

SUBJECT Curriculum Map

Year 9



Rationale and Links to The National Curriculum

Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems.

It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

- To be **fluent** in the fundamentals of mathematics so that pupils have a deep conceptual understanding and are able to recall and apply mathematics skills quickly.
- To **reason mathematically** by following lines of enquiry, developing arguments, drawing conclusions and generalisations from their findings.
- To **solve problems** by applying their mathematical understanding to a variety of contextual and abstract problems.
- To **communicate mathematically** using correct mathematical terminology and notation.
- To recognise and appreciate the interlinking nature of mathematics and **make connections** through the different areas of maths.

Year 9 students are taught elements of each topic area that build on knowledge acquired in years 7 and 8.

The expectation is that the majority of students will progress through the scheme of learning at broadly the same pace. However, decisions about when to progress will always be based on the security of students' understanding and their readiness to progress.

Students who grasp concepts rapidly will be challenged through being offered rich and sophisticated problems before any acceleration through new content in preparation for key stage 4 (year 10 & 11)

Those who are not sufficiently fluent should consolidate their understanding, including through additional practice, before moving on.

Throughout the five years, students will cover a range of topics within the following areas of mathematics:

- Number
- Algebra
- Ratio, Proportion and Rates of Change
- Geometry & Measures
- Probability
- Statistics

The exact content within each area will differ depending on the students' recall of previous learning.

Year 9	Half Term 1	Half Term 2	Half Term 3
Key Topics	Unit 1 Straight Line Graphs Unit 2 Forming & Solving Equations Unit 3 Testing Conjectures	Unit 4 2D & 3D Shapes Unit 5 Constructions & Congruence Unit 6 Numbers	Unit 7 Using Percentages Unit 8 Maths & Money Unit 9 Deduction
Substantive Knowledge (Bold is higher tier only)	<ul style="list-style-type: none"> Plot graphs in the form $y=mx + c$ from a table of co-ordinates Identify lines that are parallel to the axes, including $y=x$ and $y=-x$ Find the (positive or negative) gradient of a line from a graph Find the y-axis intercept of a graph from a graph Understand and use $y = mx + c$ Write an equation in the form $y= mx + c$ (include negative and fractional gradients) when rearranging is required Find the equation of a line from a graph (include negative and fractional gradients) Multiply out and factorise into a single bracket Solve one and two step equations and inequalities, with and without brackets Solve equations and inequalities with unknowns on both sides, and negative numbers Rearrange one, two-step and complex formulae Identify different types of numbers, including square, cube, prime, multiples and factors Understand the meaning of an identity Argue mathematically whether something is true or false Expand a pair of binomials and 3 binomials Reason with conjectures about numbers and with algebra Reason with sums and products of odd and even numbers (proof by example and with n) Reason with 'Show that' questions containing algebra ie 'multiple of 3'. 	<ul style="list-style-type: none"> Calculate the area of a trapezium and other 2D shapes Recognise and label parts of a circle: centre; radius; chord; diameter; circumference; tangent; arc; sector and segment Calculate the area of any circle, semi-circles and quarter-circles including in terms of pi and with a calculator Calculate the area of any sector (including in terms of pi) Calculate the circumference and arc length of a circle, semi-circle and quarter circle, including in terms of pi and with a calculator Calculate the arc length and perimeter of any sector (including in terms of pi) Calculate the area and perimeter of compound shapes including circles Calculate the surface area of cubes and cuboids, triangular prisms, cylinders and other prisms (including triangular prisms), and giving answers in terms of pi) Work backwards to find missing lengths (triangle and trapeziums) Work backwards to find the radius and diameter given the area / circumference of circles Recognise and understand prisms Sketch and recognise nets of cuboids and other 3D shapes Interpret and draw plans and elevations Calculate the volume of cubes and cuboids, prisms and cylinders (including giving answers in terms of pi) Calculate the volume of cones, pyramids and spheres (H) Construct and interpret scale drawings 	<p>How to:</p> <ul style="list-style-type: none"> Use the equivalence of fractions, decimals and percentages Express one number as a fraction or percentage of another (with and without a calculator) Calculate percentage increase and decrease manually and using multipliers Express a change as a percentage Recognise and solve percentage problems (non-calculator) Calculate simple interest and compound interest Solve reverse percentage problems Solve problems with repeated percentage change (including growth and decay) Interpret bills and bank statements Solve problems with value added tax Calculate wages and tax in real life context such as hourly rates of pay, payslips and income tax Simple interest problems in terms of savings accounts Solve problems with exchange rates Calculate compound interest problems in terms of savings accounts and comparisons Identify and calculate with co-interior, alternate and corresponding angles Find and use the interior angles sum with any polygon Find the exterior angles of any polygon Find angles using algebraic methods Reason with conjectures involving angles and shape Solve angle problems using chains of reasoning Solve more complex angle problems with algebra Solve more complex angle problems using chains of reasoning

