - To distinguish between regular and irregular polygons based on reasoning about equal sides and angles - To know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles - To draw given angles, and measure them in degrees ($^\circ$) - To identify: - angles at a point and one whole turn (total 360°) - angles at a point on a straight line and 1/2 a turn (total 180°) - other multiples of 90° - To identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed - Describe positions on the full coordinate grid (all four quadrants)
Algebra	**Statistics and probability**
- Simplify expressions by collecting like terms - Substitute into a simple expression - Recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3}) - Use simple formulae in words, and express missing number problems algebraically. - Generate and describe linear number sequences. - Find possible values in missing number problems and equations involving 1 or 2 unknowns.	- To complete, read and interpret information in tables, including timetables - To solve comparison, sum and difference problems using information presented in a line graph

Key skills/content requirements at GCSE			
Number and ratio	**Algebra**	**Statistics and probability**	**Geometry**
- Ordering different types of number - Calculations with the four operations - Calculations involving decimals - Types of number – squares, cubes and primes - Negative numbers - Fraction, decimal and percentage conversions	- Forming and simplifying expressions - Substitution - Forming and solving equations - Linear graphs - Inequalities	- Reading and interpreting timetables - Averages including from grouped data and diagrams - Drawing and interpreting graphs - Pie charts - Scatter graphs and correlation	- Transformations - Symmetry - Properties of triangles and quadrilaterals 3D shapes - Nets

▪ Fractions ▪ Percentages ▪ Interest ▪ Order of operations (BIDMAS) ▪ Factors, multiples and prime factors ▪ Ratio – simplifying and sharing ▪ Proportion problems ▪ Recipes ▪ Best buys ▪ Currency conversions ▪ Indices ▪ Calculator skills ▪ Standard form	▪ Expanding and factorising linear and quadratic expressions ▪ Simultaneous equations ▪ Real-life graphs ▪ Non-linear graphs ▪ Solving quadratic equations ▪ Linear sequences ▪ Generating quadratic sequences	▪ Questionnaires ▪ Sampling ▪ Probability ▪ Sample space diagrams ▪ Venn diagrams ▪ Tree diagrams	▪ Plans and elevations ▪ Angle facts and geometrical reasoning ▪ Constructions ▪ Perimeter ▪ Area of triangles and quadrilaterals ▪ Pythagoras' theorem ▪ Trigonometry ▪ Congruence and similarity ▪ Volume and Surface area ▪ Circles, sectors and segments ▪ Conversions ▪ Maps and scales

Curriculum Overview

	Year 7 (Including Year 6 objectives)	Year 8 (Including Year 7 objectives)	Year 9 (Including Year 8 objectives)	Year 10 (Including Year 9 objectives)	Year 11 (Including Year 10 objectives)
Number	▪ use negative numbers in context, ▪ round any whole number to a required degree of accuracy ▪ solve problems involving basic operations ▪ solve multi-step problems in contexts, deciding which operations and methods to use and why ▪ use estimation to check answers to calculations ▪ use the order of operations to make calculations ▪ identify common factors, common multiples and prime numbers ▪ compare and order fractions ▪ to simplify fractions ▪ add and subtract fractions and mixed numbers ▪ multiply two simple fractions ▪ divide proper fractions by whole numbers ▪ multiply and divide numbers by 10, 100 and 1000 ▪ multiply one-digit numbers with up to two decimal places by whole numbers ▪ use written division methods in cases where the answer has up to two decimal places ▪ associate a fraction with	▪ order positive and negative integers, decimals and fractions ▪ recognise and use relationships between operations, including inverse operations ▪ use conventional notation for priority of operations, including brackets ▪ use powers and roots ▪ where appropriate ▪ round numbers and measures to an appropriate significant figures	• add, subtract, multiply and divide positive and negative numbers. • use BIDMAS • add, subtract, multiply and divide decimals. • estimate by rounding • know square and cube numbers • use laws of indices • to order and compare fractions • find fractions of an amount • add, subtract, multiply and divide fractions and mixed numbers • convert between fractions, decimals and percentages • find percentage of amounts with and without a calculator • find percentage increase and decrease • find percentage change		▪ write down the reciprocal of an integer, fraction or decimal ▪ know and recall that a number to the power of 0 always equals 1 ▪ Convert numbers to and from standard form ▪ perform calculations with numbers in standard form ▪ express a number as a percentage of another ▪ calculate percentage profit or loss ▪ calculate the original amount given the final amount and percentage change ▪ recall and use the compound interest formula ▪ set up and solve problems in growth and decay problems

