Year 10 Curriculum Overview

Year 10		HT1	HT2	HT3	HT4	HT5	HT6
	Topic	Similarity	Developing Algebra	Geometry	Proportions and Proportional Change	Delving into Data	Using number & Expressions
Mathematics	Areas of study	Congruence, similarity and enlargement. Trigonometry.	Representing solutions of equations and inequalities. Simultaneous equations.	Angles and bearings. Working with circles. Vectors.	Ratio and fractions. Percentages and interest. Probability.	Collecting, representing and interpreting data. Non-calculator methods.	Types of number and sequences. Indices and roots. Manipulating expressions.
	Why this and why now?	Building on their experience of enlargement and similarity in previous years, this unit extends students' experiences and looks more formally at dealing with topics such as similar triangles. It would be useful to use ICT to demonstrate what changes and what stays the same when manipulating similar shapes. Parallel line angle rules are revisited to support establishment of similarity. Congruency is introduced through considering what	Students will have covered both equations and inequalities at key stage 3, and this unit offers the opportunity to revisit and reinforce standard techniques and deepen their understanding. Looking at the difference between equations and inequalities, students will establish the difference between a solution and a solution set; they will also explore how number lines and graphs can be used to represent the solutions to inequalities. As well as solving equations, emphasis	As well as the formal introduction of bearings, this block provides a great opportunity to revisit other materials and make links across the mathematics curriculum. Accurate drawing and use of scales will be vital, as is the use of parallel line angles rules; all of these have been covered at Key Stage 3. Students will also reinforce their understanding of trigonometry and Pythagoras from earlier this year, applying their skills in	This block builds on KS3 work on ratio and fractions, highlighting similarities and differences and links to other areas of mathematics including both algebra and geometry. The focus is on reasoning and understanding notation to support the solution of increasingly complex problems that include information presented in a variety of forms. The bar model is a key tool used to support representing and solving these problems.	This block builds on KS3 work on the collection, representation and use of summary statistics to describe data. Much of the content is familiar, both from previous study within and beyond mathematics (including Geography and Science) and from everyday life. The steps have been chosen to balance consolidation of existing knowledge with extending and deepening, particularly in terms of interpretation of results and evaluating and criticising statistical	This block again mainly revises KS3 content, reviewing prime factorisation and associated number content such as HCF and LCM. Sequences is extended for Higher Tier to include surds and finding the formula for a quadratic sequence. This block consolidates the previous two blocks focusing on understanding powers generally, and in particular in standard form. Negative and fractional indices are explored in detail. Again, much of

information is needed to produce a unique triangle. Higher level content extends enlargement to explore negative scale factors, and also looks at establishing that a pair of triangles are congruent through formal proof. Trigonometry is introduced as a special case of similarity within right-angled triangles. Emphasis is placed throughout the steps on linking the trig functions to ratios, rather than just functions. This key topic is introduced early in Year 10 to allow regular revisiting e.g. when looking at bearings. For the Higher tier, calculation with trigonometry is covered now and graphical representation is covered in Year 11.	needs to be placed on forming equations from given information. This provides an excellent opportunity to revisit other topics in the curriculum such as angles on a straight line/in shapes/parallel lines, probability, area and perimeter etc. Factorising quadratics to solve equations is covered in the Higher strand here and is revisited in the Core strand in Year 11. Students now move on to the solution of simultaneous equations by both algebraic and graphical methods. The method of substitution will be dealt with before elimination, considering the substitution of a known value and then an expression. With elimination, all types of equations will be considered, covering simple addition and subtraction up to complex pairs where both equations need adjustment. Links will be made to graphs and	another context as well as using mathematics to model real-life situations. This block also introduces new content whilst making use of and extending prior learning. The formulae for arc length and sector area are built up from students' understanding of fractions They are also introduced to the formulae for surface area and volume of spheres and cones; here higher students can enhance their knowledge and skills of working with area and volume ratios. Higher tier students are also introduced to four of the circle theorems; the remaining theorems will be introduced in Year 11 when these four will be revisited. Students will have met vectors to describe translations during Key Stage 3	Although percentages are not specifically mentioned in the KS4 national curriculum, they feature heavily in GCSE papers and this block builds on the understanding gained in KS3. Calculator methods are encouraged throughout and are essential for repeated percentage change/growth and decay problems. Use of financial contexts is central to this block, helping students to maintain familiarity with the vocabulary they are unlikely to use outside school. This block also builds on KS3 and provides a good context in which to revisit fraction arithmetic and conversion between fractions, decimals and percentages. Tables and Venn diagrams are revisited and understanding and use of tree diagrams is developed at both tiers, with conditional probability	methods and diagrams. For students following Higher tier, there is additional content relating to continuous data including histograms, cumulative frequency diagrams, box plots and associated measures such as quartiles and the interquartile range. Again the emphasis with these topics should be on interpretation (particularly in making comparisons) and not just construction. This block revises and builds on KS3 content for calculation. Mental methods and using number sense are to be encouraged alongside the formal methods for all four operations with integers, decimals and fractions. Where possible this should be covered through problems, particularly multi-step problems in preparation for GSCE. The limits of accuracy of truncation are explored and	this content will be familiar from KS3, particularly for Higher tier students, so this consolidation material may be covered in less than two weeks allowing more time for general non-calculator and problem-solving practice. To consolidate the index laws, these can be revisited in the next block when simplifying algebraic expressions. This final block of year 10 builds on the Autumn term learning of equations and inequalities, providing revision and reinforcement for Foundation tier students and an introduction to algebraic fractions for those following the Higher tier. This also allows all students to revise fraction arithmetic to keep their skills sharp. Algebraic argument and proof are considered, starting with identities and moving on to consider generalised number.

