Year 10 GCSE Mathematics Higher tier Curriculum Sequence						
Subject Intent: For every learner to be confident and fluent mathematicians who enjoy and succeed in mathematics, leaving school with a solid foundation of mathematical skills, knowledge and understanding, primed for their chosen fields in the 21st century.						
	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
Big idea/Theme	**Investigating properties of shapes** • Investigate similar triangles • Explore trigonometry in right-angled triangles • Set up and solve trigonometric equations • Use trigonometry to solve practical problems	**Mathematical movement 1** • Explore enlargement of 2D shapes • Investigate the transformation of 2D shapes	**Patterns** • Explore quadratic sequences • Investigate geometric progressions	**Conjecturing** • Investigate geometric patterns using circles • Explore circle theorems • Make and prove conjectures	**Exploring fractions, decimals and percentages** • Explore the links between recurring decimals and fractions • Solve problems involving repeated percentage change • Solve problems involving exponential growth and decay	**Analysing statistics** • Construct and interpret cumulative frequency graphs • Construct and interpret box plots • Analyse distributions of data sets
Big Idea/Theme	**Calculating** • Estimate with powers and roots • Calculate with powers and roots • Explore the impact of rounding	**Algebra: manipulation** • Manipulate algebraic fractions • Manipulate algebraic expressions	**Solving equations and inequalities II** • Understand and use set notation • Solve inequalities • Represent inequalities on a graph	**Algebra: visualising I** • Explore exponential graphs • Create and use graphs of non-standard functions	**Solving equations and inequalities III** • Solve quadratic equations • Use graphs to solve equations	**Algebra: visualising II** • Investigate features of straight line graphs • Know and use the equation of a circle with

				• Investigate gradients of graphs • Find and interpret areas under graphs • Investigate features of quadratic graphs		centre at the origin • Solve problems involving the equation of a circle
Big Idea/Theme	**Solving equations and inequalities 1** • Find approximate solutions to complex equations • Solve simultaneous equations • Solve problems involving simultaneous equations	**Proportional reasoning** • Explore differences between direct and inverse proportion • Investigate ways of representing proportion in situation • Solve problems involving proportion	**Calculating space** • Calculate surface areas of solids • Calculate volumes of solids • Solve problems involving enlargement and 3D shapes		**Understanding risk** • Understand and use the product rule for counting • Use Venn diagrams to represent probability situations • Use two-way tables to represent probability situations • Solve probability problems involving combined events	**Mathematical movement II** • Explore the concept of a vector • Solve problems involving vectors

Knowledge that needs to stick	• Know the convention for labelling the sides in a right-angle triangle • Know the trigonometric ratios, sinθ = opposite/hypotenuse, cosθ = adjacent/hypotenuse, tanθ = opposite/adjacent • Know exact values of sinθ and cosθ for θ = 0°, 30°, 45°, 60° and 90° • Know the exact value of tanθ for θ = 0°, 30°, 45° and 60° • Know that a^1/n = $\sqrt[n]{a}$ • Know that a^-n = $1/a^n$	• Know the information required to describe a transformation • Know how to set up an equation involving direct or inverse proportion	• Know the conventions for representing inequalities graphically • Know the formulae for the volume of a sphere, a cone and a pyramid • Know the formulae for the surface area of a sphere, and the curved surface area of a cone	• Know the circle theorems • Know the characteristic shape of the graph of an exponential function • Know the meaning of roots, intercepts and turning points • Know the definition of acceleration	• Know how to convert a recurring decimal into a fraction • Know set notation • Know how to solve quadratic equations by factorising	• Know how to construct a box plot • Know the conditions for perpendicular lines • Know and use diagrammatic representations and different notations for vectors
Demonstration of Knowledge (Assessment)	• Live assessment in the classroom	• Live assessment in the classroom • Analysis of students' written	• Live assessment in the classroom • Analysis of students' written	• Live assessment in the classroom • Analysis of students' written	• Live assessment in the classroom • Analysis of students' written	• Live assessment in the classroom • Analysis of students' written

