Year 9 Curriculum Implementation: Mathematics

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Knowledge & Skills	**Multiples Factors and Primes** • Find products of primes • Find HCF from products of primes • Find LCM from products of primes **Angles in Parallel Lines** • Understanding and using alternate angles • Understand and use corresponding angles • Understand and use co-interior angles **Congruence and Similarity** • Use congruence in triangles • Understand and use integer scale factors • Understand and use fractional scale factors • Use area and volume scale factors	**Accuracy** • Find upper and lower bounds from rounding integers • Find upper and lower bounds from rounding decimals • Find upper and lower bounds from rounding to significant figures • Represent rounding as an inequality **Surface Area of Cylinders** • Calculate the surface area of a prism • Calculate the surface area of a cylinder • Calculate the surface area of 3D composite shapes **Types of Sequences** • Recognise and generate geometric sequences • Recognise and generate quadratic sequences • Find the nth term of simple quadratic sequences **Pythagoras Theorem** • Label right angles triangles appropriately • Use Pythagoras to find the hypotenuse • Use Pythagoras to find shorter sides of triangles • Solve problems using Pythagoras (3D)	**Graphs, Equations and Gradients** • Draw straight line graphs • Draw quadratic graphs • Recognise exponential and reciprocal graphs • Understand y = mx + c • Find the gradient • Finding the equation from a graph **Applying Percentages** • Use multipliers to increase/decrease by a percentage • Understand how to find original amounts • Calculate simple interest • Calculate compound interest **Inverse Proportion** • Use and draw direct proportion graphs • Understand inverse proportion • Solve problems using inverse proportion • Use and draw inverse proportion graphs	**Probability Diagrams** • Construct and interpret Venn Diagrams including probability. • Draw and label tree diagrams to represent combined events • Use tree diagrams to combine independent events with "AND" rule **Equations, inequalities and formulae** • Solve equations with multiple steps • Solve quadratics through factorising • Solve inequalities • Substitute numbers into complex formulae • Change the subject of Scientific formulae • Solve problems involving inequalities and formulae	**Scatter Graphs** • Plot points on a scatter graph and draw lines of best fit • Identify correlation and comment • Use a scatter graph to estimate values **Volume** • Calculate the volume of a prisms including cylinders • Calculate the volume of pyramids and cones • Calculate the volume of composite 3D shapes • Solve problems involving volume of prisms **Enlargements** • Be able to enlarge a given shape by scale factors • Be able to enlarge a shape from a centre point. • Be able to describe enlargements including centres of enlargement.	**Compound Measures** • Know units for and calculate using speed (proportion method) • Know units for and calculate using density (proportion method) • Know the formulae and methods for Speed and Density • Solve problems involving compound measures **Bearings** • Be able to measure a bearing • Use bearing and scales to construct maps • Use angle theories to calculate bearings **Standard form** • Recognise when a number is in standard form • Convert large and small numbers between ordinary and standard form • Use standard form in calculations

Links to prior learning	**Multiples Factors and Primes**
	• Year 8
	  ○ Autumn 1
	  ○ Factors, multiples and primes
	
	Angles in Parallel Lines
	• Year 8
	  ○ Spring 2
	  ○ Angles in polygons
	
	Congruence and Similarity
	• Year 8
	  ○ Autumn 1
	  ○ Direct Proportion
		Accuracy
		• Year 8
		  ○ Autumn 2
		  ○ Estimation
		
		Surface Area of Cylinders
		• Year 8
		  ○ Autumn 2
		  ○ Circle Area
		  ○ Summer 2
		  ○ Surface Area of a Prism
		
		Types of Sequences
		• Year 8
		  ○ Spring 1
		  ○ Nth Term
		
		Pythagoras Theorem
		• Year 9
		  ○ Autumn 1
		  ○ Factors, multiples and primes
		• Year 7
		  ○ Spring 1
		  ○ Substitution
		  ○ Year 7
		  ○ Spring 2
		  ○ Measures
		  ○ Year 7
		  ○ Summer 1
			Graphs, Equations and Gradients
			• Year 8
			  ○ Spring 2
			  ○ Co-ordinates and Graphs
			
			Applying Percentages
			• Year 8
			  ○ Spring 1
			  ○ Further Percentages
			Inverse Proportion
			• Year 8
			  ○ Autumn 1
			  ○ Direct Proportion
				Probability Diagrams
				• Year 8
				  ○ Summer 1
				  ○ Frequency Trees and Two Way Tables
				
