Year 9 Curriculum Overview

Year 9	HT1	HT2	HT3	HT4	HT5	HT6
Topic	Reasoning with Algebra	Constructing in 2 and 3 Dimensions	Reasoning with Number	Reasoning with Geometry	Reasoning with Proportion	Representations
Why this and why now? (Mathematics)	**Straight Line Graphs** Pupils will be familiar with horizontal and vertical lines. This units looks at gradients and y – intercept and formalize y = mx + c. Students will be introduced to perpendicular and parallel line. This work is important for future learning when pupils are taught to equate lines and curves and use the properties of lines to solve problems with and without diagrams. **Forming and Solving equations and Inequalities** Pupils have already spent time solving linear equations and learning the basic algebraic rules. This unit looks at the	**Three Dimensional Shapes** Pupils will be confident with working with 2D shapes and their areas. This block of work extends into 3D shapes. Pupils will work on surface areas, volumes and nets of the shapes. Pupils will in future use Pythagoras and trigonometry to further extend their work with 3D shapes. **Constructions and Congruency** Pupils will be familiar with using a compass, protractor and ruler when they drew accurate triangle diagrams. They will learn further how to use these mathematical	**Numbers** The majority of the topics in this block have been covered earlier in KS3. This is another opportunity to secure basic numeracy skills. The number section is important for a range of topics at KS4. It is important that these skills are well embedded at KS3 so pupils can tackle more in-depth questions at KS4. **Using Percentages** The majority of the topics in this block have been covered earlier in KS3. This is another opportunity to secure basic numeracy skills. In this unit pupils will also look at repeated percentages. It is really important that they and confident to	**Deduction** This topic builds on the work on angle in Year 7 and 8. Pupils are asked to make conjectures and then check to see if they work in a variety of geometric contexts. This work is crucial as it leads into circle theorem work and eventually having to prove some of the circle theorems. **Rotation and translation** Pupils will have rotated shapes before. This unit formalizes the need for rotation around a point and using 4 quadrant coordinate diagrams. Pupils should start to use translations vectors for translations on 4 quadrant coordinate diagrams.	**Enlargement and similarity** Pupils will be familiar with basic enlargement of shape. This unit aims to deepen this area looking at fractional and negative enlargements about a point. They will also learn how to find missing sides on shapes if shapes are similar using scale factors. The enlargement unit will be repeated at GCSE but the skills don't really increase. It will be an opportunity to further embed these skills. Similarity work will be increased when students have to prove congruence and also look at connections between scale, area and volume factors.	**Probability** Pupils will be used to finding probabilities of single events. This unit expands on this with multiple events using two-way tables and tree diagram probability. This will lead to pupils being competent in the future with tree diagram probability to look at dependent events and algebraic probability. **Algebraic Representations** Pupils will be confident at plotting and understanding straight line graphs and y = mx + c. This unit moves onto quadratic graphs, the importance of the intersection of simultaneous

