Curriculum Maps

Rationale:

Intent:

These schemes of learning (SOL) have been carefully designed both to maximise progression and to allow flexibility. In Years 7 and 8 all pupils follow the same SOL irrespective of prior achievement as we understand that pupils may flourish at different ages. Year 7 are taught in mixed ability groups and we set in Year 8 by ability into three main types of sets: Higher, Core and Foundation. Some content will inevitably be met in our higher prior achieving sets earlier than in others. This means that for those not yet attaining as highly as their peers, there will be more time for consolidating and revisiting concepts before rushing on to new content. In Years 7 and 8 we teach a Mastery curriculum and the principles of Teaching for Mastery are a key feature of the department. Mastery is achieved through developing procedural fluency and conceptual understanding in tandem. Lessons are designed collaboratively to have a high level of teacher-pupil and pupil-pupil interaction. We aim for all pupils to be thinking about, working on and discussing the same mathematical content. Challenge and the opportunity to deepen understanding through solving problems linking key mathematical ideas is provided for all. This deep understanding is then built upon with the further content required in Years 9 to 11.

Implementation:

The content covered and the sequence of this content for all year groups has been carefully designed so that topics can build on previous content learnt. For example, Year 7 starts with developing algebraic thinking and then further development of algebraic skills is then woven throughout the year so students reinforce and extend their knowledge and understanding. The new GCSE places great emphasis on problem solving, because of this we teach certain pivotal topics needed for problem solving early in each year so that these topics can then be combined with later topics. For example, solving equations is taught early and revisited each year as this can be combined with almost every topic to create problem solving questions. We hold great value in revisiting and overlearning previous content. Our Schemes of learning allow plenty of opportunity for students to overlearn and use skills learnt earlier in the year when solving problems involving many different areas of mathematics. Our overarching theme is to combine topics, wherever possible, to cope with the high demands of the new GCSE.

We recognise that practice is a vital part of learning and we aim for the practice to be intelligent practice that develops pupils' conceptual understanding and encourage reasoning and mathematical thinking, as well as reinforcing their procedural fluency. We use well-crafted examples and exercises which, through careful use of variation focuses pupils' attention on the key learning point. Significant time is spent developing a deep understanding of the key ideas and concepts needed to underpin future learning. The structures and connections within the mathematics are emphasised, which helps to ensure the pupil's learning is sustainable over the five years. We believe that making mistakes in maths is one of the best ways to learn and gain a strong understanding. We will encourage pupils to 'have a go' at everything, building their resilience and confidence in lessons.

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Every attempt is made to keep the whole class learning together. Differentiation is achieved through paying attention to the levels of questioning and the support and challenge needed to allow every pupil to fully grasp the methods and concepts being learnt. This ensures all pupils gain a deep and secure understanding of the mathematics being learnt which can then be built on with subsequent content in the learning sequence. Acceleration by some pupils through new content is avoided. Instead, these pupils are challenged by deeper analysis of the methods and concepts and are challenged by applying this content in new and unfamiliar problem-solving situations. If some pupils fail to grasp an important aspect of the method or concept this will be identified quickly either by teacher monitoring or by an end of topic diagnostic task. Early intervention in these cases will ensure that these pupils will catch up.

To encourage independent learning, home learning and home work will be split into two distinct types of task. These tasks will be set every other week, an independent home learning task one week and a home work task the next. Independent home learning: These will be set to students and will be linked to the SOL. The tasks will be to watch two/three lesson clips from www.corbettmaths.com to remind them of the topics and methods learnt earlier in the term. We will run 3 weeks behind the SOL so that these tasks act as a revision for topics just learnt or help with any overlearning.

Assessments run throughout the year to check understanding and each one of these will be followed with a DIRT task to either consolidate or for overlearning. The end of year assessments will cumulatively assess all topics covered. Pupils will complete a diagnostic task after each topic to check understanding and these are also accompanied with a DIRT task and an opportunity for further challenge with problem-solving.

Extra-curricular activities are embedded within our departmental culture, we aim to engage pupils in exploring topics across the curriculum and to take them to new levels of thinking. We participate in The UKMT maths challenges and team events and hold selection trials leading up to these where all pupils can get involved.

Our Year 9 scheme is a bespoke scheme designed to develop understanding (from Years 7 and 8) and to introduce new content that we, as a department, have decided are the most pivotal for success at GCSE. This scheme has been designed to enable the pupils to explore as many of the methods and the maths for themselves aiming to gain a deep understanding of these methods. All pupils follow the same scheme despite being set by ability. Higher groups will delve deeper into the problem solving elements than perhaps the lower groups, although there is flexibility for all groups to explore.

From Year 10 the schemes are split into two tiers and these are:

The Foundation Tier – by the end of Year 11, the foundation tier will cover all the content in the Foundation GCSE, allowing students to attain a grade 5.