				Equations, inequalities and formulae
				• Year 8
				  ○ Autumn 1
				  ○ Algebra Functions and Formulae
				  ○ Autumn 2
				  ○ Complex Linear Functions
				  ○ Spring 1
				  ○ Identities in Algebra
					Scatter Graphs
					• Year 8
					  ○ Summer 1
					  ○ Graphs and Charts
					
					Volume
					• Year 8
					  ○ Autumn 2
					  ○ Circle Area
					  ○ Summer 2
					  ○ Volume
					
					Enlargements
					• Year 8
					  ○ Summer 2
					  ○ Transformations
					  ○ Summer 2
					  ○ Scale Diagrams
						Compound Measures
						• Year 8
						  ○ Autumn 1
						  ○ Direct Proportion
						• Year 7
						  ○ Spring 2
						  ○ Measures
						
						Bearings
						• Year 9
						  ○ Autumn 1
						  ○ Angles in Parallel Lines
						• Year 8
						  ○ Spring 2
						  ○ Angles in Polygons
						  ○ Summer 2
						  ○ Scale Diagrams
						
						Standard form
						• Year 8
						  ○ Autumn 1
						  ○ Factors, multiples and primes
						• Year 7
						  ○ Autumn 1
						  ○ Place Value and Rounding

		○ Area and Perimeter				
Assessment	**Unit Reviews** These will be completed on a regular basis after a unit of work has been completed. **End of Half Term Assessment** An assessment based on the units covered during this half term	**Unit Reviews** These will be completed on a regular basis after a unit of work has been completed. **End of Half Term Assessment** An assessment based on the units covered during this half term	**Unit Reviews** These will be completed on a regular basis after a unit of work has been completed. **End of Half Term Assessment** An assessment based on the units covered during this half term	**Unit Reviews** These will be completed on a regular basis after a unit of work has been completed. **End of Half Term Assessment** An assessment based on the units covered during this half term	**Unit Reviews** These will be completed on a regular basis after a unit of work has been completed. **End of Half Term Assessment** An assessment based on the units covered during this half term	**Unit Reviews** These will be completed on a regular basis after a unit of work has been completed.
Home learning	**Multiples/Factors and Product of Primes** • Primes • Multiples and Factors • Prime Factorisation : Product of Primes • Uses of Prime Factorisation **Angles** • Straight Line Angles • Vertically Opposite Angles • Angles Around a Point • Problems involving angle properties **Ratio/Proportion** • Sharing with a Given Ratio • Part of a Ratio to the Whole • Ratio: Problem Solving • Ratio: Two Ratios • Ratio: Applied Problems **Working with Fractions** • Four Operations with Fractions • Multiplying with Whole Numbers and Fractions • Dividing with Whole Numbers and Fractions • Fraction of Amounts • Reverse Fractions • Applied Fractions **Significant Figures and Estimation** • Rounding to Mixed Decimal Places • Rounding to 1 Significant Figure • Rounding to Mixed Significant Figures • Estimation • Mixed Rounding problems • Rounding to Appropriate Degrees of Accuracy **Revision for Assessment** Pupils will have a set of topics to revise and can produce a revision sheet for the assessment.	**Circles** • Naming the Parts of a Circle • Circumference • Area of a Circle: From Radius or Diameter • Using the Area of a Circle to find the Radius or Diameter • Areas of Part Circles • Area of a Sector **Area** • Area of Squares, Rectangles and Parallelograms • Area of Triangles • Area of Trapeziums • Area of Composite Shapes : Adding • Area Problem Solving **Sequences and nth Term** • Linear Sequences: Finding the Term-to-Term Rule • Linear Sequences: Using the nth Term 1 (Substitute) • Linear Sequences: Finding the nth Term (Increasing) • Linear Sequences: Finding the nth Term (Decreasing) • Linear Sequences: Using the nth Term 2 (Solve) • Unusual Sequences **Solving Equations** • Solving Equations: One Step (+ – × ÷) • Solving Equations: Two Steps ax + b = c • Solving Equations: Two Steps (× ÷) • Solving Equations: Two Steps (Unknown as Denominator) • Solving Equations: Two Steps (Negative Unknown) **Squares/Roots/Powers** • Squares • Powers • Square Roots • Cube Roots • Estimating Powers and Roots **Similarity** • Similarity • Similar Polygons: Finding the Scale Factor • Similar Polygons: Missing Sides • Similar Area • Similar Volume **Substitution** • Substitution into Expressions : One Term Two Terms Two Terms incl. Squares	**Types of sequences** • Important Sequences: Squares, Cubes and Triangular Numbers • Important Sequences: Geometric • Important Sequences: Fibonacci • Quadratic Sequences: Using the nth Term **Drawing linear graphs** • Midpoint of a Line Segment • Horizontal and Vertical Graphs • Other Important Linear Graphs • Plotting Straight Line Graphs: 4 Quadrants **Accuracy and bounds** • Rounding to Appropriate Degrees of Accuracy • Mixed Rounding • Upper and Lower Bounds • Bounds : Error Intervals **Percentages** • Finding Percentages 1: Integer Percentages < 100% (Calculator) • Finding Percentages 2: > 100% or Non-Integer Percentages (Calculator) • Percentage Increase and Decrease (Calculator) • Percentage Change • Express One Amount as a Percentage of Another **Surface area** • Surface Area of Cuboids • Surface Area of Prisms • Surface Area of Cylinders • Surface Area of Part Cylinders • Surface Area of Pyramids **Revision for Assessment** Pupils will have a set of topics to revise and can produce a revision sheet for the assessment.	**Pythagoras** • Pythagoras: Finding the Hypotenuse • Pythagoras: Finding a Short Side • Pythagoras: Applied Questions **Gradient and Intercept** • Plotting Straight Line Graphs: 4 Quadrants • Finding the Gradient of a Line Segment • Finding y = mx + c from a Gradient and a Point • Finding y = mx + c from Two Points • Finding y = mx + c from a Graph **Ratio and Proportion** • Recipe Ratio : Find Amount of Ingredients • Recipe Ratio : Find the Number of People • Recipe Ratio : Maximum That Can Be Made • Better Value • Direct Proportion **Percentage - compound interest** • Simple Interest • Compound Interest • Depreciation • Reverse Percentage **Solving Equations** • Solving Equations: Two Steps (Mixed Exercise) • Solving Equations: (Unknown on both sides) • Generating Equations from Words **Revision for Assessment** Pupils will have a set of topics to revise and can produce a revision sheet for the assessment.	**Basic Probability** • Calculating Probability • Mutually Exclusive Events • Two Way Tables: Probability • Listing Outcomes • Relative Frequency • Expected Frequency **Quadratics** • Expanding double brackets • Factorising Quadratics **Volume** • Volume of Cubes and Cuboids • Volume of Prisms **Inequalities** • Representing inequalities on a number line • Stating values from an inequality • Solving inequalities **Venn Diagrams** • Reading Venn diagrams • Drawing and completing Venn diagrams • Probability from Venn diagrams **Revision for Assessment** Pupils will have a set of topics to revise and can produce a revision sheet for the assessment.	**Tree Diagrams** • Completing tree diagrams • Drawing tree diagrams to represent events • Probability from tree diagrams **Transformations** • Drawing and describing: Rotations Reflections Translations Enlargements **Compound Measures** • Calculating and using compound measures: Speed Density Pressure **Angles and Scales** • Angle properties in parallel lines • Map scales • Converting scales **Standard Form** • Converting between ordinary and standard form (large numbers) • Converting between ordinary and standard form (small numbers) **Revision for Assessment** Pupils will have a set of topics to revise and can produce a revision sheet for the assessment.