		forming the equations will be explored as well as solving them. The Higher strand will include the solution of a pair of simultaneous equations where one is a quadratic, again dealing with factorisation only at this stage.	This will be revisited and used as the basis for looking more formally at vectors, discovering the meaning of $-a$ compared to a to make sense of operations such as addition, subtraction and multiplication of vectors. This will connect to exploring 'journeys' within shapes linking the notation AB with $b - a$ etc. Higher tier students will then use this understanding as the basis for developing geometric proof, making links to their knowledge of properties of shape and parallel lines.	being a key focus for Higher tier students.	compared to rounding, and Higher tier students will look at all aspects of irrational numbers including surds.	
	What is the essential knowledge that needs to be remembered?	To enlarge a shape by a positive scale factor To enlarge a shape by a fractional scale factor To enlarge a shape by a negative scale factor To be able to identify similar shapes To work out missing sides and angles in a pair of given shapes To be able to use parallel line rules to work out missing angles	Understand the meaning of a solution Form and solve one-step and two-step equations Form and solve one-step and two-step inequalities Show solutions to inequalities on a number line Interpret representations on number lines as inequalities Represent solutions to inequalities using set notation	Use cardinal directions and related angles Draw and interpret scale diagrams Understand and represent bearings Measure and read bearings Make scale drawings using bearings Calculate bearings using angles rules Solve bearings problems using Pythagoras and trigonometry	Compare quantities using a ratio Link ratios and fractions Share in a ratio (given total or one part) Use ratios and fractions to make comparisons Link ratios and graphs Solve problems with currency conversion Link ratios and scales Use and interpret ratios of the form $1 : n$ and $n : 1$ Solve 'best buy' problems Combine a set of ratios	Understand populations and samples Construct a stratified sample Primary and secondary data Construct and interpret frequency tables and frequency polygons Construct and interpret two-way tables Construct and interpret line and bar charts (including composite bar charts)	Understand the difference between factors and multiples Understand primes and express a number as a product of its prime factors Find the HCF and LCM of a set of numbers Describe and continue arithmetic and geometric sequences Explore other sequences Describe and continue sequences involving surds

