Maths Department - Year 10 Foundation

Shirley High Curriculum Map

The year 10 curriculum builds on the knowledge and skills students have acquired in Key Stage 3. Examination technique is introduced, and students now focus on using their ability to communicate and reason Mathematically, developed at Key Stage 3, to problem solve using a wide array of techniques learnt from the six key concepts of Mathematics at Key Stage 4: Algebra, Geometry and Measures, Number, Ratio, Proportion and Rates of Change, Probability and Statistics.

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	Theme/Topic/Skill:	Theme/Topic/Skill:	Theme/Topic/Skill:	Theme/Topic/Skill:	Theme/Topic/Skill:	Theme/Topic/Skill:
	(1) Number (2) Algebra (3) Graphs, tables and charts	(4) Fractions and percentages. (5) Equations, inequalities and sequences	(6) Angles (7) Averages and range	(8) Perimeter, area and volume 1 (9) Graphs (10) Transformations	(11) Ratio and proportion (12) Right-angled triangles (13) Probability	(14) Multiplicative reasoning (15) Constructions, loci and bearings (R) Revision (EoY) End of Year Assessment
Why Now?	(1) Pupils consolidate learning from KS3 on some fundamental topics within Number. Some of the key skills in this unit will be used in all units. (2) Pupils consolidate learning from KS3 on some fundamental topics within Algebra. Some of the key skills in this unit will be used in all units. (3) Pupils consolidate learning from KS3 whilst being introduced to exam technique.	(4) This unit builds on learning from unit 1. Problem solving questions can also be accessed using skills from unit 2. (5) Pupils consolidate learning from KS3 whilst being introduced to exam technique. Problem solving questions can also be accessed using skills from unit 2.	(6) Pupils apply their understanding from units 1,2 and 5 to geometric problems. (7) Pupils consolidate learning from KS3 whilst being introduced to exam technique. Problem solving questions can also be accessed using skills from unit 2.	(8) Pupils consolidate learning from KS3 focusing on exam technique and problem solving. (9) Pupils see the graphical representation of concepts seen in unit 5. (10) Pupils cover the GCSE content for transformations in this unit with a focus on exam technique.	(11) This unit builds upon unit 4 and leads on from content in unit 10. Problem solving questions may involve content from units such as units 5 and 6. (12) This unit builds upon unit 6. Problem solving questions may involve content from units such as units 5, 8 and 11. (13) Pupils cover the GCSE content for probability in this unit. Skills from unit 1 will enable pupils to execute calculations, whilst content from units 5 and 11 will feature in problem solving questions.	(14) This unit builds on prior knowledge from units 8, 10 and 11. Problem solving questions will require recall from units 4 and 5. (15) Pupils build on their understanding from KS3. Problem solving questions will involve using understanding from units 6 and 12.
Fundamental Concepts	Number Algebra Statistics	Number Algebra	Geometry and measures Statistics	Geometry and measures Algebra	Ratio, proportion and rates of change Geometry and measures Probability	Number Algebra Ratio, proportion and rates of change Geometry and measures Probability Statistics
Students will learn about …	(1) **Applying** system listing strategies. **Using** priority of operations with positive and negative numbers. **Simplifying** calculations by cancelling. **Using** inverse operations. **Rounding** measurements to one decimal place. **Multiplying** decimal numbers. **Multiplying** decimals using the grid method. **Dividing** decimal numbers. **Converting** metric measures. **Writing** decimal numbers of millions. **Rounding** to a given number of significant figures. **Estimating** answers to calculations. **Using** one calculation to find the answer to another. **Recognising** two-digit prime numbers. **Finding** factors and multiples of numbers. **Finding** common factors and common multiples of numbers. **Finding** the HCF and LCM of two numbers by listing. **Finding** square roots and cube roots. **Recognising** powers of 2, 3, 4 and 5. **Understanding** surd notation on a calculator. **Using** index notation for powers of 10. **Using** index notation in calculations. **Using** the laws of indices. **Writing** a number as a product of its prime factors. **Using** prime factor decomposition and Venn diagrams to find the HCF and LCM. (2) **Using** correct algebraic notation. **Writing** and simplifying expressions. **Using** the index laws. **Multiplying** and dividing expressions. **Substituting** numbers into expressions. **Writing** more complex expressions. **Recognising** the difference between a formula and an expression. **Writing** and using formulae. **Using** smaller numbers to identify patterns. **Expanding** brackets.	