		• Substituting into a Formula **Revision for Assessment** Pupils will have a set of topics to revise and can produce a revision sheet for the assessment.				
Cultural Capital and extra-curricular opportunities	**Artful Maths Club** Where geometry meets creativity. Pupils can learn to fold their way into the wonders of maths with Artful Maths Club.	**Artful Maths Club** Where geometry meets creativity. Pupils can learn to fold their way into the wonders of maths with Artful Maths Club.	**Maths LIVE Conference** 4-day residential trip to Disneyland Paris to attend the Maths LIVE conference. This is an opportunity for pupils to understand how skills in Mathematics can be applied to a wider range of career paths. Pupils also have an opportunity to investigate the maths skills embedded throughout the Disney parks.	**Artful Maths Club** Where geometry meets creativity. Pupils can learn to fold their way into the wonders of maths with Artful Maths Club.	**Artful Maths Club** Where geometry meets creativity. Pupils can learn to fold their way into the wonders of maths with Artful Maths Club.	**Artful Maths Club** Where geometry meets creativity. Pupils can learn to fold their way into the wonders of maths with Artful Maths Club.
Literacy	**Key Words** **Multiples Factors and Primes** Prime, Prime factor, Prime factorisation, Product, Venn diagram, Highest common factor, Lowest common multiple **Angles in Parallel Lines** Degrees, Right angle, acute angle, obtuse angle, reflex angle, vertically opposite, geometry, geometrical, Parallel, alternate angles, corresponding angles, Interior angle, exterior angle **Congruence and Similarity** Congruent, SAS, SSS, ASA, RHS, Similar, Similarity, Scaling, Scale factor, Scale drawing	**Key Words** **Accuracy** Truncate, Round, Minimum, Maximum, Interval, Decimal place, Significant figure, Upper Bound, Lower Bound, Inequality, Estimate **Surface Area of Cylinders** Prism, cylinder, Cross-section, pyramid, surface area, compound, composite, cuboid, triangular, edge, face, vertices **Types of Sequences** Term, Term-to-term rule, Position-to-term rule, nth term, generate, linear, quadratic, difference, Fibonacci sequence, Geometric Progression **Pythagoras Theorem** Hypotenuse, Pythagoras' theorem, right angle, triangle **Famous Mathematicians** Short reading and comprehension exercise through Microsoft Forms on 'Famous Mathematicians – Cardano'.	**Key Words** **Graphs, Equations and Gradients** Plot, Equation), Function, Formula, Linear, Coordinate plane, Gradient, y-intercept, Substitute, Quadratic **Applying Percentages** Percentage change, original amount, Multiplier, Compound interest, Simple interest, (Exponential) growth, decay	**Key Words** **Inverse Proportion** Proportion, Quantity, Integer, Ratio, Compare, comparison, Part, Unit, Proportional, Multiplier, Unitary method, Direct proportion, Inverse proportion **Probability Diagrams** Outcome, Event, Experiment, Combined experiment, Enumerate, Set, Venn diagram, equally likely outcomes, Theoretical probability, Random, Bias, Fairness, independent event, dependent event, Tree diagrams **Equations, inequalities and formulae** Change the subject, Algebra, Symbol, Expression, Variable, Substitute, Equation, Unknown, Enumerate, Operation, Solve, Solution, Brackets **The Colosseum** Short reading and comprehension exercise through Microsoft Forms on 'The Colosseum'.	**Key Words** **Scatter Graphs** Categorical data, Discrete data, Continuous data, Scatter graph, Bivariate data, Correlation, Positive correlation, Negative correlation, Line of best fit, Interpolate, Extrapolate, Trend, Causation **Volume** Prism, cylinder, Cross-section, pyramid, volume, compound, composite, cuboid, triangular, edge, face, vertices, cone **Enlargements** Similar, Similarity, Enlarge, enlargement, Scaling, Scale factor, Centre of enlargement, Object, Image	**Key Words** **Compound Measures** Length, distance, Mass, weight, Volume, Capacity, Metre, centimetre, millimetre, Tonne, kilogram, gram, milligram, Litre, millilitre, Hour, minute, second, Inch, foot, yard, Pound, ounce, Pint, gallon, Direct proportion, Multiplier, Compound unit, Speed, Density, Population density, Pressure **Bearings** Length, distance, Metre, centimetre, millimetre, Inch, foot, yard, multiplier, scale, construct, measure, convert, bearing **Standard form** Large, Small, Standard Form, Ordinary Form, Power, Indices, Significant