To understand the difference between congruency and similarity Higher tier students can explore areas and volumes of similar shapes and prove that a pair of triangles are congruent. Explore ratio in similar right-angled triangles Work fluently with the hypotenuse, opposite and adjacent sides Use the tangent, sine and cosine ratios to find missing side lengths Use tangent, sine and cosine to find missing angles Calculate sides in right-angled triangles using Pythagoras' Theorem Select the appropriate method to solve right angled triangle problems Work with key angles in right angled triangles Use trigonometry in 3D shapes (H) Use ½absinC to find the area of a triangle (H) Understand and use the sine rule to find missing lengths and angles (H) Understand and use the cosine rule to find missing lengths and angles (H) Choosing and using the cosine and sine rules	Draw straight line graphs Find solutions to equations using straight line graphs Represent solutions to single inequalities on a graph Represent solutions to multiple inequalities on a graph Form and solve equations with unknowns on both sides Form and solve inequalities with unknowns on both sides Form and solve more complex equations and inequalities Solve quadratic equations by factorisation Solve quadratic inequalities in one variable Understand that equations can have more than one solution Determine whether a given (x, y) is a solution to a pair of linear simultaneous equations Solve a pair of linear simultaneous equations by substituting a known variable Solve a pair of linear simultaneous equations by substituting an expression (1) & (2) Solve a pair of linear simultaneous equations using graphs Solve a pair of linear simultaneous equations by subtracting equations	Solve bearings problems using the sine and cosine rules Recognise and label parts of a circle Calculate fractional parts of a circle Calculate the length of an arc Calculate the area of a sector Circle theorem: Angles at the centre and circumference Circle theorem: Angles in a semicircle Circle theorem: Angles in the same segment Circle theorem: Angles in a cyclic quadrilateral Understand and represent vectors Use and read vector notation Draw and understand vectors multiplied by a scalar Draw and understand addition of vectors Draw and understand addition and subtraction of vectors Explore vector journeys in shapes Explore quadrilaterals using vectors Understand parallel vectors	Link ratio and algebra Apply ratio to area and volume problems Convert and compare fractions, decimals and percentages Work out percentages of amounts (with and without a calculator) Increase and decrease by a given percentage Express one number as a percentage of another Calculate simple and compound interest Repeated percentage change Find the original value after a percentage change Solve problems involving growth and decay Understand iterative processes Solve problems involving percentages, ratios and fractions Know how to add, subtract and multiply fractions Find probabilities using equally likely outcomes Use the property that probabilities sum to 1 Using experimental data to estimate probabilities Find probabilities from tables, Venn diagrams and frequency trees Construct and interpret sample spaces for more than one event Calculate probability with independent events	Construct and interpret pie charts Criticise charts and graphs Construct histograms Interpret histograms Find and interpret averages from a list Find and interpret averages from a table Construct and interpret time series graphs Construct and interpret stem-and-leaf diagrams Construct and interpret cumulative frequency diagrams Use cumulative frequency diagrams to find measures Construct and interpret box plots Compare distributions using charts and measures Compare distributions using complex charts and measures Construct and interpret scatter graphs Draw and use a line of best fit Understand extrapolation Mental/written methods of integer/decimal addition and subtraction Mental/written methods of integer/decimal multiplication and division The four rules of fraction arithmetic Exact answers Rational and irrational numbers (convert recurring decimals here) Understand and use surds	Find the rule for the nth term of a linear sequence Find the rule for the nth term of a quadratic sequence Square and Cube numbers Calculate higher powers and roots Powers of ten and standard form The addition and subtraction rules for indices Understand and use the power zero and negative indices Work with powers of powers Understand and use fractional indices Calculate with numbers in standard form Simplify algebraic expressions Use identities Add and subtract simple algebraic fractions Add and subtract complex algebraic fractions Multiply and divide simple algebraic fractions Multiply and divide complex algebraic fractions Form and solve equations and inequalities with fractions Solve equations with algebraic fractions Represent numbers algebraically Algebraic arguments and proof

	Solve a pair of linear simultaneous equations by adding equations Use a given equation to derive related facts Solve a pair of linear simultaneous equations by adjusting one equation Solve a pair of linear simultaneous equations by adjusting both equations Form a pair of linear simultaneous equations from given information Form and solve pair of linear simultaneous equations from given information Higher tier pupils will be able to determine whether a given (x, y) is a solution to both a linear and quadratic equation Solve a pair of simultaneous equations (one linear, one quadratic) using graphs Solve a pair of simultaneous equations (one linear, one quadratic) algebraically Solve a pair of simultaneous equations involving a third unknown		Use tree diagrams for independent events Use tree diagrams for dependent events	Calculate with surds Rounding to decimal places and significant figures Estimating answers to calculations Understand and use limits of accuracy Upper and lower bounds Use number sense Solve financial maths problems Break down and solve multi-step problems	
What is the assessment intent and how will you assess?	The assessment takes place at the end of each week via a low stakes quiz. At the end of each topic students will sit an end of topic assessment. Cumulative half termly assessments will assess learning from class. Teachers check the progress and areas of concern are addressed through whole class teaching with targeted Do Nows and HW. Previous blocks are also assessed each week to assess Covid learning losses so that gaps can be filled whilst continuing with the curriculum.				
What should the end point look like?	Pupils should be fluent in finding lengths of similar shapes, enlarging a shape, and finding congruent shapes.	Pupils should be fluent in solving one step, two step and equations with unknowns on both sides.	Pupils will be comfortable with bearings, be able to compare lengths using scale factors, apply Pythagoras' Theorem and trig ratios to find angles and lengths.	Pupils will be fluent in using ratios and fractions. They will be able to work with compound measures and be able to compare lengths, areas and	Pupils will be fluent in constructing and interpreting information from tables and charts. They will be able to apply sampling to a set of data and be able to compare	Pupils are fluent in factors, multiples, primes, HCF and LCM They can describe and continue sequences, recognise and use sequences of triangular,