(4) **Comparing** fractions. **Adding** and subtracting fractions. **Using** fractions to solve problems. **Finding** a fraction of a quantity or measurement. **Using** fractions to solve problems. **Using** bar models to help solve problems. **Multiplying** whole numbers, fractions and mixed numbers. **Simplifying** calculations by cancelling. **Dividing** a whole number by a fraction. **Dividing** a fraction by a whole number or a fraction. **Comparing** fractions to decimals and vice versa. **Using** decimals to find quantities. **Working** out divisions with decimal answers. **Writing** one number as a fraction of another. **Converting** percentages to fractions and vice versa. **Writing** one number as a percentage of another. **Converting** percentages to decimals and vice versa. **Finding** a percentage of a quantity. **Using** percentages to solve problems. **Calculating** simple interest. **Calculating** percentage increases and decreases. **Using** percentages in real-life situations. **Calculating** VAT (value added tax). (5) **Understanding** and using inverse operations. **Solving** simple linear equations. **Solving** two-step equations. **Solving** linear equations with brackets. **Solving** equations with unknowns on both sides. **Using** correct notation to show inclusive and exclusive inequalities. **Showing** inequalities on a number line. **Writing** down whole numbers which satisfy an inequality. **Solving** simple linear inequalities. **Solving** two-sided inequalities. **Substituting** values into formulae and solving equations. **Changing** the subject of a formula.	(6) **Solving** geometric problems using side and angle properties of quadrilaterals. **Identifying** congruent shapes. **Understanding** and using angle properties of parallel lines. **Finding** missing angles using corresponding and alternate angles. **Solving** angle problems in triangles. **Understanding** angle proofs about triangles. **Calculating** the interior and exterior angles of regular polygons. **Calculating** the interior and exterior angles of polygons. **Explaining** why some polygons fit together and others do not. **Solving** angle problems using equations. **Solving** geometric problems showing reasoning. **Using** x for the unknown to help solve problems. (7) **Calculating** the mean from a list and from a frequency table. **Comparing** sets of data using the mean and range. **Finding** the mode, median and range from a stem and leaf diagram. **Identifying** outliers. **Estimating** the range from a grouped frequency table. **Recognising** the advantages and disadvantages of each type of average. **Finding** the mode, modal class and median from a frequency table. **Estimating** the mean of grouped data. **Understanding** the need for sampling. **Understanding** how to avoid bias.	(8) **Calculating** the perimeter and area of rectangles, parallelograms and triangles. **Calculating** a missing length, given the area. **Calculating** the area and perimeter of trapezia. **Finding** the height of a trapezium given its area. **Converting** between area measures. **Calculating** the perimeter and area of shapes made from triangles and rectangles. **Calculating** area in hectares. **Converting** between hectares and metres squared. **Calculating** the surface area of a cuboid. **Calculating** the surface area of a prism. **Calculating** the volume of a cuboid. **Calculating** the volume of a prism. **Using** the flow diagram to help solve problems. **Converting** between measures of volume. **Solving** problems involving surface area and volume. (9) **Finding** the midpoint of a line segment. **Recognising**, naming and plotting straight line graphs parallel to an axis. **Recognising**, naming and plotting the graphs $y = x$ and $y = -x$. **Generating** and plotting coordinates from a rule. **Plotting** straight line graphs from a table of values. **Drawing** graphs to represent relationships. **Finding** the gradient of a line. **Identifying** and interpreting the gradient from an equation. **Understanding** what m and c represent in the equation $y = mx + c$. **Drawing** and interpreting graphs from real data. **Using** distance-time graphs. **Drawing** distance-time graphs. **Interpreting** rate of change graphs. **Drawing** and interpreting a range of graphs. **Understanding** when predictions are reliable. (10) **Translating** a shape on a coordinate grid. **Using** a column vector to describe a translation.	(11) **Writing** a ratio in its simplest form. **Solving** simple problems using ratios. **Using** ratios involving decimals. **Writing** and using ratios for shapes and their enlargements. **Using** ratios to convert between units. **Dividing** a quantity into 2 parts in a given ratio. **Dividing** a quantity into 3 parts in a given ratio. **Solving** word problems using ratio. **Using** bar models to help solve ratio problems. **Comparing** ratios. **Writing** ratios in the form $1 : n$ or $n : 1$. **Solving** ratio and proportion problems. **Using** the unitary method to solve proportion problems. **Working** out which product is better value for money. **Recognising** and using direct proportion on a graph. **Understanding** the link between the unit ration and the gradient. **Recognising** the different types of proportion. **Solving** word problems involving direct and inverse proportion. (12) **Understanding** Pythagoras' theorem. **Calculating** the length of the hypotenuse in a right-angled triangle. **Solving** problems using Pythagoras' theorem. **Calculating** the length of a line segment AB. **Calculating** the length of a shorter side in a right-angled triangle. **Solving** problems using Pythagoras' theorem. **Understanding** and recalling the sine ratio in right-angled triangles. **Using** the sine ratio to calculate the length of a side in a right-angled triangle. **Using** the sine ratio to solve problems. **Using** the sine ratio to calculate an angle in a right-angled triangle. **Understanding** and recalling the cosine ratio in right-angled triangles.	