Numeracy	**Scientific Calculator** First and foremost, we always try and use our mental and written method when attempting a calculation. If a calculator is need then this needs to be a scientific calculator. This is a requirement, and pupils are expected to have their own calculator in school. Pupils need to know how to use a scientific calculator correctly and they are taught this in their Maths lessons.	**Approach** Pupils must be encouraged to always show their working out, regardless of whether they are using a calculator or not.	**Vocabulary** Mathematical vocabulary is precise and rigorously defined. It should be used carefully to avoid misinterpretation and confusion with the same similar words used elsewhere.	**Estimation** Errors are commonly made when students fail to check the reasonableness of their answer in the context of the question. Recognising that estimation is not just a guess, but rounding needs to be used.	**Talk Through Problems** Pupils encouraged to talk through their methods of working out (explain their thinking out loud) to help clarify understanding.	**Break Down Word Problems** Focus on reading questions carefully, underlining key facts, and planning step-by-step how to solve them.
Careers Information, Education, Advice and Guidance (CEIAG)	**Multiples Factors and Primes** <u>Finding HCF and LCM from listing and/or Venn diagrams</u> • Business and computing: Cost effective problems • Technology: Effective use of resources and waste management <u>Prime factor decomposition</u> • ICT/Business/Computing: Cryptography and programming **Where are these skills transferred to real life contexts?** • Any business setting: Business will use factors and multiples to optimise resources and minimise waste for cost effectiveness. This can also be used for timetabling purposes too • Construction workers: When working with building materials, as above, they would need to minimise waste and correctly distribute resources	**Accuracy** <u>Rounding, estimation and error intervals</u> • Science: Rounding in calculations and measures. Using estimations to make predictions in experiments • Geography: Using rounding and estimation when calculating percentage growths, losses, land space etc • Business: Estimation of costings, resources, profits and losses • Tech; Using rounding when working with lengths and materials. Estimation of materials/ingredients needed to plan for production	• Graphs, Equations and Gradients • Graphs (Linear, Quadratic, Exponential, Reciprocal) • Science: Linear equations formed in Physics from real life contexts can be plotted onto graphs and used for forecasting trends, solving problems and making predictions for experiments • Business: Again, used for predictions, trends and forecasting • Geography: Graphs used to compare and contrast data and information	**Inverse Proportion** **Direct Proportion and Inverse Proportion** • Technology: When working with recipes, proportion is used for scaling up or down ingredients measures • Science: Speed, distance and time of vehicles. Distance of planets and sunlight **Where are these skills transferred to real life contexts?** • Architecture: Architects and designers will need ratio and proportions when using scale drawings and creating designs in real life	**Scatter Graphs** **Correlation and scatter graphs** • Geography: Using scatter graphs to plot two variables such as death rates, earthquakes, population changes etc. Correlation is used to recognise trends and patterns in data • Science: Scatter graphs are used as above to plot two variables and compare using lines of best fit and correlation **Where are these skills transferred to real life contexts?** • Economists conduct research and analyse trends on a wide range of economic phenomena, including prices, employment, production, inflation and business cycles. Scatter graphs help visually illustrate relationships between two economic phenomena, such as employment and	**Compound Measures** • Geography: Using standard units of measure to calculate distances, temperatures, river flows etc. • Science: Calculating speed, distance and time, density, mass and volume, and pressure force and area in Physics. Applying limits of accuracy when calculating with compound measures • Art: Using measurements in drawings for scale and proportionality. Converting between measurements when scaling • Technology: Conversions between capacity and mass units when working with ingredients. Working with standard units of length in textiles and resistant materials

