

# KS4 - MATHS - FOUNDATION

Although the KS4 curriculum has been designed in line with the national curriculum and to ready students for a GCSE linear examination, our teaching does not lose sight of introducing arithmetical knowledge for life and problem solving/contextual problems are embedded into our everyday teaching. In response to linear examinations, the programme of study has been designed in a cumulative fashion where students simultaneously study all areas of mathematics in all years. This maximises student interest and enables links to be formed between the different branches of mathematics. The pathways shown below demonstrate the progressive nature of our design, from the concepts that overlap in KS3 and KS4 to the more complex skills in KS4 only. It has been designed to allow students many opportunities to learn, forget, re-visit and consolidate, therefore promoting the long-term retention of mathematics.

## Implementation

KS3 transition (overlapping KS3 and KS4 topics)			KS4 study			
Unit 1 (Y9 term 1/2)	Unit 2 (Y9 term 3/4)	Unit 3 (Y9 term 5/6)	Unit 4 (Y10 term 1/2)	Unit 5 (Y10 term 3/4)	Unit 6 (Y10 term 5/6)	Unit 7 (Y11 term 1/2/3)
<b>Shape and Space</b>						
SS1 Defining quadrilaterals SS2 Visualising in three-dimensions (nets, views and 3D drawing)	SS3 Area and perimeter of common shapes [SS1, A2, N2, N3] SS4 Reading scales and inaccuracy of measurement [N1, N2] SS5 Volume and surface area [SS2, A2, N2, N3]	SS6 Interpreting and drawing scaled drawings. [N2] SS7 Discovering and applying Pythagoras' theorem [A1, A2, N2, N3, SS3, SS5] SS8 Standard angle facts/proofs including those with parallel lines [SS1, N2]	SS9 Calculating and reasoning with angles in polygons [SS1, SS8, A7] SS10 Transforming shapes [SS1, A1, A4, SS3, SS5, N2, N7] SS11 N/A (higher only) SS12 N/A (higher only)	SS13 Reading, writing, drawing and calculating with bearings [SS6, SS7, SS8, SS9] SS14 Compound measures [SS3, SS5, A2, A5, N1, N2, N3, N4, N8, N9] SS15 Converting units (metric and imperial) [SS3, SS5, SS12, A2, A5, N2] SS16 Basic trigonometry [SS2, SS3, SS5, SS7, A1, N3]	SS17 Read, write, calculate and proof with vectors [SS7, SS10, SS13, SS16, A1, A6, N2, N7, N12, N13] SS18 Constructions and loci [SS1, SS2, SS6, SS13, N12] SS19 N/A (higher only) SS20 N/A (higher only)	SS21 Identify, use and reason with similar/congruent triangles [SS7, SS8, SS9, SS10, A7, N2] SS22 Exact trigonometric ratios [SS7, SS8, SS16, A15] SS23 Sector area and perimeter [SS2, SS3, SS5, SS8, A2, A7, N1, N2, N3, N7] SS24 More complex volume and surface area (spheres and pyramids) [SS2, SS3, SS5, SS7, A2, A7, N2, N3, N7]
<b>Algebra</b>						
A1 Simple co-ordinate geometry A2 Working with expressions, formulas and identities and manipulating simple formulas. A3 Sequences	A4 Reading, writing and plotting linear functions including calculating gradient [A1, A2, N2, N3] A5 Plotting and interpreting real life graphs including interpreting gradient as a rate of change [A1, N1]	A6 Simplifying expressions including expanding and factorising [A2, N2] A7 Forming and solving linear equations and manipulating more complex formulas. [SS1, SS3, SS5, A2, A3, N2, N3, A4]	A8 Solving linear inequalities [A1, A2, A4, A6, A7, N2, N3] A9 N/A (higher only)	A10 Naming linear functions of the form $y = mx + c$ including use of parallel lines [SS1, A1, A2, A4, A7, N2, N3, N5, N9] A11 N/A (higher only)	A12 Plotting, sketching and using quadratic and cubic graphs [A1, A2, A4, A6, A9, A10, N2, N3, N5] A13 Expanding the product of two or three linear brackets and factorising quadratic expressions [A2, A6, N2, N10] A14 N/A (higher only) A15 N/A (higher only)	A16 Solving linear simultaneous equations algebraically and graphically [SS3, SS5, SS8, SS9, A1, A2, A4, A6, A7, N2, N10] A17 Solving quadratic equations algebraically and graphically [SS3, SS5, SS7, A2, A4, A6, A7, A12, A13, N2, N10] A18 Exponential growth/decay [A2, A3, A5, A7, A15, N2, N3, N5] A19 Recognising/sketching graphs [A1, A3, A4, A7, A10, A12, A13, N2, N3, N11, N14, N15]
<b>Number and proportion</b>						
N1 Reading/writing fractions and using equivalent fractions N2 Using the 4 operations confidently including with negatives and decimals N3 Calculate in order inc. efficient calculator use.	N4 Reading and writing proportion (fractions, decimals and percentages) [N1, N2] N5 Higher order powers and roots [N2, N3] N6 Rounding and estimation [N2, N3]	N7 Interpreting proportion as an operator [N1, N2, N4, N5] N8 Using bounds to represent the inaccuracy of measurement [N2, N3, SS3, SS4, SS5, N6]	N9 Using the 4 operations confidently with fractions [N1, N2, N3, N5, N7] N10 Multiples, factors and primes including LCM/HCF [A3, A6, N1, N5] N11 Laws of indices [SS3, SS5, A3, A6, N3, N5]	N12 Reading, writing and using equivalent ratio including comparing ratio and proportion. [SS6, SS12, A4, N1, N2, N7, N10] N13 Sharing in a ratio [N1, N2, N7]	N14 Direct and inverse proportion [SS3, SS5, SS12, A2, A4, A7, N2, N3, N5, N12] N15 Simple and compound interest [A3, N2, N4, N7, N11] N16 Standard form [N2, N3, N5, N6, N11]	N17 N/A (higher only)
<b>Handling data</b>						
D1 Classifying, collecting and sorting data D2 Interpreting discrete bi-variate data in two-way tables inc. conditional probability	D3 Calculating measures of central tendency and spread including using these to compare distributions [N2, N3, D1]	D4 Displaying discrete and continuous frequency distributions [D1, D3, A1, SS3, SS4] D5 Plotting and interpreting continuous bi-variate data in scatter graphs [D1, A1, A4, A5, SS4]	D6 Reading, writing and interpreting probability [N1, N4, D2, D4] D7 Drawing and interpreting pie charts [SS8, N1, N2, N4, N7, D1] D8 Systematic listing including permutations and combinations between/within groups [N2]	D9 Experimental probability and expectation [N1, N4, N7, D6] D10 Drawing and interpreting time-series graphs [A5, SS4, D1]	D11 Compound probability using probability trees [A6, A9, N1, N2, N3, N9, D6, D8]	D12 Reading, writing and drawing Venn diagrams inc. conditional probability [A3, A7, N10, D1, D6] D13 Sampling including inferences about a population [N1, N4, N7, D1, D2]
10 topics	9 topics	9 topics	9 topics	9 topics	8 topics+wk experience	10 topics