The Higher Tier – all of the Higher level GCSE content is covered, allowing access for students all the way to grade 9.

There is a large overlap between the two tiers covering all the grade 3 to 5 content and the structure has been planned so that any student who changes tier can do so easily.

On the next two pages are the Curriculum Maps for Years 7 to 9 which all pupils follow and then for the Foundation and then Higher Tiers:

Curriculum Maps

Years 7 to 9:

7	Sequences	Understanding and using algebraic notation	Equality and equivalence	Place value, integers and decimals	Fraction, decimal percentage equivalence	Addition, subtraction, multiplication and division	Four operations with directed number	addition/subtraction of fractions	Developing number sense	Sets and probability	Prime numbers and proof	Constructing, measuring and using geometric notation	Develop geometric reasoning						
Detail	Exploring all types of sequence, term to term	Use of function machines, forming and substituting into expressions, functions graphically.	Expression equivalence. Forming and solving one step equations, collecting like terms	Place value, ordering, range and median, rounding	FDP equivalence, pie charts, fractional sequences. **ASSESSMENT 1**	using formal methods, solve problems in context with perimeter, area money, frequency trees and tables. HCF/LCM, BIDMAS, solving two step equatuons	Order directed numbers, calculate using directed number	Add subtract fractions different denominators, use equaivalent fractions. **ASSESSMENT 2**	Mental strategies, known facts to derive other facts - inc algebraically	Understand set notation, venn diagrams and probability of an event	types of number, primes, powers and roots, counter examples.	Drawing, measuring lines and angles, parallel/perpendicular, SSS, SAS, and ASA	Calculate using angle facts, around a point, straight line, vertically opposite, triangles and quadrilaterals **ASSESSMENT 3**						
8	Ratio and scale	Multiplicative change	Multiplying and diving fractions	Coordinates	Collecting and representing data	Tables	Brackets, equations and inequalities	sequences	Indices	Fractions and percentages	Standard Form	Number sense	Angles in parallel lines and polygons	Area of Trapezia and circles	Symmetry and reflection	Data Handling cycle	Averages		
Detail	Understand ratio, simplifying, link to multiplication, solve problems involving ratio, circumference of circles	Use scale factors with direct proportion and with scales and maps	Multiply and divide fraction by integer and by fractions	Plotting straight lines, equations of horizontal and vertical lines, link with expressions	Scatter graphs and correlation, two way tables, listing outcomes	Probability sample space tables **ASSESSMENT 1**	Expand single brackets, form expressions, form and solve equations and inequalities	Using more complex rules, brackets and squared terms	Writing expressions with powers (extension: factorising, expanding binomials, nth term of linear sequences)	Revisit FDP equivalence, one number as percentage of another	Conversion between standard and ordinary form, ordering.	Revisit BIDMAS, measures and units, estimation and mental strategies. **ASSESSMENT 2**	Review year 7 angle facts, angles in special quadrilaterals, angles in polygons	Review area of shapes Year 7. Area trapezium, circles and compound shapes	Line symmetry in polygons, reflecting shapes	Collecting data, constructing and interpreting charts	Revisit Mode, median and mean, inc. from grouped data **ASSESSMENT 3**		
9	Number types	Fractions	Ratio and Proportion	Percentages	Estimating and approximating	Algebraic expressions	Solving equations and formulae	Linear graphs and coordinates	Perimeter and area	Volume	Collecting and representing data and averages	Scattergraphs	Indices	Standard form	Probability	Angles	Properties of polygons	Transformations	Pythagoras' Theorem and trigonometry
Detail	4 operations, directed number, LCM/HCF, prime factors, inverse operations,	Order fractions, use all 4 operations, mixed/improper and problem solving	Link to fractions, simplifying, sharing, multiplicative relationship, graphically. Proportion	Basic percentage, percenatge change, increase/decrease, reverse and simple interest and intro to percentage multipliers **ASSESSMENT 1**	Rounding to decimal places/significant figures, bounds and error interval	All notation, simplifying, basic expanding and common factors	Substitution, Solve equations inc. unknowns on both sides, change subject of formulae	Plot y = mx + c, identify parallel lines, explore gradients, draw other graphs **ASSESSMENT 2**	Perimeter and Area of all shapes, inc circles. Higher: inc. sectors and arc lengths	Volumes of prisms, cones, spheres and pyramids. **ASSESSMENT 3**	Pie charts, stem and leaf, two way tables, time series. Calculate the three averages, compare using average and spread	Use and interpret, recognise correlation, make predictions	Calculate using indices, use index laws inc. negative and fractional indices	Place value, calculate and interpret standard form (calc and non-calc) **ASSESSMENT 4**	All probability. Single events, combined events, relative frequency, tree diagrams, conditional probability, venn diagrams	All notation, at a point, straight line, vertically opposite and with parallel lines.	Special quadrilaterals, angles in polygons, exterior and interior	Reflect, rotate, translate and enlarge (positive and negative scale factors)	Know and use pythagoras' theorem and trig ratios