	division and calculate decimal fraction equivalents ▪ recall and use equivalences between simple fractions, decimals and percentages, including in different contexts ▪ draw and translate simple shapes on the coordinate plane, and reflect them in the axes				
Ratio and Proportion	▪ solve problems involving the relative sizes of two quantities ▪ solve problems involving the calculation of percentages ▪ solve problems involving similar shapes ▪ solve problems involving unequal sharing and grouping using knowledge of fractions and multiples	▪ change freely between related standard units ▪ express one quantity as a fraction of another ▪ simplifying ratio ▪ divide a given quantity into two parts ▪ express one quantity as a percentage of another ▪ compare two quantities using percentages		▪ solve a ratio problem in context ▪ write a ratio as a fractions or a linear function ▪ proportion problems such as best buys ▪ scale up/down recipes ▪ convert between currencies. ▪ solve problems using the unitary method	
Algebra	▪ use simple formulae ▪ generate and describe linear number sequences ▪ express missing number problems algebraically ▪ find pairs of numbers that satisfy an equation with two unknowns ▪ enumerate possibilities of combinations of two variables	▪ use and interpret algebraic notation ▪ substitution ▪ understand and use the concepts and vocabulary of expressions, equations, formulae and terms ▪ simplify expressions by collecting like terms and multiplying a single term over a bracket ▪ interpret functions with inputs and outputs ▪ understand and use lines parallel to the axes, y=x and y=-x ▪ solve linear equations ▪ generate sequences ▪ recognise and use special sequences	▪ form expressions ▪ simplify expressions using laws of indices ▪ expand single brackets ▪ factorise into single brackets	▪ solving linear equations ▪ forming equations ▪ rearranging equations ▪ representing inequalities on a number line and solving inequalities ▪ recognising special sequences ▪ finding nth term of arithmetic sequences ▪ generating terms of geometric and quadratic sequences ▪ calculate midpoint of a line segment ▪ draw straight line graphs from real life situations ▪ create and interpret distance/time graphs ▪ plot and draw straight line graphs from a table of values ▪ identify gradient and y intercept from an equation and graph ▪ find the equation of a	● answer simple show that questions and proofs ● calculate the equation of a line given two points ● sketch the equations of simple cubic and reciprocal functions ● form and solve simultaneous equations algebraically ● recall and use the laws of indices