	• Event planners: When planning events with large seating areas, distribution of rows, chairs etc would need to be done efficiently using HCF and LCM • Traffic systems: HCF and LCM would need to be used when planning the traffic light systems in a town so they are in sync at certain times **Angles in Parallel Lines** **Angle and shape properties, Parallel lines** • Art: Shape properties will be widely used in drawings, constructions and creating 3D drawings. Pupils in art will need to be able to measure and draw angles as well as calculate using angle facts • Technology: Shape properties are needed in design projects especially in resistant materials and textiles • Science: Angles are used in Science when working with elevations and positionings **Where are these skills transferred to real life contexts?** • Construction workers: Construction workers and builders need to accurately work with angles and dimensions to ensure the safety of the designs • Interior designers: Need to know properties of room spaces to ensure maximum efficient use of space • Animation and games design: Creation of objects and people in games rely on properties of shapes and angles • Architect: The building of offices, homes and buildings requires extensive knowledge of shapes (of rooms), to ensure well designed and manufactured spaces **Congruence and Similarity** **Scale diagrams, Congruence, Similarity, Constructions and Loci** • Technology: When creating and designing scale diagrams are used for the initial planning phase • Geography: Maps are scale diagrams of larger scale places (countries, continents etc) • Art: Scale drawings are required for design and creating of projects. The use of congruence and similarity is used for some drawings **Where are these skills transferred to real life contexts?** • Architects/interior designers: Scale drawings are used in the planning and design of houses, offices and any other areas • Builders/Plumbers/Electricians: Will need to use scale diagrams and floor plans to ensure safety in building, plumbing and design • Athletes: Loci is used to calculate the best path to take for the shortest possible distances in running • Phone networking: Pylons need to be placed in exact locations to ensure efficient signalling to certain areas • Farmers: When planning the dimensions of their land in regards to pens, fencing and animal space, loci is needed	**Where are these skills transferred to real life contexts?** • Business: The ability to estimate the time, resources and money needed to complete a project is necessary in almost any career. Teachers, for example, distribute supplies based upon their predictions of student use, managers use these skills for creating yearly budgets, and most businesses depend on this ability for cost effectiveness • Surface Area of Cylinders • Types of Sequences • Linear, Quadratic, Geometric and Fibonacci • Science: Geometric sequences can be used for growth and decay including bacteria and infection growth • Geography: Geometric sequences can be used to determine population growth • Drama: Set production and plays follow sequences • Business: Arithmetic sequences can be used to make estimations about how something will change in the future **Where are these skills transferred to real life contexts?** • Business/Demographics: The ability to forecast growth and population using sequencing including pricing and profits • Farmers/agriculture: Need sequencing to predict crop growth and corresponding revenue growth • Food production/factory production: Preparation of food/goods need to be followed in a sequenced order. Machinery will need to be programmed to follow a certain sequence • Theatre production/Media: Plays and production follow sequencing for running orders **Pythagoras Theorem** Although the topic of Pythagoras' Theorem is not explicitly taught in other subjects, the skills required are transferrable. • Science: Use of large and small numbers represented in index form. Substitution into formulae used which included powers and roots • Business and Computing: Substitution into formulae, using powers and roots **Where are these skills transferred to real life contexts?** • Construction worker and management: Determining	**Where are these skills transferred to real life contexts?** • Politics: Used for election votes, predictions and trends. The government use graphs to support their data on the economy and health (eg covid). • NHS: Graphs will be used to compare and make predictions from regarding treatments, for monitoring purposes for example heart rates, blood sugar levels etc. • Any business setting: One of the most helpful ways to apply linear equations in everyday life is to make predictions about what will happen in the future. While real world factors certainly impact how accurate predictions are, they can be a good indication of what to expect in the future. Linear equations are a tool that make this possible and is made even clearer by representing this information on a graph • Applying Percentages • Geography: Calculating percentage increase and decreases in populations, GDP, or any other data. Percentages can be used to show the percentage of land compared to water in certain areas Population density is expressed as a percentage • Science: Calculating percentage quantities of amounts to compare and analyse data • Business: Profit/loss, percentage changes in business trends. Interest rates, and calculating interest on loans • Art: Proportion of shapes, diagrams for shading. Percentage of paper/space used for drawings. Where are these skills transferred to real life contexts? • Any business setting: Workers within a business, but more importantly managers and owners, need to be able to calculate percentages of amounts, percentage increase and decreases and percentage changes. They use these skills to efficiently forecast trends, work out what resources they need to buy, work out prices, calculate profit and losses and much more • Retail: Retailers use percentages in promotions and	• Construction: Will need to work with scale ratios and proportion in the same way as above • Chefs/Bakers: Any profession which works with ingredients will need to use ratio and proportion when working with ingredients. Specifically, when baking/cooking on a large scale • Business: Most businesses which require purchases of stock (clothes, ingredients etc), will need to use proportion when calculating 'best buys. Businesses need to calculate the best possible price of buying stock based upon the units they are purchasing when buying in bulk • Physicists: When working with acceleration and velocity, inverse proportion is used **Probability Diagrams** • Geography: Using probability in weather forecasting • Science: In any experiment to predict the chance of an outcome. In Biology probability is used for predictions of genetics and births • PE: Making predictions on sporting events using previous data and analysis **Where are these skills transferred to real life contexts?