Curriculum Maps

Foundation Tier:

10	Overlearning: number stuff	Overlearning: algebraic expressions	Overlearning plus: Solving equations	Overlearning plus: Angles and Properties of	Overlearning Fractions	Coordinates and straight lines	Indices	Standard form	Percentages and growth and decay	Ratio and Proportion	Pythagoras' Theorem	Review plus: Perimeter and area	Volume	Probability and sets	Transformations	Collecting and representing data and averages	Scattergraphs	Constructions and Loci	Representations
Detail	A combination of: 4 operations with integers and decimals, directed number, inverse operations, number types, LCM/HCF, prime factors Upper and lower bounds, error intervals	Simplfy expressions using all the proper notation inc with brackets and use of fractions. Expanding brackets, factorising using common factors	Solve equations inc unknowns on both sides, forming and solving equations in a variety of contexts linking to many previous topic areas	All angle facts, inc. with parallel lines and angles in polygons, exterior and interior. Problem solving and linking with forming and solving equations	Revisit all fractions: Ordering, all 4 operations, mixed/improper and problem solving, simple algebraic fractions	Plotting straight lines, equations of horizontal, vertical and diagonal lines, understanding of gradient and intercept in y=mx+c	Calculate using indices, use index laws	Place value, calculate and interpret standard form (calc and non-calc) **ASSESSMENT 2**	Review of basics plus: Percentage change, increase/decrease, using multipliers for growth and decay problems, simple and compound interest	Simplifying, sharing and solving problems using ratio, simple combined ratios, simple multiplicative reasoning (best buys, currency conversions) **ASSESSMENT 3**	Understand and use pythagoras' theorem inc problem solving	Perimeter and Area of all shapes, inc circumference and area of circles	Volumes of cuboids and other simple prisms inc. change of units **ASSESSMENT 4**	All probability. Single events, combined events, relative frequency, tree diagrams, venn diagrams	Reflect, rotate, translate and enlarge (only positive scale factors)	Pie charts, stem and leaf, two way tables, time series. Calculate the three averages, compare using average and spread	Use and interpret, recognise correlation, make predictions	perpendicular bisector, angle bisect, and loci problems	Plan views, front and side elevations, bearings and scale drawings **ASSESSMENT 5**
11	Compound measure	Overlearning: algebraic expressions	Simultaneous equations, inequalities	Overlearning: Percentages	Sequences	Vectors	Overlearning: Ratio and Proportion	Congruence and similarity	Quadratics	Quadratic equations	Further graphs	Trigonometry	Overlearning: Statistics	Overlearning: Linear and other graphs					
Detail	Speed, density and pressure.	Simplfy expressions using all the proper notation inc with brackets and use of fractions. Expanding brackets, factorising using common factors and quadratics. Solving equations	Solve linear simultaneous equations, algebraically and graphically. Solve linear inequalities and show on number line. Changing the subject	Basic percentage, percentage change, increase/decrease, reverse and simple interest and intro to percentage multipliers	Exploring all types of sequence, term to term and nth terms of linear sequences	Addition and subtraction of vectors, multiplication by a scalar, both diagrammatic and column representation of vectors	Simplifying, sharing and solving problems using ratio, simple combined ratios, simple multiplicative reasoning (best buys, currency conversions)	Conditions for congruence, similar shapes and using similarity to calculate missing lengths **MOCK 1**	Expanding one and two binomials, factorise quadratics inc difference of two squares solving quadratics by factorising	Solving quadratic equations using factorising, sketching quadratic graphs	Plotting/drawing graphs of quadratics, cubics and reciprocal graphs	Understand and use the three trig ratios. Know the exact trig ratios for sin, cos and tan for angles of 0, 30, 45, 60 and 90.	Revisit all previous representations and all measures of average and spread. Compare distributions	Plot y = mx + c, identify parallel lines, explore gradients, draw other graphs **MOCK 2**					

Higher Tier:

Review: Number types	Compound measure	Review: expressions and equations	Review: Angles	Properties of polygons	Circle theorems	Indices and surds	review: Standard form	y = mx + c and gradients	Review: Fractions	Percentages multipliers	Review: Ratio and Proportion	Quadratics	Proof	Algebraic fractions	Perimeter and area	Volume	Probability and Sets	review: transformations	Statistics	Pythagoras' Theorem and trigonometry	Constructions and Loci
4 operations, directed number, LCM/HCF, prime factors. GCSE problem solving	Speed, density and pressure. Upper and lower bounds, error intervals and calculations using bounds	Substitution, simplifying, solving all types of linear equations.	All notation, at a point, straight line, vertically opposite and with parallel lines.	Special quadrilaterals, angles in polygons, exterior and interior	Apply and prove the 8 circle theorems **ASSESSMENT 1**	Calculate using indices, use index laws inc. negative and fractional indices, simplify surds	Place value, calculate and interpret standard form (calc and non-calc)	Plot y = mx + c, identify parallel and perpendicular lines, find equations of lines	Order fractions, use all 4 operations, mixed/improper and problem solving **ASSESSMENT 2**	Basic percentage, percentage change, increase/decrease, reverse and multipliers for growth and decay	Solving problems using ratio, combined ratios	Expanding two/three binomials, factorise quadratics, change the subject, complete the square. Solve by factorising and drawing quadratic graphs	Argue mathematically to show equivalence, use algebra to prove	Simplifying algebraic fractions by factorising and using the four operations with equivalence	Review: Perimeter and Area of all shapes, inc circles and sectors and arc lengths.	Volumes of prisms, cones, spheres and pyramids **ASSESSMENT 3/4**	All probability. Single events, combined events, relative frequency, tree diagrams, conditional probability	Reflect, rotate, translate and enlarge (positive and negative scale factors). Invariance	Revisit all previous representations inc boxplots, cumulative frequency, histograms and all measures of average and spread	Revisit all Pythag and trig inc exact values.	perpendicular bisector, angle bisect, and loci problems
Quadratic equations	Further graphs	Pre-calculus	Sequences	Direct and Inverse Proportion	Functions	iteration	Sine cosine rules	Vectors	Congruence and similarity	Further graphs and transformations											
Solving quadratic equations and inequalities using factorising and the formula. Simultaneous eqn linear and quadratic. Sketching quadratic graphs	Plotting/drawing graphs of quadratics, cubics, reciprocals, circles and exponentials.	Gradients of tangents to curves, area under curves. In context	nth terms of linear and quadratic sequences. Revisit all other types	Construct and interpret equations that describe direct and inverse proportion. Graphs	Composite and inverse functions	Approximate solutions to equations using iteration **MOCK1**	Know and apply the sine and cosine rules inc area of triangle	Use vectors to construct geometrical proofs	Conditions for congruence and proof, similar shapes, lengths areas and volumes	Revisit all graph work and inc trig graphs and transformations of graphs (only reflections and translations) **MOCK 2**											

Curriculum Maps

Years 12 and 13:

Algebra and functions	Coordinate geometry	Introduction to Mechanics	Further Algebra	Statistics: Data presentation	Calculus: Introduction to differentiation	Algebra and Functions 2	Trigonometry	Calculus: Introduction to integration	Statistics: Probability, Statistical distributions and Hypothesis testing	Vectors	Mechanics	Exponentials and Logarithms
Indices and surds, solving quadratics, completing the square, inequalities, graphs of quadratics, cubics,	equation of a straight line, equation of circles (any centre)	Straight line Kinematics (SUVAT)			From first principles, general case for polynomials and applications to stationary		Solving Trig equations inc. quadratics, use of Pythagoras' theorem	Integrating as reverse process of differentiation, applications to area under curve		2D vectors, geometrical proofs, magnitude and direction	Forces, Newtons laws and further kinematics with calculus	Introduction to logs and their rules, solving equations using logs and exponentials, log and exponential
Series and Sequences	**Rational functions and Partial Fractions**	**Further Trigonometry**	**Calculus: Further differentiation**	**Functions and modelling**	**Calculus: Further integration**	**Mechanics:**	**Statistics**	**Binomial**	**Parametric Equations**	**Numerical Methods**	**Further Vectors**	
Arithmetic and Geometric Progressions. Recursive relations	Four operations with rational functions. Partial fractions inc. repeated factors	Radians, arc length, sector area, further solving equations inc sec, cosec and cot, addition formulae and double angle	Differentiation of the following functions: trig, exp, logs, chain rule, product rule and quotient rule. All applications		Integrating: trig functions, exp, logs, substitution and parts	Moments, Forces at any angle, application of forces and further kinematics	Regression and correlation, Normal Distribution			Newton-Raphson,	3D vectors, geometrical proofs, magnitude and direction	

Impact:

Our pupils will be mathematically coherent and be able to make mathematical connections. They will be able to describe the mathematics they are doing and have an understanding of why it works. They will be mathematically fluent. Fluency demands more of pupils than memorising. It encompasses a mixture of efficiency, accuracy and flexibility. Quick and efficient recall of facts and methods is important in order for pupils to work through multi-step problems and think strategically. Fluency also demands the flexibility to move between different contexts and representations of mathematics, to recognise relationships and make connections to make appropriate choices from a whole toolkit of methods, strategies and approaches. Our pupils will be able to think mathematically. Mathematical thinking involves: looking for patterns, relationships and connecting ideas; reasoning logically, explaining, conjecturing and proving when appropriate.