(14) **Calculating** percentage profit or loss. **Expressing** a given number as a percentage of another in more complex situations. **Calculating** percentage profit or loss. **Finding** the original amount given the final amount after percentage increase or decrease. **Solving** problems involving compound measures. **Converting** between metric measures of speed. **Calculating** average speed, distance and time. **Using** formulae to calculate speed and acceleration. **Using** ratio and proportion in measures and conversions. **Using** inverse proportion. (15) **Making** accurate drawings of triangles using a ruler, protractor and compasses. **Identifying** SSS, ASA, SAS and RHS triangles as unique from a given description. **Identifying** congruent triangles. **Drawing** diagrams to scale. **Using** scales on maps and diagrams to work out lengths and distances. **Solving** problems involving scales. **Accurately** drawing angles and 2D shapes using a ruler, protractor and compasses. **Constructing** a polygon inside a circle. **Drawing** accurate nets. **Bisecting** angles and lines using a ruler and compasses. **Finding** the shortest distance from a point to a line. **Drawing** loci for the path of points that follow a give rule. **Identifying** regions bounded by loci to solve practical problems. **Finding** and using three-figure bearings. **Using** angles on parallel lines to work out bearings. **Solving** problems involving bearings and scale diagrams.

	Simplifying expressions with brackets. **Writing** and using formulae with brackets. **Factorising** algebraic expressions. **Using** the identity symbol ≡ and the not equal to symbol ≠ . **Writing** expressions and simple formulae. **Using** maths and science formulae. (3) **Designing** tables and data collection sheets. **Reading** data from tables. **Using** data from tables. **Designing** and using two-way tables. **Drawing** and interpreting comparative and composite bar charts. **Interpreting** and comparing data shown in bar charts, line graphs and histograms. **Plotting** and interpreting time series graphs. **Using** trends to predict what might happen in the future. **Constructing** and interpreting stem and leaf and back-to-back stem and leaf diagrams. **Drawing** and interpreting pie charts. **Plotting** and interpreting scatter graphs. **Determining** whether there is a relationship between sets of data. **Drawing** a line of best fit on a scatter graph. **Using** the line of best fit to predict values.	**Knowing** the difference between an expression, an equation and a formula. **Recognising** and extending sequences. **Using** the nth term to generate terms of a sequence. **Finding** the nth term of an arithmetic sequence.		**Drawing** a reflection of a shape in a mirror line. **Drawing** reflections on a coordinate grid. **Describing** reflections on a coordinate grid. **Rotating** a shape on a coordinate grid. **Describing** a rotation. **Enlarging** a shape by a scale factor. **Enlarging** a shape using a centre of enlargement. **Identifying** a scale factor of an enlargement. **Finding** the centre of enlargement. **Describing** an enlargement. **Transforming** shapes using more than one transformation. **Describing** combined transformations of shapes on a grid.	**Using** the cosine ratio to calculate the length of a side in a right-angled triangle. **Using** the cosine ratio to solve problems. **Using** the cosine ratio to calculate an angle in a right-angled triangle. **Understanding** and recalling the tangent ratio in right-angled triangles. **Using** the tangent ratio to calculate the length of a side in a right-angled triangle. **Using** the tangent ratio to calculate an angle in a right-angled triangle. **Solving** problems using an angle of elevation or an angle of depression. **Understanding** and recalling trigonometric ratios in right-angled triangles. **Using** trigonometric ratios to solve problems. **Knowing** the exact values of the sine, cosine and tangent of some angles. (13) **Calculating** probabilities from equally likely events. **Calculating** probabilities of mutually exclusive and exhaustive events. **Solving** probability problems. **Working** out probabilities from sample space diagrams. **Drawing** and using sample diagrams to solve probability problems. **Estimating** and interpreting probabilities based on experimental data. **Making** predictions from experimental data. **Understanding** the language of sets and Venn diagrams. **Using** Venn diagrams to solve probability problems. **Solving** problems using frequency trees and tree diagrams. **Working** out probabilities using tree diagrams. **Understanding** independent events. **Understanding** when events are not independent. **Solving** probability problems involving events that are not independent.	
