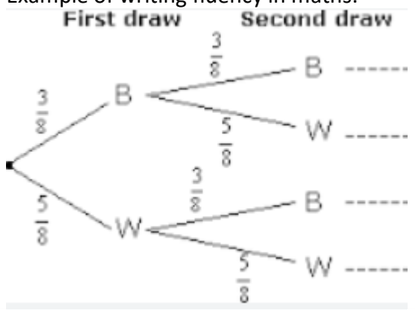
	Year:10 Higher		Subject:	Maths	Autumn 1		Autumn 2		Spring 1	
Intent	**Subject Concepts (Substantive knowledge)** 	5 concepts areas: 1) Number 2) Algebra 3) Geometry & Measure 4) Statistics & Probability Ratio & Proportion			**Equations and Inequalities 9** • Quadratic Equations • Completing The Square • Simultaneous Equations Linear Inequalities	Prior Knowledge: • Understand the ≥ and ≤ symbols. • Substitute into, solve and rearrange linear equations. • Factorise simple quadratic expressions. • Recognise the equation of a circle. Takeaway Learning: • Find the roots of quadratic functions. • Rearrange and solve simple quadratic equations. • Solve more complex quadratic equations. • Use the quadratic formula to solve a quadratic equation. • Complete the square for a quadratic expression. • Solve quadratic equations by completing the square. • Solve simple simultaneous equations. • Solve simultaneous equations for real-life situations. • Use simultaneous equations to find the equation of a straight line. • Solve linear simultaneous equations where both equations are multiplied. • Interpret real-life situations involving two unknowns and solve them. • Solve simultaneous equations with one quadratic equation. • Use real-life situations to construct quadratic and linear equations and solve them. Solve inequalities and show the solution on a number line and using set notation.	**Probability 10** • Combined Events • Mutually Exclusive Events • Experimental Probability • Independent Events • Tree Diagrams • Conditional Probability • Venn Diagrams • Set Notation	Prior Knowledge: • Understand that a probability is a number between 0 and 1, and distinguish between events which are impossible, unlikely, even chance, likely, and certain to occur. • Mark events and/or probabilities on a probability scale of 0 to 1. • Know how to add and multiply fractions and decimals. • Express one number as a fraction of another. • List all outcomes for a single event systematically. • Make predictions from experimental data. • Complete a two-way table. Takeaway Learning: • Use the product rule for finding the number of outcomes for two or more events. • List all the possible outcomes of two events in a sample space diagram. • Identify mutually exclusive outcomes and events. • Find the probabilities of mutually exclusive outcomes and events. • Find the probability of an event not happening. • Work out the expected results for experimental and theoretical probabilities. • Compare real results with theoretical expected values to see if a game is fair. • Draw and use frequency trees. • Calculate probabilities of repeated events. • Draw and use probability tree diagrams. • Decide if two events are independent. • Draw and use tree diagrams to calculate conditional probability. • Draw and use tree diagrams without replacement. • Use two-way tables to calculate conditional probability. • Use Venn diagrams to calculate conditional probability. Use set notation.	**Multiplicative Reasoning 11** • Growth and decay • Compound Measures • Ratio and Proportion	Prior Knowledge: • Find a percentage of an amount and relate percentages to decimals. • Rearrange equations and use these to solve problems. • Know speed = distance/time, density = mass/volume. • Convert between metric units. • Solve simple direct and indirect proportion problems, including currency conversion. • Takeaway Learning: • Find an amount after repeated percentage changes. • Solve growth and decay problems. • Calculate rates. • Convert between metric speed measures. • Use a formula to calculate speed and acceleration. • Solve problems involving compound measures. • Use relationships involving ratio. • Use direct and indirect proportion. •
						Prior Knowledge: •		Prior Knowledge: •	**Similarity and Congruence 12** • Congruence • Proof • Similarity	Prior Knowledge: • Recognise and enlarge shapes and calculate scale factors. • Know how to calculate area and volume in various metric measures. • Measure lines and angles, and use compasses, ruler and protractor to construct standard constructions. • Recognise congruent shapes. • Know basic angle facts.

				Takeaway Learning: •		Takeaway Learning: •		Takeaway Learning: • Show that two triangles are congruent. • Know the conditions of congruence. • Prove shapes are congruent. • Solve problems involving congruence. • Use the ratio of corresponding sides to work out scale factors. • Find missing lengths on similar shapes. • Use similar triangles to work out lengths in real life. • Use the link between linear scale factor and area scale factor to solve problems. • Use the link between scale factors for length, area and volume to solve problems.