Pupils should be able to apply what they have learnt in trigonometry to solve problems.	They should also know how to solve a simultaneous equation.	They will be able to list circle properties and have knowledge of sectors. Pupils will be fluent in describing transformations using vector notation.	volumes using ratio notation. Pupils will be fluent in using percentages. Pupils will be able to use tables, venn diagrams and tree diagrams to find probabilities. They will be able to calculate the probability of independent and dependent combined events.	the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency (including modal class) and spread. Pupils develop their use of formal mathematical knowledge to interpret and solve problems, including in financial contexts • make and use connections between different parts of mathematics to solve problems	simple arithmetic progressions, Fibonacci type sequences, quadratic sequences, and simple geometric Pupils can also deduce expressions to calculate the nth term of linear sequences.

Half term assessment will show current performance.
This will be further assessed in the future with "Can you still" questions showing learning embedded into long term learning. These tests will be used weekly to assess Covid learning losses so that gaps can be filled whilst continuing with the curriculum.

| How does it cover the NC? | **Congruence, Similarity and Enlargement**

▪ **G3** apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles; understand and use alternate and corresponding angles on parallel lines; derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in any polygon, and to derive properties of regular polygons) | **Representing Solutions of Equations and Inequalities**

▪ **A21** translate simple situations or procedures into algebraic expressions or formulae; derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution
▪ **A12** recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions, the | **Angles and Bearings**

▪ **G15** measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings
▪ **R12** compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors
▪ **G20** know the formulae for: Pythagoras' | **Ratio and Fractions**

▪ **R4** use ratio notation, including reduction to simplest form
▪ **R5** divide a given quantity into two parts in a given part:part or part:whole ratio; express the division of a quantity into two parts as a ratio; apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations) | **Collecting, Representing & Interpreting Data**

▪ **S1** infer properties of populations or distributions from a sample, while knowing the limitations of sampling
▪ **S2** interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped | **Non-calculator Methods**

▪ **N8** calculate exactly with fractions**, surds** and multiples of π**; simplify surd expressions involving squares (e.g. √12 = √(4 × 3) = √4 × √3 = 2√3) and rationalise denominators**
▪ **N10** work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 7/2 or 0.375 or 3/8); **change** |

G7 identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional and negative scale factors)

G19 apply the concepts of congruence and similarity, including the relationships between lengths, areas and volumes in similar figures

R2 use scale factors, scale diagrams and maps

Trigonometry

G20 know the formulae for: Pythagoras' theorem $a^2+b^2=c^2$, and the trigonometric ratios, sin θ = opposite/hypotenuse , cos θ = adjacent/hypotenuse and tan θ = opposite/adjacent ; apply them to find angles and lengths in right-angled triangles and, where

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reciprocal function y=1/x with x ≠ 0, **exponential functions y = k^x for positive values of k, and the trigonometric functions (with arguments in degrees) y = sin x, y = cos x and y = tan x for angles of any size**

A4 simplify and manipulate algebraic expressions (including those involving surds **and algebraic fractions**) by factorising quadratic expressions of the form $x^2 + bx + c$, including the difference of two squares; **factorising quadratic expressions of the form $ax^2 + bx + c$**

A18 solve quadratic equations **(including those that require rearrangement)** algebraically by factorising, **by completing the square and by using the quadratic formula;** find

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theorem $a^2 + b^2 = c^2$, and the trigonometric ratios, sin θ = opposite/hypotenuse , cos θ = adjacent/hypotenuse and tan θ = opposite/adjacent ; apply them to find angles and lengths in right-angled triangles **and, where possible, general triangles** in two **and three** dimensional figures

G22 know and apply the sine rule a/sin A = b/sin B = c/sin C , and cosine rule $a^2 = b^2 + c^2 – 2bc$ cos A, to find unknown lengths and angles

Working with Circles

G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment

G18 calculate arc lengths, angles and areas of sectors of circles

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R6 express a multiplicative relationship between two quantities as a ratio or a fraction