similarities and differences for solving equations and inequalities. The pupils need a solid grasp of solving linear equations and inequalities. This work moves towards solving quadratic equations and inequalities at KS4. **Testing Conjectures** Pupils will have tested conjectures in Year 8 and 9. This unit looks to formalize this process into a proper mathematical structure. For GCSE pupils will have to prove geometrically and algebraically. Testing conjectures is an excellent introduction into this area.	instruments with a wide variety of constructions. They will also be introduced to basic congruency. These skills will be further developed when pupils have to formalize geometric proofs. They will also build their skills at applying constructions into contextualized questions.	use a decimal multiplier when working out percentage questions. Pupils will expand their work on compound interest looking at repeating calculations with different multipliers and also reversing the calculation to find the decimal multiplier and percentage equivalent. **Mathematics and Money** This unit using number and percentage but puts it into a context for money life skills that the pupils will need in future. This will help pupils manage their financial arrangements in future. This unit will be revisited at KS4 to ensure that pupils leave school confident with money. The exam has	The rotation works is not really built upon until A level but the translations are formalized more with vectors and transformation of functions at GCSE. **Pythagoras' Theorem** This is a new topic although pupils will be familiar with right angled triangles, squares and square roots. This unit enables the pupils to find the length on an unknown side of a right-angled triangle. There is scope to look at 3D shapes but this is explored in greater detail at KS4. Pupils will use the techniques learnt at KS3 to further build their skills with 2D problem solving and move onto 3D shapes. The distance formula can also be introduced at GCSE higher level.	**Solving Ratio and Proportion Problems** Pupils will have solved problems at primary and KS3 using proportion and the unitary method. This unit looks again at these problems but also explores what is happening graphically. Pupils build on earlier work on ratio and start to problem solve by split amounts by a ratio. This work will lead to formal methods when finding direct and inverse proportion at KS4. Pupils will also develop ratio techniques using algebraic methods, two-way tables and tree diagrams. **Rates** Pupils will be used to using formula with area etc. They will now look at SDT and DMV and other rate questions. This unit	equations and piece-wise graphs. Pupils will look at quadratic graphs in more detail at KS4. Work will include completing the square and turning points and solving quadratics for the intersections point with the x – axis. Pupils might even go onto look at the discriminate and its effect on a quadratic

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			limited testing on this area but we should try to ensure that young people are confident with numerical and financial calculations.		will look at the connection between the variables as well as using the formulae. This work will eventually lead to working out gradients of straight lines and tangents to curves at GCSE. A pre-cursor to calculus at A level.	
What is the essential knowledge that needs to be remembered?	**Straight Line Graphs** Lines parallel to the axes, y = x and y =-x (R) Using tables of values (R) Compare gradients Compare intercept Understand and use y = mx + c Write an equation in the form y = mx + c (H) Find the equation of a line from a graph Interpret gradients and intercepts of real-life graphs Model real-life graphs involving inverse proportion (H) Explore perpendicular lines (H) **Forming and Solving equations and Inequalities**	**Three Dimensional Shapes** Know the names of 2-D and 3-D shapes Recognise prisms Accurate nets of cuboids and other 3-D shapes Sketch and recognize nets of cuboids and other 3-D shapes Plans and elevations Find area of 2-D shapes (R) Surface area of cubes and cuboids Surface area of cubes and cuboid Surface area of triangular prisms Surface area of a cylinder Volume of cubes and cuboids Volume of other 3-D shapes, prisms and cylinders	**Numbers** Integers, real and rational numbers Understand and use surds (H) Work with directed number (R) Solve problems with integers Solve problems with decimals HCF and LCM (R) Adding and subtracting fractions (R) Multiplying and dividing fractions (R) Solving problems with fractions Numbers in standard form (R) **Using Percentages** Use the equivalence of fractions, decimals and percentages (R)	**Deduction** Angles in parallel lines (R) Solving angles problems (using chains of reasoning) Angles problems with algebra Conjectures with angles Conjectures with shapes Link constructions and geometrical reasoning (H) **Rotation and translation** Identify the order of rotational symmetry of a shape Compare and contrast rotational symmetry with line symmetry Rotate a shape about a point on a shape Rotate a shape about a point not on a shape	**Enlargement and similarity.** Recognise enlargement and similarity Enlarge a shape by a positive integer scale factor Enlarge a shape by a positive integer scale factor from a point Enlarge a shape by a positive fractional scale factor Enlarge a shape by a negative scale factor (H) Work out missing sides and angles in a pair of given similar shapes Solve problems with similar triangles (H) Explore ratios in right-angled triangles (H) **Solving Ratio and Proportion Problems.**	**Probability** Single event probability (R) Relative frequency – include convergence Expected outcomes Independent events Use tree diagrams (H) Use tree diagrams to solve "without replacement" problems (H) Use diagrams to work out probabilities **Algebraic Representations** Draw and interpret quadratic graphs Interpret graphs, including reciprocal and piece-wise Investigate graphs of simultaneous equations (H) Represent inequalities
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Solve one and two step equations and inequalities Solve one and two step equations and inequalities with brackets Inequalities with negative numbers Solve equations with unknowns on both sides Solve inequalities with unknowns on both sides Solve equations and inequalities in context Substituting into formulae and equations Rearrange formulae (one-step) Rearrange formulae (two-step) Rearrange complex formula including bracket and squares (H) **Testing Conjectures** Factors, Multiples and Primes True or False? Always, Sometimes, Never true Show that Conjecture about number Expand a pair of binomials Conjectures with algebra Explore the 100 grid	Explore volumes of cones, pyramids and spheres (H) **Constructions and Congruency** Draw and measure angles (R) Construct and interpret scale drawings (R) Locus of distance from a point Locus of distance from a straight line/shape Locus equidistant from two points Construct a perpendicular bisector Construct a perpendicular from a point Construct a perpendicular to a point Locus of distance from two lines Construct an angle bisector Construct triangles from given information (R) Identify congruent figures Explore congruent triangles Identify congruent triangles	Calculate percentage increase and decrease (R) Express a change as a percentage (R) Solve "reverse" percentage problems Recognise and solve percentage problems (non – calculator) Recognise and solve percentage problems (calculator) (R) Solve problems with repeated percentage change (H) **Mathematics and Money** Solve problems with bills and bank statements Calculate simple interest Calculate compound interest Solve problems with Value Added Tax Calculate wages and taxes Solve problems with exchange rates Solve unit pricing problems	Translate points and shapes by a given vector Compare rotation and reflection of shapes Find the result of a series of transformations (H) **Pythagoras' Theorem** Squares and square roots (R) Identify the hypotenuse of a right-angled triangle Determine whether a triangle is right-angled Calculate the hypotenuse of a right-angled triangle Calculate missing sides in right angled triangles Use Pythagoras theorem on coordinate axes Explore proofs of Pythagoras' theorem Use Pythagoras' theorem in 3-D shapes (H)	Solve problems with direct proportion (R) Direct proportion and conversion graphs (R) Solve problems with inverse proportion Graphs of inverse relationships (H) Solve ratio problems given the whole or a part (R) Solve "best buy" problems Solve problems ratio and algebra (H) **Rates** Solve speed, distance and time problems without a calculator Solve speed, distance and time problems with a calculator Use distance/time graphs Solve problems with density, mass and volume Solve flow problems and their graphs Rates of change and their units Convert compound units (H)	