	Disciplinary Knowledge		**Equations and Inequalities 9** Algebra progression map		**Probability 10** Probability progression map		**Multiplicative Reasoning 11** Fractions, decimals and percentages progression map **Similarity and Congruence 12** Position and direction progression map	
Implementation	**Common Misconceptions**		**Equations and Inequalities 9** • Not working inversely to solve equations • Misapplying completing the square • Factorising quadratics incorrectly • Once pupils know how to factorise a quadratic expression of the form $x^2 + bx + c$ they might overcomplicate the simpler case of factorising an expression such as $3x^2 + 6x$ ($\equiv (3x + 0)(x + 2)$) • Some pupils may think that $(x + a)^2 \equiv x^2 + a^2$ • Some pupils may apply the 'rules of factorising' quadratics of the form $x^2 + bx + c$ to quadratics of the form $ax^2 + bx + c$; e.g. $2x^2 + 7x + 10 \equiv (2x + 5)(x + 2)$ because $2 \times 5 = 10$ and $2 + 5 = 7$.		**Probability 10** • Not understanding words mutually exclusive • Not reducing denominator for conditional probability • Not setting out tree diagram correctly • When constructing a Venn diagrams for a given situation, some pupils may struggle to distinguish between elements that are included in the intersection of both regions or only in one of the regions • Some pupils may muddle the conditions for adding and multiplying probabilities • Some pupils may add the denominators when adding fractions •	**Multiplicative Reasoning 11** • Not converting to same unit to solve DST problem. • Incorrect multipliers used • Mixing up acceleration and distance calculation on a graph • Some pupils may incorrectly think $0.111111\ldots = {}^{1}/_{11}$ • Some pupils may think that an the amount created by increasing a quantity by 5% repeated four times is the same as increasing the quantity by 5% and multiplying that amount by 4. • Some pupils may think the percentage multiplier for a 20% increase (or decrease) is 0.2 **Similarity and Congruence 12** • Unable to recall all 4 conditions of congruence • Misapplying link between LSF and ASF/VSF • Setting out proof of congruence in unclear manner • Some pupils may think that the resulting image of an enlargement has to be larger than the original object. • Some pupils may think that the order of transforming an object does not have an effect on the size and position of the final image. • Some pupils may link scale factors and similarity using an additive, rather than multiplicative, relationship.
	Enabling or Adapting the Curriculum	**SEND Students**	**Equations and Inequalities 9** • Number lines in classrooms to support counting • Grouping similar items before introducing the idea of collecting like terms and algebra, x and y • Solving problems with a box indicating missing numbers instead of letters.		**Probability 10** • Multiplications grids available to support times tables • Number lines in classrooms to support counting • Fraction walls available in lessons • Equivalences overview/chart		**Multiplicative Reasoning 11** • Multiplications grids available to support times tables • Triangle formulae shared eg DST • Scaffolding worksheets to gradually build to independence • Modelled examples	

			• Scaffolding worksheets to gradually build to independence • Modelled examples • Sentence starters and writing frames	• Scaffolding worksheets to gradually build to independence • Modelled examples • Sentence starters and writing frames	• Sentence starters and writing frames **Similarity and Congruence 12** • 4 conditions of congruence shared with examples • Multiplications grids available to support times tables, which in turn will help with scale factors • Scaffolding worksheets to gradually build to independence • Modelled examples Sentence starters and writing frames
		Disadvantaged Students	• Scaffolding worksheets to gradually build to independence • Modelled examples • Sentence starters and writing frames when answering problem solving questions • Necessary equipment to support in lessons	• Scaffolding worksheets to gradually build to independence • Modelled examples • Sentence starters and writing frames when answering problem solving questions • Necessary equipment to support in lessons	• Scaffolding worksheets to gradually build to independence • Modelled examples • Sentence starters and writing frames when answering problem solving questions • Necessary equipment to support in lessons
			• Show me a pair of simultaneous equations with a solution x = 4, y = -2. And another. And another … • Convince me x + 2y = 11, 3x + 4y = 18 can be solved using substitution and using elimination. Which method is best in this case? Always/ Sometimes/ Never: Solving a pair of simultaneous equations using elimination is more efficient than using substitution	• Show me an example of a Venn diagram. And another. And another • Show me an example of a two-way table. And another. And another Always / Sometimes / Never: All the regions of a Venn diagram must be populated	**Multiplicative Reasoning 11** • Show me a fraction that can be expressed as a recurring decimal. And another. And another … • Always/Sometime/Never: If the denominator is odd, the fraction can ve expressed as a recurring decimal • Convince me $^1/_7$ can be expressed as a recurring decimal • Convince me 0.9999999999 … = 1 Kenny thinks that the interest gained when £100 is increased 20% per annum for 4 years can be calculated by multiplying £100 by 2.0736. Do you agree with Kenny? Explain your answer. **Similarity and Congruence 12** • Show me a pair of similar shapes. And another. And another … • Always/ Sometimes/ Never: The resulting image of an enlargement is larger than the original object Kenny thinks rotating an object 90° about the origin followed by a reflection in the y-axis has the same effect as reflecting an object in the y-axis followed by a rotation 90° about the origin. Do you agree with Kenny? Explain your answer.
