Year:10 Foundation	Subject:	Maths	Spring 2	Summer 1	Summer 2

Intent	Subject Concepts (Substantive knowledge)	5 concepts areas: 1) Number 2) Algebra 3) Geometry & Measure 4) Statistics & Probability 5) Ratio & Proportion

Spring 2

Probability 13
- Calculating
- Two events
- Experimental probability
- Venn diagrams
- Tree diagrams

Prior Learning:
- Add and multiply fractions and decimals.
- Have experience of expressing one number as a fraction or percentage of another number.
- Convert between fractions, decimals and percentages.
- Understand the terms impossible, unlikely, even chance, likely, certain.
- Calculate theoretical probabilities for simple situations, e.g. spinner landing on a given colour.

Takeaway Learning:
- Calculate simple probabilities from equally likely events.
- Understand mutually exclusive and exhaustive outcomes.
- Use two-way tables to record the outcomes from two events.
- Work out probabilities from sample space diagrams.
- Find and interpret probabilities based on experimental data.
- Make predictions from experimental data.
- Use Venn diagrams to work out probabilities.
- Understand the language of sets and Venn diagrams.
- Use frequency trees and tree diagrams.
- Work out probabilities using tree diagrams.
- Understand independent events.
- Understand when events are not independent.
- Solve probability problems involving events that are not independent.

Summer 1

Multiplicative Reasoning 14
- Percentages
- Growth and decay
- Compound measures
- Distance, speed and time
- Direct and inverse proportion

Prior Learning:
- Interpret scales on a range of measuring instruments.
- Convert between metric measures.
- Understand ratio notation, and be able to write a ratio in its simplest form.
- 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."
- Find the equation of a line from a graph.
- Identify a graph showing direct proportion.

Takeaway Learning:
- Calculate a percentage profit or loss.
- Express a given number as a percentage of another in more complex situations.
- Find the original amount given the final amount after a percentage increase or decrease
- Find an amount after repeated percentage change.
- Solve growth and decay problems.
- Solve problems involving compound measures.
- Convert between metric speed measures.
- Calculate average speed, distance and time.
- Use formulae to calculate speed and acceleration.
- Use ratio and proportion in measures and conversions.
- Use inverse proportions.

Summer 2

Construction, Loci and Bearings 15
- 3D solids
- Plans and elevations
- Accurate and scale drawings
- Constructions and loci
- Bearings

Prior Knowledge:
- Measure and draw lines.
- Write a ratio in the form 1 : m and in its simplest form.
- Know the 8 points of the compass.
- Draw a net of a 3D shape.
- Know clockwise, anticlockwise.
- Identify congruent shapes.

Takeaway Learning:
- Recognise 3D shapes and their properties.
- Describe 3D shapes using the correct mathematical words.
- Understand the 2D shapes that make up 3D objects.
- Identify and sketch planes of symmetry of 3D shapes.
- Understand and draw plans and elevations of 3D shapes.
- Sketch 3D shapes based on their plans and elevations.
- Make accurate drawings of triangles using a ruler, protractor and compasses.
- Identify SSS, ASA, SAS and RHS triangles as unique from a given description.
- Identify congruent triangles
- Draw diagrams to scale.
- Correctly interpret scales in real-life contexts.
- Use scales on maps and diagrams to work out lengths and distances.
- Know when to use exact measurements and estimations on scale drawings and maps.
- Draw lengths and distances correctly on given scale drawings.
- Accurately draw angles and 2D shapes using a ruler, protractor and compasses.
- Construct a polygon inside a circle.
- Recognise nets and make accurate drawings of nets of common 3D objects.
- Draw accurately using rulers and compasses.
- Bisect angles and lines using rulers and compasses.
- Draw loci for the path of points that follow a given rule.
- Identify regions bounded by loci to solve practical problems.

			Prior Knowledge: •		Prior Knowledge: •	Find and use three-figure bearings. Use angles at parallel lines to work out bearings.
						Graphs 16 • Expanding double brackets • Quadratic graphs • Quadratic factorisation • Quadratic equations	Prior Knowledge: • Square negative numbers. • Substitute into formulae. • Plot points on a coordinate grid. Expand single brackets and collect 'like' terms.
			Takeaway Learning: •		Takeaway Learning: •	Takeaway Learning: • Use FOIL method to multiply out brackets • Plot points, join with curved line • Factorise quadratically • Factorise to solve • Complete the square to solve • Use the quadratic formula to solve.

	Disciplinary Knowledge	**Probability 13** [Probability progression map](#)	**Multiplicative Reasoning 14** [Fractions, decimals and percentages progression map](#)	**Construction, Loci and Bearings 15** [Properties of Shape progression map](#)
				Graphs 16 [Algebra progression map](#)

Implementation

Common Misconceptions

Probability 13
- Not understanding the words mutually exclusive
- For conditional probability, not reducing the denominator
- Not laying 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
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Multiplicative Reasoning 14
- Having new amount at bottom of percentage change calculation
- Correct multipliers mis-applied
- Not converting units to same unit for DST Qs
- Some pupils may incorrectly think $0.111111\ldots = \frac{1}{11}$
- 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

Construction, Loci and Bearings 15
- Mixing up plans with elevations
- Mis-reading protractor by reading wrong way
- Not applying correct construction to solve loci problem.
- When constructing the bisector of an angle some students may think that the intersecting arcs need to be drawn from the ends of the two lines that make the angle.
- When constructing a locus such as the set of points a fixed distance from the perimeter of a rectangle, some students may not interpret the corner as a point (which therefore requires an arc as part of the locus)
- The north elevation is the view of a shape from the north (the north face of the shape), not the view of the shape while facing north.