R7 understand and use proportion as equality of ratios

R8 relate ratios to fractions and to linear functions

R11 use compound units such as speed, rates of pay, unit pricing, density and pressure

R12 compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors

G19 apply the concepts of congruence and similarity, including the relationships between lengths, areas and volumes in similar figures

Percentages and Interest

R9 define percentage as 'number of parts per hundred';

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discrete numerical data, tables and line graphs for time series data and know their appropriate use

S3 construct and interpret diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and cumulative frequency graphs, and know their appropriate use

S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through:
● appropriate graphical representation involving discrete, continuous and grouped data, **including box plots**
● appropriate measures of central tendency (median, mean, mode and modal class) and spread (range,

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recurring decimals into their corresponding fractions and vice versa

N16 apply and interpret limits of accuracy, including upper and lower bounds

Types of Number Sequences

N4 use the concepts and vocabulary of prime numbers, factors (divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation theorem

A23 generate terms of a sequence from either a term-to-term or a position-to-term rule

A24 recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions, Fibonacci type sequences,

possible, general triangles in two and three dimensional figures ▪ **G21** know the exact values of sin θ and cos θ for θ = 0°, 30°, 45°, 60° and 90°; know the exact value of tan θ for θ = 0°, 30°, 45° and 60° ▪ **G22** know and apply the sine rule a/sinA =b/sinB=c/sinC , and cosine rule a^2=b^2+c^2 − 2bc cos A, to find unknown lengths and angles ▪ **G23** know and apply Area = 1/2 ab sin C to calculate the area, sides or angles of any triangle	approximate solutions using a graph **A22** solve linear inequalities in one **or two** variable**(s), and quadratic inequalities in one variable;** represent the solution set on a number line, **using set notation and on a graph** **Simultaneous Equations** ▪ **A21** translate simple situations or procedures into algebraic expressions or formulae; derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution ▪ **A19** solve two simultaneous equations in two variables (linear/linear **or linear/quadratic)** algebraically; find approximate solutions using a graph	▪ **G17** know the formulae: circumference of a circle = 2πr = πd , area of a circle = πr² ; calculate: perimeters of 2D shapes, including circles; areas of circles and composite shapes; surface area and volume of spheres, pyramids, cones and composite solids ▪ **G10 apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results** **Vectors** ▪ **G24** describe translations as 2D vectors ▪ **G25** apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors**; use vectors to construct geometric**	interpret percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively; express one quantity as a percentage of another; compare two quantities using percentages; work with percentages greater than 100%; solve problems involving percentage change, including percentage increase/decrease and original value problems, and simple interest including in financial mathematics ▪ **N12** interpret fractions and percentages as operators ▪ **R16** set up, solve and interpret the answers in growth and decay problems, including compound interest **and work with general iterative processes** **Probability**	including consideration of outliers, **quartiles and inter-quartile range)** ▪ **S5** apply statistics to describe a population ▪ **S6** use and interpret scatter graphs of bivariate data; recognise correlation and know that it does not indicate causation; draw estimated lines of best fit; make predictions; interpolate and extrapolate apparent trends while knowing the dangers of so doing	quadratic sequences, and simple geometric progressions (rⁿ where n is an integer, and r is a rational number > 0 or a surd) **and other sequences** ▪ **A25** deduce expressions to calculate the nth term of linear **and quadratic** sequences **Indices and Roots** ▪ **A24** recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions, Fibonacci type sequences, quadratic sequences, and simple geometric progressions (rⁿ where n is an integer, and r is a rational number > 0 **or a surd) and other sequences** ▪ **N6** use positive integer powers and associated real roots (square, cube and higher), recognise powers of

| | | | | arguments and proofs | | P4 apply the property that the probabilities of an exhaustive set of outcomes sum to one; apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one

P5 understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size

P7 construct theoretical possibility spaces for single and combined experiments with equally likely outcomes and use these to calculate theoretical probabilities

P8 calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the | | 2, 3, 4, 5, estimate powers and roots of any given positive number

N7 calculate with roots, and with integer and fractional indices

N9 calculate with and interpret standard form $A \times 10^n$, where $1 \le A < 10$ and n is an integer

A4 simplify and manipulate algebraic expressions (including those involving surds and algebraic fractions) by simplifying expressions involving sums, products and powers, including the laws of indices |

				underlying assumptions		
				P9 calculate and interpret conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams and Venn diagrams		