Language for Life (Key terms/Vocabulary)	(1) Integer, number, digit, negative, decimal, addition, subtraction, multiplication, division, remainder, operation, estimate, power, roots, factor, multiple, primes, square, cube, even, odd. (2) Expression, identity, equation, formula, substitute, term, 'like' terms, index, power, collect, substitute, expand, bracket, factor, factorise, linear, simplify. (3) Mean, median, mode, range, average, discrete, continuous, qualitative, quantitative, data, scatter graph, line of best fit, correlation, positive, negative, sample, population, stem and leaf, frequency, table, sort, pie chart, estimate.	(4) Decimal, percentage, inverse, addition, subtraction, multiplication, division, fractions, mixed, improper, recurring, integer, decimal, terminating, percentage, VAT, increase, decrease, multiplier, profit, loss. (5) Arithmetic, geometric, function, sequence, nth term, derive, quadratic, triangular, cube, square, odd, even, solve, change, subject, inequality, represent, substitute, bracket, expand, linear, equation, balance, accuracy.	(6) Quadrilateral, angle, polygon, interior, exterior, proof, tessellation, rotational symmetry, parallel, corresponding, alternate, co-interior, vertices, edge, face, sides, triangle, perpendicular, isosceles, scalene, clockwise, anticlockwise, hexagons, heptagons, octagons, decagons, obtuse, acute, reflex, quadrilateral, triangle, regular, irregular, two-dimensional, three-dimensional, measure, line, angle, order, intersecting. (7) Mean, median, mode, range, average, discrete, continuous, qualitative, quantitative, data, sample, population, stem and leaf, frequency, table, sort, pie chart, estimate, primary, secondary, interval, midpoint, survey.	(8) Triangle, rectangle, parallelogram, trapezium, area, perimeter, formula, length, width, prism, compound, measurement, polygon, cuboid, volume, symmetry, vertices, edge, face, units, conversion. (9) Linear, graph, distance, time, coordinate, quadrant, real-life graph, gradient, intercept, function, solution, parallel. (10) Transformation, rotation, reflection, enlargement, translation, single, combination, scale factor, mirror line, centre of rotation, centre of enlargement, column vector, vector, similarity, congruent, angle, direction, coordinate, describe.	(11) Ratio, proportion, share, parts, fraction, function, direct proportion, inverse proportion, graphical, linear, compare. (12) Hypotenuse, surd, opposite, adjacent, sine, $\sin sin\ \theta$, sin^{-1}, cosine, $\cos cos\ \theta$, tangent, $\tan tan\ \theta$, elevation, depression. (13) Probability, dependent, independent, conditional, tree diagrams, sample space, outcomes, theoretical, relative frequency, fairness, experimental.	(14) Ratio, proportion, best value, proportional change, compound measure, density, mass, volume, speed, distance, time, density, mass, volume, pressure, acceleration, velocity, inverse, direct. (15) Construct, circle, arc, sector, face, edge, vertex, two-dimensional, three-dimensional, solid, elevations, congruent, angles, regular, irregular, bearing, degree, bisect, perpendicular, loci, map, scale, plan, region.