	Literacy/Numeracy Skills 	**LITERACY** **Reading:**	**Equations and Inequalities 9** Key Words • Add and subtract algebraic fractions • Multiply and divide algebraic fractions • Simplify an algebraic fraction • Expand the product of three binomials • Expand the product of two binomials involving surds • Factorise an expression involving the difference of two squares • Factorise a quadratic expression of the form $ax^2 + bx + c$ (a is prime) • Factorise a quadratic expression of the form $ax^2 + bx + c$ (a is composite)	**Probability 10** Key Words Outcome, equally likely outcomes Event, independent event, dependent event Tree diagrams Theoretical probability, experimental probability Random Bias, unbiased, fair Enumerate Set Conditional probability Venn diagram	**Multiplicative Reasoning 11** • Key Words Fraction Mixed number Top-heavy fraction Percentage change, percentage increase, percentage increase Compound interest, Simple interest Terminating decimal, Recurring decimal (Exponential) growth, decay **Similarity and Congruence 12** • Key Words Perpendicular bisector Scale Factor

			• Identify when factorisation of the numerator and/or denominator is needed to simplify an algebraic fraction • Simplify an algebraic fraction that involves factorisation • Change the subject of a formula when more than two steps are required Change the subject of a formula when the required subject appears twice		Similar Congruent Invariance Transformation Rotation Reflection Translation Enlargement
		Writing:	Writing reasoning with correct punctuation & use of mathematical keywords & symbols. Example of writing fluency in maths: $y = x^2 + 6x + 4$ $y = (x+3)^2 + 4 - 3^2$ $y = (x+3)^2 - 5$	Writing reasoning with correct punctuation & use of mathematical keywords & symbols. Example of writing fluency in maths: 	Writing reasoning with correct punctuation & use of mathematical keywords & symbols. Example of writing fluency in maths: $A = 6500(1+0.0725)^5$ $A = 6500(1.419)$ $A = \$9223.59$
		Oracy:	Incidental language based on ability groups. Example of spoken fluency in maths: There are infinitely many solutions to each equation, but only **one solution** that satisfies **both** equations **simultaneously**.	Incidental language based on ability groups. Example of spoken fluency in maths: A type of diagram that uses overlapping circles to represent the logical relation between specific things.	Incidental language based on ability groups. Example of spoken fluency in maths: Here we can see that a scale factor of 4 was used on both top and bottom.Because the same number was used to multiply both 5 and 7, this is a proportion.
		NUMERACY	Number skills Numeracy check-up every week via: • Maths Box weekly check-up/numeracy starters/math-drills.com Staff to reflect on reasoning	Number skills Numeracy check-up every week via: • Maths Box weekly check-up/numeracy starters/math-drills.com Staff to reflect on reasoning	Number skills Numeracy check-up every week via: • Maths Box weekly check-up/numeracy starters/math-drills.com Staff to reflect on reasoning
	Digital Strategy		KM: Simplifying algebraic fractions KM: Maths to Infinity: Brackets and Quadratics KM: Stick on the Maths: Quadratic sequences NRICH: What's possible? NRICH: Finding Factors Algebra Tiles (external site)	CIMT: Venn Diagrams OCR: Check In: Combined Events and Probability Diagrams AQA: Bridging Unit: Set notation, number lines and Venn diagrams	KM: Investigate fractions connected to cyclic numbers; e.g. the decimal equivalents of sevenths, nineteenths, etc. KM: Stick on the Maths 8: Recurring decimals and fractions KM: Stick on the Maths 8: Repeated Proportional Change KM: Convinced?: Recurring decimals and fractions KM: Convinced?: Repeated Proportional Change NRICH: Repetitiously Hwb: Borrowing money: APR, Too good to be true!, Double your money! and Comparing interest KM: Enlargement 2 KM: Stick on the Maths SSM3: Enlargement (fractional scale factor) KM: Stick on the Maths SSM1: Congruence and similarity NRICH: Growing Rectangles

	Home Learning	• Either internet based work or worksheets. Homework to be set weekly based on topics covered that week and/or lesson. Work is differentiated to support the least able and stretch the most able. •				• Either internet based work or worksheets. Homework to be set weekly based on topics covered that week and/or lesson. Work is differentiated to support the least able and stretch the most able. •				• Either internet based work or worksheets. Homework to be set weekly based on topics covered that week and/or lesson. Work is differentiated to support the least able and stretch the most able. •			
Impact	**Composite Assessment** Interleaving assessments throughout the year. End of unit PLC assessment after each Unit. End of term test Autumn 2 and Spring 2. End of year test Summer 2.	Date:	TBD	Content:	**<u>Unit Test</u>** Unit 9	Date:	TBD	Content:	**<u>Unit Test</u>** Unit 10 **<u>Autumn 2 assessment</u>** Unit 1 to 9	Date:	TBD	Content:	**<u>Unit Tests</u>** Unit 11 Unit 12