** • Engineering: requires probability analysis. Engineers must calculate the probability of such things as a heavy gust of wind or a car's front suspension hitting a pothole on an average day • Computer programmers sharpen their products by using statistics • Biologists and medical experts use probabilities to better understand sophisticated mechanisms within the human body and to develop drugs • Physicists deal with uncertainty as they delve into the realm of sub-atomic particles and model these interactions by using probability models • Weather forecasting: Probability is needed to foresee the chance or rain/sun etc. • Economics and business: Economists use probability as a tool to analyse economic competition and phenomena such as bargaining, voting theory, auction, mechanism design. Executives, investors, and managers in the business world use probability for investments, launching of new products, or entering a new business	output, inflation and retail sales, and taxes and economic growth • Market research analyst - Market research involves conducting consumer surveys and focus groups, as well as gathering and analysing data on prices, sales and distribution. Often researchers analyse data on past sales to project future revenues. Market research often involves writing reports that include statistical charts that report past sales and predict future sales **Volume** • Geography: Calculating space of territories, land, and sea • Science: Volume is used across a lot of the Physics curriculum with regards to density and mass of objects. Chemistry also uses volumes for substances, and volume of gases. In Biology, Volume is calculated for cells • Art: 3D shapes are commonly drawn and volume is calculated from these. In Art they may need to create 3D objects linked to scale drawings and therefore will need to scale the volume • DT: When creating 3D models in textiles/RM, pupils will need to consider the volume of the 3D shape **Where are these skills transferred to real life contexts?** • Gardeners/landscaping/construction: They will need to consider the volume of spaces, land, or buildings when purchasing materials, pricing, and costing • Medicine: Any NHS worker who needs to administer drugs/medication needs to be aware of the volume of the substance to be given linked to the rate at which It is administered • Product packaging/manufacturing: Product packaging needs to be made to fit the quantity of the item inside and therefore volume needs to be accurately measured to minimise waste. • Transportation of goods: The volume of space inside the lorry/boat/van would need to be sufficient to carry certain amounts of goods **Enlargements** • Technology: When creating and designing, scale diagrams and enlargements are used for the initial planning phase • Geography: Maps are scale diagrams of larger scale places (countries, continents etc) and therefore enlargements and scale factors are used • Art: Scale drawings are required for design and creating of projects. The use of enlargements and scale factors are often used **Where are these skills transferred to real life contexts?** • Architects/interior designers: Scale drawings are used in the planning and design of houses, offices and any other areas • Builders/Plumbers/Electricians: Will need to use scale diagrams and floor plans to ensure safety in building, plumbing and design	• PE: Working with speed, distance and time in athletics. Conversions between standard units of length on throws and jumps • Business: Using rates of pay and pricing as a measure **Where are these skills transferred to real life contexts?** • Journey planners: Businesses which may work in haulage or transport need to work with speed distance and time to ensure efficient, scheduled deliveries and services • Town planners/Architects: Need to work with scale, conversion of measures and compound measures when planning building work • Athletics: Competitive sports such as athletics will use speed distance and time as a measure to calculate standings. Measurements may often need to be converted • Construction and builders: Need to work with pressure and density when building lifts, platforms or any other elevated surfaces to ensure safety **Bearings** • Science: Standard form is used when calculating large distances (eg between planets), sizes, or working with speed of light in Physics • In Chemistry standard form is used for small measurements such as the distance between sub-atomic particles. In Biology, the size of bacteria may be measured in standard form due to the small size **Where are these skills transferred to real life contexts?** • Astronomer: Working with planets requires the use of standard form from measuring distances to mass • Scientists/Astrophysicists/Chemists: Large and small values ranging from speed of light to atomic particles • Engineers: Engineers may use standard form when calculating distances, lengths and mass of materials **Standard form** • Science: Standard form is used when calculating large distances (eg between planets), sizes, or working with speed of light in Physics • In Chemistry standard form is used for small measurements such as the distance between sub-atomic particles. In Biology, the size of bacteria may be measured in standard form due to the small size **Where are these skills transferred to real life contexts?** • Astronomer: Working with planets requires the use of standard form from measuring distances to mass • Scientists/Astrophysicists/Chemists: Large and small values ranging from speed of light to atomic particles • Engineers: Engineers may use standard form when calculating distances, lengths and mass of materials