	• Analysis of students' written work and verbal responses • Spaced retrieval • Stage and age appropriate exam questions • Strategic questioning • Misconception checks	work and verbal responses • Spaced retrieval • Stage and age appropriate exam questions • Strategic questioning • Misconception checks	work and verbal responses • Spaced retrieval • Stage and age appropriate exam questions • Strategic questioning • Misconception checks	work and verbal responses • Spaced retrieval • Stage and age appropriate exam questions • Strategic questioning • Misconception checks	work and verbal responses • Spaced retrieval • Stage and age appropriate exam questions • Strategic questioning • Misconception checks	work and verbal responses • Spaced retrieval • Stage and age appropriate exam questions • Strategic questioning • Misconception checks
Links to key stage 3/ prior knowledge needed	• Understand and work with similar shapes • Solve linear equations, including those with the unknown in the denominator of a fraction • Understand and use Pythagoras' theorem • Calculate with positive indices using written methods and negative indices in the context of standard form • Know the multiplication and	• Use the centre and scale factor to carry out an enlargement of a 2D shape with a positive integer scale factor • Use the concept of scaling in diagrams • Carry out reflection, rotations and translations of 2D shapes • Calculate with negative numbers	• Find the nth term for an increasing linear sequence • Find the nth term for an decreasing linear sequence • Identify quadratic sequences • Establish the first and second differences of a quadratic sequence • Find the next three terms in a quadratic sequence	• Know the vocabulary of circles • Know angle facts including angles at a point, on a line and in a triangle • Know angle facts involving parallel lines and vertically opposite angles • Know the properties of special quadrilaterals • Plot graphs of linear, quadratic, cubic	• Identify if a fraction is terminating or recurring • Move freely between terminating fractions, decimals and percentages • Use a multiplier to calculate the result of percentage changes • Manipulate linear equations • Factorise a quadratic expression of	• Know the meaning of discrete and continuous data • Interpret and construct frequency tables • Analyse data using measures of central tendency • Use the form y = mx + c to identify parallel lines • Rearrange an equation into the form y = mx + c

	division laws of indices • Round to a given number of decimal places or significant figures • Identify the minimum and maximum values of an amount that has been rounded (to nearest x, x d.p., x s.f.) • Understand the concept of solving simultaneous equations by elimination • Solve two linear simultaneous equations in two variables in very simple cases (no multiplication required) • Solve two linear simultaneous equations in two variables in simple cases (multiplication of one equation only required)	• Multiply two linear expressions of the form $(x \pm a)(x \pm b)$ • Factorise a quadratic expression of the form $x^2 + bx + c$ • Add, subtract, multiply and divide proper fractions • Change the subject of a formula when two steps are required • Know the difference between direct and inverse proportion • Recognise direct or inverse proportion in a situation • Know the features of a graph that represents a direct or inverse	• Understand the meaning of the four inequality symbols • Find the set of integers that are solutions to an inequality • Use set notation to list a set of integers • Use a formal method to solve an inequality in one variable • Plot graphs of linear functions stated explicitly • Plot graphs of linear functions stated implicitly • Calculate exactly with multiples of π • Know and use the formula for area and circumference of a circle • Know how to use formulae to find the area of rectangles,	and reciprocal functions • Interpret the gradient of a straight line graph as a rate of change • Plot and interpret graphs of kinematic problems involving distance and speed	the form $x^2 + bx + c$ • Factorise a quadratic expression of the form $ax^2 + bx + c$ • Make connections between a linear equation and a graph • Know when to add two or more probabilities • Know when to multiply two or more probabilities • Convert between fractions, decimals and percentages • Use a tree diagram to calculate probabilities of dependent and independent combined events	• Find the equation of a line through one point with a given gradient • Find the equation of a line through two given points • Know and apply Pythagoras' Theorem • Understand column vector notation

		proportion situation • Know the features of an expression (or formula) that represents a direct or inverse proportion situation • Understand the connection between the multiplier, the expression and the graph	parallelograms, triangles, trapezia, circles, sectors and • Know how to find the area of compound shapes • Know how to find the surface area of a right prism and a cylinder • Calculate the surface area of a right prism and a cylinder • Carry out an enlargement • Find the scale factor of a given enlargement • Use Pythagoras' theorem to find missing lengths in right-angled triangles			
Skill set development	Problem solving Mathematical reasoning Quantitative reasoning Ability to manipulate	Problem solving Mathematical reasoning Quantitative reasoning	Problem solving Mathematical reasoning Quantitative reasoning	Problem solving Mathematical reasoning Quantitative reasoning	Problem solving Mathematical reasoning Quantitative reasoning	Problem solving Mathematical reasoning Analytical thinking