What is the assessment intent and how will you assess?	The assessment takes place at the end of each fortnight 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?	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.	Pupils will be able to find surface areas and volumes of 3D shapes as well as having a detailed knowledge about each shape. The pupils will also look at constructions using, a pair of compasses, protractor and ruler. Pupils should be able to draw accurate geometric constructions.	Pupils will be able to revise number and percentage which will increase their confidence. Any gaps in learning should be closed as well as applying number to real life money problems.	Pupils should be competent with angles in parallel lines. They will also use prior angle knowledge to solve extended problems. Pupils will rotate and translate shapes using formal and informal methods. Pupils will be able to find missing sides on right angled triangles.	Rates / Ratio and proportion s now a separate unit within the GCSE mathematics curriculum with its importance being elevated after the last GCSE curriculum changes. Pupils should be able to link diagrammatically and formal methods together. They should also understand SDT and DMV as rates of change and not just apply formulae.	The pupils should be confident of finding the probability of 2 events both independent or dependent. They will also have a greater understanding of graphical solutions to problems that they have solved algebraically in the past.
	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.					
How does it cover the NC?	**Straight Line Graphs** ▪ Develop algebraic and graphical fluency, including understanding linear and simple quadratic functions. ▪ Recognise, sketch and produce graphs of linear and quadratic functions in one variable with	**3D Shapes** ▪ Use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 2-D shapes. ▪ Use the properties of faces, surfaces, edges and vertices of cubes, cuboids, prisms, cylinder,	**Numbers** ▪ Use the four operations, including formal written methods, applied to integers, decimals, proper and improper fractions, and mixed numbers, all both positive and negative.	**Deduction** ▪ Derive and use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a line from/at a given point, bisecting a given angle)	**Enlargement and Similarity** ▪ Construct similar shapes by enlargement, with and without coordinate grids ▪ Use scale factors, diagrams and maps ▪ Apply angle facts, triangle and congruence,	**Probability** ▪ Record, describe and analyse the frequency of outcomes of simple probability experiments involving randomness, fairness, equally and unequally