		lengths of support beams, scaffolding and material usage. This applies to construction of bridges, buildings, theme park rollercoasters and much more • Agriculture: Any job where precise lines need to be drawn and measured. Working directly with boundaries surrounding crops, animals, trees and plants involves the use of Pythagoras' Theorem. • Surveyors: Determining length and distance to measure and map properties. They also need to set official land, air and water boundaries for homeowners, businesses and even the government • Production workers: Including machinists and welders. Being able to efficiently calculate specialised items for production • Military: In the army, Pythagoras is used in pathfinder courses to determine drop zones. It is also regularly used when constructing assault courses	sales. This links to the businesses above • Banks: Banks work with percentages when calculating interest rates on savings, loans, mortgages and working with inflation • Tax/Pensions: Percentage proportions are taking from wages to contribute to pensions and pay tax	• In politics: Diplomats and politicians use probability to analyse any situation of conflict between individuals, companies, states, and political parties. It is also used in war strategies, political voting, and political affairs **<u>Equations, inequalities and formulae</u>** <u>Algebraic notation, Substitution, Function Machines and Rearranging formulae, Forming and solving linear equations and inequalities</u> • Science: Equations, Substitution, Formulae and manipulating formulae are used in Science regularly, particularly in Physics and Chemistry • Business: Formulae is also commonly used across Business/ICT and computing in spreadsheets and revenue calculations. Functions and function machines are often used for showing processes • Technology: Substitution is used when working out areas and volumes of objects or materials. • Science: Equations are used in Science regularly, particularly in Physics and Chemistry • Business: Equations are used when forecasting future trends, profits, revenue, customer numbers etc **<u>Where are these skills transferred to real life contexts?</u>** • Accountancy: Formulae is used regularly when working with financial planning. They use formulas everyday to measure rates of interest and tax forms • Computer programmer: Uses formulae and substitution when evaluating and analysing designs • Financial analyst: Use formulae when analysing risk and reward of investments. Substitution of values is key for forecasting pay offs • Pharmacy Technician: Substitution and formulae is used when calculating quantities, counting and pricing • Management analysts: Use function machines to analyse outputs/rewards/profits for businesses based upon their inputs and the process of the business • Almost any situation where there is an unknown quantity can be represented by a linear equation, like figuring out income over time, calculating mileage rates, or predicting profit. Many people use linear equations every day, even if they do the calculations in		