Extended writing Opportunities						After the end of year assessment pupils write a reflection based on the assessment.
Maths Across the Curriculum	(1) **Factors** is a concept that links to common morals or ideology which may arise in subjects such as religious studies, modern foreign languages, English language and literature, history and geography. (2) **Pupils** learn the fundamental concepts of algebra that are used in subjects such as biology, chemistry, physics, computer science and geography. (3) **Scatter graphs** are used in subjects such as geography and biology.	(4) **Fractions,** decimals and percentages are used in subjects such as food technology, geography, English, history, design and technology and media. **Assessments** across all subjects in the curriculum will be reported back to pupils as either fractions or most commonly percentages. Therefore, pupils will have the necessary skills to understand and evaluate their attainment. (5) **Pupils** use formulae and substitution in subjects such as physics, food technology and computer science.	(6) **Lines and angles** arise in subjects such as design and technology and physics. (7) **Pupils** learn statistical techniques that are used in many other subjects such as science, geography and psychology.	(8) **Calculating areas, surface areas and volumes** are needed in subjects such as science, geography and design and technology. (9) **Interpreting the rates of change** from graphs is a technique used in subjects such as physics and geography. **Distance** time graphs are used to help describe motion in physics. (10) **Transformations** can be used in subjects such as art, photography and design and technology.	(11) **Ratios** and proportionality arise in subjects such as food technology, design and technology, science and geography. (12) **Trigonometry** is used in physics to calculate components of forces. (13) **Experimental** probabilities are used in scientific experiments and field research in geography.	(14) **Interest** rates are used and calculated in GCSE Business Studies. (15) **Constructions** can be used to create precise triangles in subjects such as art or design and technology.

Links to careers/ aspirations	(1) **Pupils** will acquire key skills for careers in finance and accounting. (2) **Pupils** learn the fundamental concepts of algebra that are used in careers involving astrology, architecture, computer engineering, market research analysis, finance and economy. (3) **Pupils** learn to use fundamental statistical techniques that are widely used in a range of professions from sports commentator to community management.	(4) **Understanding** how to calculate prices with VAT is essential for roles in business management. **Fractions** are imperative in the fields of data analysis, community management and journalism. Computer programmer, statistician, actuary, quantitative analyst, scientist, economist, urban planner, lawyer and judge all require at least some knowledge or use of fractions. (5) **Solving equations** is a skill used by business managers, financial analysts and computer programmers.	(6) **Pupils** learn how to accurately draw angles which is a key skill in drawing plans in architecture. (7) **Sampling** populations is a key statistical skill used across many fields of work such as pharmaceuticals, community management and manufacturing.	(8) **Volumes** of 3D shapes must be calculated by people in product design for items such as bottles. (9) **Graphs** are the visual representation of data. Graphs are used for statistical analysis, to make complex mathematical concepts easier to understand. Although many professionals use graphs in their work, science and mathematical occupations use graphs extensively. (10) **Transformations** are used by some professional artists whose artwork relies upon transformations such as enlargement and rotation.	(11) **Proportion** is used by chefs and manufactures of food products. (12) **Trigonometry** is used in oceanography in calculating the height of tides in oceans. The sine and cosine functions are fundamental to the theory of periodic functions, those that describe the sound and light waves. (13) **Probability** is used in careers that involve forecasting for things such as weather or sales.	(14) **Percentages** are used in discounts in shops, bank interest rates, rates of inflation and statistics in the media and therefore link to fields such as retail, journalism, finance and statistical analysis. (15) **Loci** can help architects and interior designers to account for any logistical discrepancies in their designs, whilst it can be used by software developers and game programmers in the development of video games.