appropriate scaling, using equations in x and y and the Cartesian plane.

- Interpret mathematical relationships both algebraically and graphically.
- Reduce a given linear equation in two variables to the standard form $y = mx + c$; calculate and interpret gradients and intercepts of graphs of such linear equations numerically, graphically and algebraically.
- Use linear and quadratic graphs to estimate values of y for given values of x and vice versa and to find approximate solutions of simultaneous linear equations.
- Solve problems involving direct and inverse proportion, including graphical and algebraic representations.

Forming and Solving Equations

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pyramids, cones and spheres to solve problems in 3-D

- Derive and apply formulae to calculate and solve problems involving: perimeter and area of triangles, parallelograms, trapezia, volume f cuboids (including cubes) and other prisms (including cylinders).

Constructions and Congruency

- Draw and measure line segments and angles in geometric figures, including interpreting scale drawings.
- Derive and use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from/at a given point, bisecting a given angle); recognise and use the perpendicular distance from a point to a line as the shortest

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- Use the concepts and vocabulary of prime numbers, factors (or divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation property
- Interpret and compare numbers in standard form $A \times 10^n, 1 \leq n < 10$ where n is a positive or negative integer or zero.
- Appreciate the infinite nature of the sets of integers, real and rational numbers

Using Percentages

- Define percentage as 'number of parts per hundred', interpret percentage changes as a fraction or a decimal, interpret these multiplicatively, express one

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recognise and use the perpendicular distance from a point as the shortest distance to the line.

- Describe, sketch and draw using conventional terms and notations: points, lines, parallel lines, perpendicular lines, right angles, regular polygons, and other polygons that are reflectively and rotationally symmetric
- Apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles
- Understand and use the relationship between parallel lines and alternate and corresponding angles

Rotation & Translation

- Identify properties of, and describe the results of, translations, rotations and reflections applied to given figures.
- Describe, sketch and draw using conventional terms and notations; points, lines, parallel lines, perpendicular lines, right angles,

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similarity and properties of quadrilaterals to derive results about angles and sides.

- Understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction
- Use Pythagoras' Theorem and trigonometric ratios in similar triangles to solve problems involving right-angled triangles

Solving Ratio and Proportion Problems

- Divide a quantity into two parts in given part:part or part: whole ratio; express the division of a quantity into two parts as a ratio
- Understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction
- Solve problems involving direct and inverse proportion,

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outcomes using appropriate language and the 0-1 probability scale.

- Understand that the probabilities of all possible outcomes sum to 1.
- Enumerate sets and unions/intersections of sets systematically, using tables, grids and Venn diagrams.
- Generate theoretical sample spaces for single and combined events with equally likely, mutually exclusive outcomes and use these to calculate theoretical probabilities.

Algebraic Representations

- Recognise, sketch and produce graphs of quadratic functions of one variable with appropriate scaling, using equations in x and y and the Cartesian plane.
- Use quadratic graphs to estimate values of y for given

- Move freely between different numerical, algebraic, graphical and diagrammatic representations [for example... equations and graphs].
- Use algebraic methods to solve linear equations in one variable (including all forms that require rearrangement).
- Understand and use standard mathematical formulae; rearrange formulae to change the subject.
- Model situations or procedures by translating them into algebraic expressions or formulae and by using graphs.