				straight line on a graph • expand a double bracket • factorise quadratic expressions • solve quadratic equations by factorising • plot graphs of quadratic functions and identify points of intersection	
Statistics and probability	• interpret and construct pie charts and line graphs and use these to solve problems • calculate and interpret the mean as an average	• interpret and construct tables, charts and diagrams for categorical data, and for ungrouped discrete numerical data • use the mean, median, mode and range to compare and interpret data	• sort, classify and tabulate data • interpret data for tables • identify the mode or modal group from frequency tables • read and interpret timetables in both 12 and 24hr clock • draw and interpret stem and leaf diagrams. • draw and interpret pie charts • draw and interpret scatter diagrams, including identifying outlier, correlation and using line of best fit to make estimations and predictions • design and criticise questionnaires • stratified sampling	• averages from charts and graphs • mark events and probabilities on a probability scale • calculate the probability of an event happening • list all possible outcome for events • calculate probabilities from frequency and two way tables • estimate the number of times an event will occur, given the probability • create and interpret Venn diagrams	• calculate averages from a (grouped) frequency table • compare data using averages and range • calculate probability of mutually exclusive events • Create and interpret tree diagrams
Geometry	• conversion of units of measure • calculate the area of parallelograms and triangles • calculate, estimate and compare volume of cubes and cuboids • draw 2-D shapes using given dimensions and angles • circle terminology • recognise, describe and build simple 3-D shapes, including making nets	• use the standard conventions for labelling and referring to the sides and angles of triangles • properties of: special types of quadrilaterals and triangles • understand congruence through transformations • properties of 3D solids • calculate area of triangles, parallelograms, trapezia • calculate volume of cuboids • describe translations as 2D vectors	• reflective and rotational symmetry • properties of isosceles, equilateral and right angle triangles • names and properties of quadrilaterals • find missing angles in a triangle use the rule that the angles add to 180 • angles in parallel lines (alternate, corresponding and supplementary) • angles in polygons • congruence • tessellation	• interpreting scales • naming 3D shapes • convert between metric area and volume units • calculate the area of trapeziums and parallelograms • calculate area and perimeter of compound shapes • calculate the volume and surface area of a prism • sketch nets of cuboids and prisms • transformations (rotation, reflection, translation and enlargement) • recognise and describe a	• circumference and area of a circle • perimeter and area of compound shapes which include circles • area of a sector and length of an arc • surface area and volume of a cylinder • surface area and volume of spheres, pyramids & cones • solve angle problems involving congruence • identify the scale factor of an enlargement • solve problems to find missing lengths of similar

- transformation - recall and use Pythagoras' theorem in 2D - recall and use trigonometry ratios in 2D. - draw sketches of 3D solids - properties of 3D solids - plans and elevations - similarity and congruence - constructions and loci - use and interpret maps and scale drawings - use 3 figure bearings to specify direction.	- shapes - recall and use compound measure formulae - convert between metric speed measures - understand and use column notation in relation to vectors - perform calculations involving column vectors

GCSE External assessment:

All content is assessed at the end of Year 11. The written examinations are made up of 3 examination papers, two calculator and one non-calculator. Each paper is equally weighted. Each lasts 1 hour 30 minutes and is marked out of 80. Students are awarded grades based on the 9-1 grading system (with 9 being the best grade).

Each examination is available at two tiers. Teachers will use internal class assessments to decide which tier is most appropriate for each student.

Tier	Available Grades
Higher	9-4
Foundation	1-5

SMSC in the mathematics

Through various projects, mini investigations and activities built into lessons, SMSC (Spiritual, Moral, Social and Cultural) is being delivered in high quality lessons.
What we offer:

- A classroom environment which encourages problem solving, collaborative work and enjoyment of exploring real-life problems.
- Participation in extra-curricular activities such as the UK Schools Mathematics Challenges, Maths Enrichment Days, Mathematics Revision Sessions, and Maths Club for students who want to extend themselves and have fun in mathematics

Spiritual development in mathematics
We encourage pupils to see the awe and wonder that can be found within mathematics – from the symmetry of a snowflake or the number of seeds in a sunflower head to the design of galaxies and the coordinates of a newly discovered planet. Pupils are introduced to famous
mathematicians, some of whom are also well-known as philosophers. There is a sense of wonder in the exactness of mathematics and students are able to gain a sense of personal achievement in solving problems.

Moral development in mathematics
We look at the use and interpretation of data, particularly the use of statistics and how people manipulate them to promote their own (biased) opinions. Pupils are encouraged to discuss the use and misuse of data in all issues, including those supporting moral arguments, and consider the use of questionnaires to conduct opinion surveys.

Social development in mathematics
Pupils are regularly asked to work in pairs or small groups during experimental or investigative work where they are able to develop both their problem solving and teamwork skills. They are given many opportunities to discuss their ideas and are encouraged to develop their
mathematical reasoning through communication with others. Through the use of peer- assessment pupils are able to improve their use of language and better understand how to give constructive criticism.

Cultural development in mathematics
Students are able to explore the mathematics found and used in other cultures. They are introduced to symmetrical patterns, number systems and mathematical methods such as patterns found in Islamic art and Roman numerals. Students are introduced to the culturally and historically significant art of code-breaking and theorems devised by famous mathematicians.