Graphs 16
- Misapplying FOIL method.
- Feathering quadratic graphs
- Misapplying the completing the square method.
- Some pupils may think the graphs of all quadratic functions intercept the x-axis in one or two places.
- Some pupils may think that gradient has the same value for all points for all functions
- Some pupils may join the graph of $y = a^x$ (a>1) to the x-axis
- Some pupils think that the horizontal section of a distance time graph means an object is travelling at constant speed.
- Some pupils think that a section of a distance time graph with negative gradient means an object is travelling backwards or downhill.

Enabling or Adapting the Curriculum	SEND Students	Probability 13 • Multiplications grids available to support times tables • Number lines in classrooms to support counting • Fraction walls available in lessons • Scaffolding worksheets to gradually build to independence • Modelled examples • Sentence starters and writing frames	Multiplicative Reasoning 14 • Triangle formulae shared eg DST • 1-100 grid to consolidate percentage understanding • Scaffolding worksheets to gradually build to independence • Modelled examples • Sentence starters and writing frames	Construction, Loci and Bearings 15 • Physically shown how to use compass, protractor and ruler • Bearings rules shared • Real life bearings and loci examples used • Scaffolding worksheets to gradually build to independence • Modelled examples • Sentence starters and writing frames Graphs 16 • Axes templates pre-drawn • Grid method instead of FOIL method • 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
	More Able Students	• 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	• 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.	Construction, Loci and Bearings 15 • (Given a single point marked on the board) show me a point 30 cm away from this point. And another. And another … • Provide shapes made from some cubes in certain orientations. Challenge students to construct the plans and elevations. Do groups agree? • If this is the plan: show me a possible 3D shape. And another. And another. • Demonstrate how to create the perpendicular bisector (or other constructions). Challenge students to write a set of instructions for carrying out the construction. Follow these instructions very precisely (being awkward if possible; e.g. changing radius of compasses). Do the instructions work? Give students the equipment to create standard constructions and challenge them to create a right angle / bisect an angle Graphs 16 • The answer is 2x² + 10x + c. Show me a possible question. And another. • Kenny simplifies $\frac{3x^2+x}{x}$ as 3x² + 1. Do you agree with Kenny? Explain. • Convince me that $103^2 - 97^2$ = 1200 without a calculator. • Convince me that $4x^2 - 9 \equiv (3x-2)(3x+2)$. • Jenny thinks that $(3x-2)^2 = 3x^2 + 12x + 4$. Do you agree with Jenny? Explain your answer. Convince me that $\frac{2x^2+5x+2}{2x+1}$ = x + 2

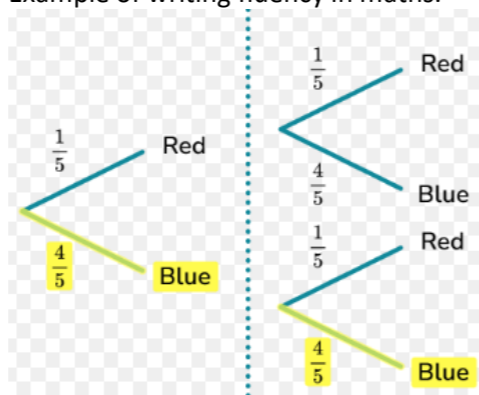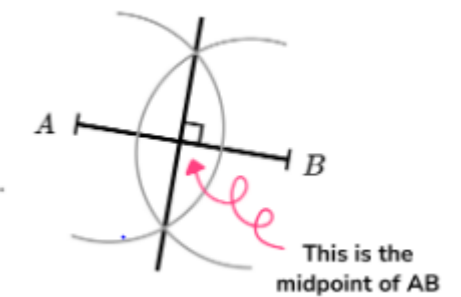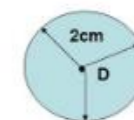| Literacy/Numeracy Skills	LITERACY	Probability 13	Multiplicative Reasoning 14	Construction, Loci and Bearings 15
	Reading:	Key Words Outcome, equally likely outcomes Event, independent event, dependent event Tree diagrams Theoretical probability, experimental probability Random Bias, unbiased, fair Enumerate Set Conditional probability Venn diagram	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	• Key Words Perpendicular bisector Scale Factor Similar Congruent Invariance Transformation Rotation Reflection Translation Enlargement **Graphs 16** 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) • 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
	Writing:	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: 	Writing reasoning with correct punctuation & use of mathematical keywords & symbols. Example of writing fluency in maths:
	Oracy:	Incidental language based on ability groups. Example of spoken fluency in maths: 	Incidental language based on ability groups. Example of spoken fluency in maths: 	Incidental language based on ability groups. Example of spoken fluency in maths:

	NUMERACY	Number skills	Number skills	Number skills
		Numeracy check-up every week via:	Numeracy check-up every week via:	Numeracy check-up every week via:
		• Maths Box weekly check-up/numeracy starters/math-drills.com	• Maths Box weekly check-up/numeracy starters/math-drills.com	• Maths Box weekly check-up/numeracy starters/math-drills.com
		Staff to reflect on reasoning	Staff to reflect on reasoning	Staff to reflect on reasoning
	Digital Strategy	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 KM: Autograph: Pre-Calculus Activity KM: Autograph: The numerical gradient NRICH: What's that graph? Hwb: The 100m race MAP: Representing functions of everyday situations ILIM: Interpreting Distance Time Graphs GCSE: Subject Knowledge Check - Tangents to a curve and Areas under a curve
	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.

	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:	**Unit Test** Unit 13	Date:	TBD	Content:	**Unit Test** Unit 14 **Autumn 2 assessment** Unit 1 to 13	Date:	TBD	Content:	**Unit Tests** Unit 15 Unit 16

Impact