				their head without drawing a line graph. • Event planners: A party planner has a limited budget for an upcoming event. They will need to figure out how much it will cost the client to rent a space and pay per person for meals. A linear equation can be constructed to show the total cost, expressed for any number of people in attendance • Any business setting: One of the most helpful ways to apply linear equations in everyday life is to make predictions about what will happen in the future. While real world factors certainly impact how accurate predictions are, they can be a good indication of what to expect in the future. Linear equations are a tool that make this possible		
Spirituality	Pythagorean Mysticism: Numbers are the essence of all things	Fibonacci sequences can be seen as a natural blueprint.		Mathematical infinity: Symbol of the infinite nature of the divine or the soul.	Geometric shapes with symbolic and sacred meanings.	Zero (0) and Emptiness: In Eastern philosophy (Buddhism, Taoism), zero resonates with the void, emptiness, and potential. In Hinduism, linked to the concept of **Shunyata** (emptiness) and cosmic cycles.
How can parents support the curriculum?	**Talk with your child about what they are learning about in Maths** • Be positive about Maths. Try not to say things like 'I can't do Maths' or 'I hated Maths at school' - your child may start to think like that themselves • Emphasize effort over innate talent. Praise your child's hard work rather than solely focussing on whether they get the right answer • Celebrate mistakes as learning opportunities. Frame errors as chances to learn and improve, rather than as failures • Be patient and encouraging. Take it slow, provide support, and celebrate even small successes	**Literacy and Oracy** • Discus the key words, that can be found in the 'Literacy' section of this document, that are associated with units of work covered throughout the corresponding half-term • Can they pronounce these words correctly? • Can they spell them correctly? • Can they explain what the mathematical meaning of these words is? • Can they give an example to show how the words are relevant to what they are learning about?	**Point out Maths in the Real World** • Refer to the information given in the 'CEIAG' sections of this document to help. • Is your child aware of the different subjects in which they might use some of the same key skills as listed in the 'Knowledge & Skills' sections of this document? • Is your child aware of, and maybe interested in, some of the careers in which they might use some of the same key skills as listed in the 'Knowledge & Skills' sections of this document?	• Revision and Preparation for End of Year Assessments • Support your child in creating a revision schedule to help them prepare for the end of year assessments • Refer to the 'Knowledge & Skills' sections, and the 'Links to prior learnings sections of this document, to help populate the schedule • Monitor your child to ensure that they are developing good habits by sticking to the agreed schedule that they have created • We recommend a minimum of 2 hours revising and practising their Maths skills, spread out over the course of each week	**Equipment** Check that your child has the relevant equipment in readiness for units of work coming up next half-term, and that they are bringing it to school with them. • Pencils • Sharpener • Eraser • Ruler • Protractor Please note that black pens, a scientific calculator, a green pen, a purple pen and a mini-whiteboard pen, will still be required.	**Summer Home Learning** • All students will be provided with a bespoke list of topics for which they need to work on to progress and improve in Mathematics • Their performance in the end of year exams will help to inform this • The list will be provided before they break for the Summer • Monitor your child's progress in working through their list so that they may make an optimum start to studying Maths in the next academic year