	Communication Representation Spatial sense Independence Teamwork	Ability to manipulate Construct logical arguments Communication Representation Spatial sense Independence Teamwork	Communication Spatial sense Patterns Independence Teamwork	Construct logical arguments Communication Spatial sense Independence Teamwork	Ability to manipulate Construct logical arguments Communication Number sense Independence Teamwork	Quantitative reasoning Communication Spatial sense Independence Teamwork
Key Vocabulary (Tier 2/ Tier 3)	Similar Opposite Adjacent Hypotenuse Trigonometry Function Ratio Sine Cosine Tangent Angle of elevation, angle of depression Power, Root Index, Indices Standard form Inequality Truncate, Round Minimum bound, Maximum bound Interval Decimal place, Significant figure Surd Limit	Perpendicular bisector Scale Factor Similar Congruent Invariance Transformation Rotation Reflection Translation Enlargement Equivalent Equation Expression Expand Linear Quadratic Algebraic Fraction Difference of two squares Binomial Factorise Direct proportion Inverse proportion	Term nth term Generate Quadratic First (second) difference Geometric Progression {Linear) inequality Variable Manipulate Solve Solution set Integer Set notation Region (Composite) solid Sphere, Pyramid, Cone Perpendicular (height), (slant height) Surface area Volume	Radius, radii Tangent Chord Theorem Conjecture Derive Prove, proof Counterexample Function, equation Linear, non-linear Quadratic, cubic, reciprocal, exponential Parabola, Asymptote Gradient, y-intercept, x-intercept, root Rate of change Sketch, plot Kinematic Speed, distance, time	Fraction Mixed number Top-heavy fraction Percentage change, percentage increase, percentage increase Compound interest, Simple interest Terminating decimal, Recurring decimal (Exponential) growth, decay (Quadratic) equation Factorise Rearrange Variable Unknown Manipulate	Categorical data, Discrete data Continuous data, Grouped data Axis, axes Population Sample Cumulative frequency Box plot, box-and-whisker diagram Central tendency Mean, median, mode Spread, dispersion, consistency Range, Interquartile range Skewness Function, equation Linear, non-linear Parallel Perpendicular Gradient

	Unknown Solve Solution set Interval Decimal search Iteration Simultaneous equations Substitution Elimination	Multiplier	Congruent, congruence Similarity, similar shapes, similar figures Enlarge, enlargement Scale factor	Acceleration, deceleration	Solve Deduce x-intercept Root Outcome, equally likely outcomes Event, independent event, dependent event Tree diagrams Theoretical probability, experimental probability Random Bias, unbiased, fair Enumerate Set Conditional probability Venn diagram	y-intercept, x-intercept, root Sketch, plot Centre (of a circle) Radius Tangent Vector Scalar Constant Magnitude
Reading and Oracy	Students need to be able read, speak and think in mathematical language, identifying key concepts and processes of the wordier questions. Teachers will improve students' verbal communication skills, to enable them to show their understanding of mathematics accurately. Common strategies within lessons are: - giving students sufficient time to read and process information from wordier questions - asking open questions - expanding and justifying answers - repetition of a correctly modelled sentence, to practice oracy skills - using the correct vocabulary and terms within discussions - referring to definitions and meanings when using tier 2 and 3 mathematically vocabulary					

	- addressing common misconceptions.					
Numeracy	Algebra Equations Simultaneous Equations Geometry Trigonometry	Algebra Geometry Ratio and proportion Transformations	Algebra Area Cartesian coordinate systems Inequalities Shapes Surface area Volume	Algebra Angles Cartesian coordinate systems Geometry	Algebra Decimals Equations Fractions Money, saving and interest Percentages Probability Set theory Symbols	Addition, subtraction and multiplication Algebra Averages Data – presenting and analysing Equations Geometry
Opportunities						
Careers	Architects Engineers Surveyors Economists Scientists	Fashion designers Construction Production managers Computer programmers Surveyors and cartographers	Computer and information systems managers Analysts Physicists Nursing Optometrists	Engineers Graphic designers Manufacturers Physicists	Banking and finance Ecologists Tradesmen Computer scientists	Scientists Historians Analysts Pilots and captains Engineers
SMSC including British Values, Culture and Diversity	The mathematics curriculum helps prepare pupils for life in a modern Britain by developing their personal qualities and social skills with the chance to discuss, argue and challenge other people's ideas in a safe environment. Everyone is encouraged to express their own personal views on the mathematical topics. Alongside everyone learning how to be accepting of other people's views, students gain realisation that there is not always one route to an answer but several different ways. **Spiritual** - pupils are encouraged to use their imagination and creativity to break problems down and solve them by thinking out side of the box. **Moral** – pupils look at consequences and what happens if rules are not followed. Will an action to one number apply to all numbers? **Social** – developing personal qualities and social skills. Being able to work with others, show perseverance, being able to ask for help and not being afraid to try something new.					

	Cultural – understanding others students' views and being able to express their own views. Exploring problems from a range of cultures.
Relationship and Sex Education and Health Education	The mathematics curriculum aims to provide pupils with the knowledge and understanding that will enable them to lead a happy, healthy and successful adult life. All pupils are supported to develop resilience, to know how and when to ask for help, and to know where to access support. This develops their capacity to make sound decisions when facing risks, challenges and complex contexts in their lives. Character traits such as perseverance and self-belief, together with personal attributes such as honesty, integrity, tolerance and kindness, will be actively cultivated and celebrated.

Key Documents:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/908013/Relationships_Education__Relationships_and_Sex_Education__RSE__and_Health_Education.pdf

https://www.thecdi.net/write/CDI-Framework-Jan2020-web.pdf