Testing Conjectures

- Make and test conjectures about patterns and relationships; look for proofs or counterexamples.
- Begin to reason deductively in

distance to the line.
- Describe, sketch and draw using conventional terms and notations: points, lines, parallel lines, perpendicular lines, right angles, regular polygons, and other polygons that are reflectively and rotationally symmetric.
- Use the standard conventions for labelling the sides and angles of a triangle ABC and know and use the criteria for congruence of triangles.

quantity as a percentage of another, compare two quantities using percentages, and work with percentages greater than 100%.
- Interpret fractions and percentages as operators.
- Solve problems involving percentage change, including: percentage increase, decrease and original value problems and simple interest in financial mathematics

Maths & Money

- Solve problems involving percentage change, including: percentage increase, decrease and original value problems and simple interest in financial mathematics.
- Select and use appropriate calculations strategies to solve

regular polygons and other polygons that are reflectively and rotationally symmetric.
- Develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi step problems.

Pythagoras' Theorem

- Use Pythagoras' theorem to solve problems in right-angled triangles
- Apply angle facts, triangle congruence, similarity and properties of quadrilaterals to derive results about angles and sides using Pythagoras' Theorem, and use known results to obtain simple proofs
- Interpret mathematical relationships both algebraically and geometrically
- Begin to reason deductively in a geometry, number and algebra, including using geometrical constructions
- Begin to model situations mathematically and

including graphical and algebraic representations
- Use compound units such as speed, unit pricing and density to solve problems

Rates

- Use compound units such as speed, unit pricing and density to solve problems
- Understand that multiplicative relationship between two quantities can be expressed as a ratio or a fraction
- Change freely between related standard units [for example time, length, area volume/capacity, mass]

values of x and vice-versa.
- Fina approximate solutions to contextual problems from given graphs of a variety of functions, including piece-wise linear, exponential and reciprocal graphs.
- Use linear graphs to estimate values for x and vice-versa and fine approximate solutions of linear equations.
- Understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors.

geometry, number and algebra. • Use the concepts and vocabulary of prime numbers, factors (or divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation. • Simplify and manipulate algebraic expressions to maintain equivalence by expanding products of two or more binomials.	increasingly complex problems • Interpret when the structure of numerical problems requires additive, multiplicative or proportional reasoning • Develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics.	express the results using a range of formal mathematical representations.

Year 9 Assessment Matrix

Legend:
- **Block Test** (green)
- **Can You Still?'** (purple)
- **End of term CORE test** (light green)

Year 9	Straight line graphs	Forming and solving equations	Testing conjectures	3D Shapes	Constructions and congruency	Numbers	Using percentages	Maths and money	Deduction	Rotation and Translation	Pythagoras' Theorem	Enlargement and Similarity	Ratio and proportion	Rates	Probability	Algebraic representation
Straight line graphs	Block															
Forming and solving equations	Can You Still?	Block														
Testing conjectures		Can You Still?	Block													
3D Shapes	Can You Still?		Can You Still?	Block												
End of Term CORE test	CORE	CORE	CORE	CORE	CORE											
Constructions and congruency		Can You Still?			Block											
Numbers			Can You Still?		Can You Still?	Block										
Using percentages				Can You Still?		Can You Still?	Block									
Maths and money							Can You Still?	Block								
Deduction						Can You Still?		Can You Still?	Block							
Rotation and Translation							Can You Still?		Can You Still?	Block						
End of Term CORE test		CORE	CORE	CORE	CORE	CORE	CORE	CORE	CORE	CORE	CORE					
Pythagoras' Theorem	Can You Still?										Block					
Enlargement and Similarity										Can You Still?	Can You Still?	Block				
Ratio and proportion											Can You Still?		Block			
Rates											Can You Still?		Can You Still?	Block		
Probability												Can You Still?		Can You Still?	Block	
Algebraic representation													Can You Still?		Can You Still?	Block
End of Year CORE test	TBC when written by WRM															