Cultural Capital	(1) **Estimating** is an important part of our everyday experience, from budgeting to making sense of problems and persevere in solving them. Without estimation skills, pupils would not be able to determine if an answer is within a reasonable and acceptable range. (2) **Pupils** learn about scientific formulas such as the relationship between speed, distance and time or the relationship between final velocity, initial velocity, acceleration and time. (3) **Pupils** learn how to interpret time series graphs which they may see used when researching about the fluctuations of prices of shares, currencies or consumables.	(4) **Pupils** can use their understanding of fractions to better understand the statistics and likelihoods they are exposed to through media. (5) **Pupils** are exposed to a method of solving linear equations known as balancing. This idea can be used as a template for pupils to understand social distress with regards to issues involving equality. By understanding that with equations, like forces in physics, one action must have an equal and opposite action to maintain balance.	(6) **Pupils** learn the connection between the construction of shapes and a full rotation through the formula calculating the exterior angle of any n sided polygon. (7) **Pupils** learn that statistics can be misleading which will better prepare them to think independently when exposed to advertising and marketing campaigns across social media clubs.	(8) **Proving** that two triangles are congruent allows pupils to understand the difference between knowing a point or hypothesis themselves and providing a logical and reasoned explanation to allow others to understand too. This skill translates across all stages of life from essay writing to collaboration with colleagues in the workplace. (9) **Understanding graphs** can aid pupils in understanding information relayed to them from retailers or price comparison sites. Allowing them to make better informed decisions. (10) **Pupils** can learn to appreciate forms of art that specifically specialise in the use of transformations.	(11) **Multiplicative reasoning** skills are applied when converting from one currency to another and when calculating winnings on a bet. You can use multiplicative reasoning to calculate the cost of food and drinks you need for a party as well as the recipe to prepare a certain meal. (12) **Pupils** learn about the presence of Mathematics throughout history as Pythagoras' theorem dates to the 6th century BC. (13) **Venn diagrams** are often used in decision making where there is a need to see a visual comparison of the advantages, or disadvantages or multiple options.	(14) **Pupils** learn how to calculate percentage change. This empowers pupils to be better informed when shopping. They can independently assess whether the reduction offer on a product they may be interested in buying has been accurately advertised in terms of its percentage reduction. (15) **Studying construction** allows pupils to broaden their appreciation for architecture. Every building such as schools, libraries, houses, apartment complexes, and movie theatres, is the product of mathematical principles applied to design and construction. Before construction workers can build a habitable structure, an architect must design it. Architects apply their construction and drawing skills to plan their blueprints or initial sketch designs.
Practical Application of Skills	(1) **Pupils** can use their understanding of estimation when shopping in the grocery store and trying to stay within a budget, for example, you estimate the cost of the items you put in your cart to keep a running total in your head. (2) **Pupils** can use their understanding of equations and formulae to better understand how they are billed for electricity, gas, water, a meal at a restaurant or an Uber journey. (3) **Pupils** can use their ability to draw time series graphs to follow trends in their day-to-day life, such as mobile phone usage and time spent revising to aid them in identifying if a change in routine is necessary.	(4) **Pupils** learn how to calculate a VAT which can help them to calculate the total cost of their items when shopping in shops that do advertise the price of items without their VAT. (5) **Pupils** can substitute values into real life formulae such as converting the temperature in degrees Celsius to degrees Fahrenheit	(6) **Pupils** can use their understanding of interior angles when organising furniture in a room. For example, they will be able to identify if tables can be placed together without a space between them. (7) **Pupils** can decipher whether a given statistic witnessed in advertising is misleading.	(8) **Pupils** can use their understanding of surface areas to inform purchases such as wrapping paper and paint. (9) **Pupils** will have a better understanding of using graphs to make predictions reliably when interpreting graphs of the cost of energy from different suppliers. (10) **Pupils** can use their understanding of scale factors to enlarge images on software without distorting the image.	(11) **Pupils** can use their understanding of multiplicative reasoning for tasks such as exchanging between currencies and adapting recipes. (12) **Pupils** can use Pythagoras' theorem to calculate or verify the size of a television as it is always the diagonal length that is advertised. (13) **Experimental probability** will provide pupils with a better understanding of why when they roll a dice 6 times they don't always get at least one 5, despite the probability of rolling a 5 being 1 out of 6.	(14) **Inverse proportion** can be used to estimate how long a task will take if the number of people completing the task is increased. (15) **Loci** teaches pupils to problem solve by satisfying an array of requirements. This methodology can be translated to everyday problem solving such as positioning of furniture in a room or garden.