		<ul style="list-style-type: none"> Construct triangles from given information Find and draw the locus of distance from a point and a locus equidistant from 2 points or 2 lines Identify congruent figures and congruent triangles (SSS, SAS, ASA, RHS) Construct an angle bisector and a perpendicular bisector Construct a perpendicular line from and to a point Work with directed numbers Calculate the HCF and LCF of 2 or more numbers Convert fluently between numbers in standard form and ordinary form (small and large) Multiply, divide, add and subtract fractions (including mixed numbers) Understand and recognise integers, real and rational numbers Understand and use surds 	<ul style="list-style-type: none"> Link constructions and geometrical reasoning
Disciplinary Knowledge (Bold is higher tier only)	<p>Select and apply the most appropriate mathematical method to solve problems, including those, by working with:</p> <ul style="list-style-type: none"> Graphs in the form $y=mx + c$ from a table of co-ordinates Lines that are parallel to the axes, including $y=x$ and $y=-x$ (Positive or negative) gradients of a line from a graph The y-axis intercept of a graph from a graph The interpretation and use of $y = mx + c$ Equations in the form $y= mx + c$ (include negative and fractional gradients) when rearranging is required The equation of a line from a graph (include negative and fractional gradients) Single brackets One and two step equations and inequalities, with and without brackets equations and inequalities with unknowns on both sides, and negative numbers One, two-step and complex formulae Different types of numbers, including square, cube, prime, multiples and factors An identity 	<p>Select and apply the most appropriate mathematical method to solve problems, including those, by working with:</p> <ul style="list-style-type: none"> Area of a trapezium and other 2D shapes Parts of a circle: centre; radius; chord; diameter; circumference; tangent; arc; sector and segment Area of any circle, semi-circles and quarter-circles including in terms of pi and with a calculator Area of any sector (including in terms of pi) The circumference and arc length of a circle, semi-circle and quarter circle, including in terms of pi and with a calculator Arc length and perimeter of any sector (including in terms of pi) Area and perimeter of compound shapes including circles Surface area of cubes and cuboids, triangular prisms, cylinders and other prisms (including triangular prisms, and giving answers in terms of pi) Missing lengths (triangle and trapeziums) Radius and diameter given the area / circumference of circles Prisms Nets of cuboids and other 3D shapes 	<p>Select and apply the most appropriate mathematical method to solve problems, including those, by working with:</p> <ul style="list-style-type: none"> Equivalence of fractions, decimals and percentages One number as a fraction or percentage of another (with and without a calculator) Percentage increase and decrease manually and using multipliers Express a change as a percentage Percentage problems (non-calculator) Simple interest and compound interest Reverse percentage problems Problems with repeated percentage change (including growth and decay) Bills and bank statements Value added tax Wages and tax in real life context such as hourly rates of pay, payslips and income tax Simple interest problems in terms of savings accounts Exchange rates Compound interest problems in terms of savings accounts and comparisons Co-interior, alternate and corresponding angles

	<ul style="list-style-type: none">• Proof - Argue mathematically whether something is true or false• A pair of binomials and 3 binomials• Conjectures about numbers and with algebra• Sums and products of odd and even numbers (proof by example and with n)• 'Show that' questions containing algebra ie 'multiple of 3'.	<ul style="list-style-type: none">• Plans and elevations• Volume of cubes and cuboids, prisms and cylinders (including giving answers in terms of pi)• Volume of cones, pyramids and spheres (H)• Scale drawings• Construction of triangles from given information• Locus of distance from a point and a locus equidistant from 2 points or 2 lines• Congruent figures and congruent triangles (SSS, SAS, ASA, RHS)• Constructions of an angle bisector and a perpendicular bisector• Constructions of a perpendicular line from and to a point• Directed numbers• HCF and LCF of 2 or more numbers• Numbers in standard form and ordinary form (small and large)• Fractions - Multiply, divide, add and subtract fractions (including mixed numbers)• Integers, real and rational numbers• Understand and use surds	<ul style="list-style-type: none">• Interior angles sum with any polygon• Exterior angles of any polygon• Angles using algebraic methods• Conjectures involving angles and shape• Angle problems using chains of reasoning• More complex angle problems with algebra• More complex angle problems using chains of reasoning• Constructions and geometrical reasoning			
Assessment (The methods that teachers will use to assess the progress of all students)	<ul style="list-style-type: none">• Autumn assessment consisting of one calculator and one non-calculator paper• Check In Tasks are completed the week prior to teaching each unit to assess retained knowledge and starting point.• Check Out Tasks are completed the week following teaching with a teacher-led feedback and improvement lesson following marking.	<ul style="list-style-type: none">• Check In Tasks are completed the week prior to teaching to assess retained knowledge and starting point.• Check Out Tasks are completed the week following teaching with a teacher-led feedback and improvement lesson following marking.	<ul style="list-style-type: none">• Check In Tasks are completed the week prior to teaching to assess retained knowledge and starting point.• Check Out Tasks are completed the week following teaching with a teacher-led feedback and improvement lesson following marking.			
Reading, Writing and Vocabulary	The national curriculum for mathematics reflects the importance of spoken language in students' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak are key factors in developing their mathematical vocabulary and presenting a mathematical justification, argument or proof. Students are assisted in making their thinking clear to themselves as well as others and explicit modelling is a key priority for classroom teaching. Teachers ensure that pupils build secure foundations by using discussion and whiteboard assessment to probe and remedy any misconceptions.					
	expand simplify factorise solve brackets balance inverse operation	square cube prime sum product odd even	trapezium circle radius diameter chord tangent arc	cube cuboid triangular prism volume surface area prism cylinder	percentage multiplier simple interest compound interest decay geometric sequence contribution	best buy bill bank statement credit debit balance hourly rate

	formula equation Identity Term expression inequality substitution elimination intercept	identity hypothesis conjecture proof	sector segment circumference area construct accurate net cube cuboid plan elevation angle bisector perpendicular bisector congruency congruent locus/loci	pi pyramid cone sphere highest common factor lowest common multiple product prime factors power standard form Venn diagram prime factorisation rational irrational surd(s) rationalise denominator	simple interest savings account salary mortgage credit card loan compound interest	payslip deduction income tax National Insurance pension
Numeracy	<ul style="list-style-type: none"> As defined 					
Personal Development	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> 			<ul style="list-style-type: none"> 	