# KS4 - MATHS - HIGHER

Although the KS4 curriculum has been designed in line with the national curriculum and to ready students for a GCSE linear examination, our teaching does not lose sight of introducing arithmetical knowledge for life and problem solving/contextual problems are embedded into our everyday teaching. In response to linear examinations, the programme of study has been designed in a cumulative fashion where students simultaneously study all areas of mathematics in all years. This maximises student interest and enables links to be formed between the different branches of mathematics. The pathways shown below demonstrate the progressive nature of our design, from the concepts that overlap in KS3 and KS4 to the more complex skills in KS4 only. It has been designed to allow students many opportunities to learn, forget, re-visit and consolidate, therefore promoting the long-term retention of mathematics.

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<b>Shape and Space</b>						
SS1 Defining quadrilaterals SS2 Visualising in three-dimensions (nets, views and 3D drawing)	SS3 Area and perimeter of common shapes [SS1, A2, N2, N3] SS4 Reading scales and inaccuracy of measurement [N1, N2] SS5 Volume and surface area [SS2, A2, N2, N3]	SS6 Interpreting and drawing scaled drawings. [N2] SS7 Discovering and applying Pythagoras' theorem [A1, A2, N2, N3, SS3, N5] SS8 Standard angle facts/proofs including those with parallel lines [SS1, N2]	SS9 Calculating and reasoning with angles in polygons [SS1, SS8, A7] SS10 Transforming shapes [SS1, A1, A4, SS3, SS5, N2, N7] SS11 Circle theorems inc. proof [SS1, SS7, SS8, A6, A7] SS12 Length, area and volume scale factors [N2, SS3, SS5, SS6, N5]	SS13 Reading, writing, drawing and calculating with bearings [SS6, SS7, SS8, SS9] SS14 Compound measurers [SS3, SS5, A2, A5, N1, N2, N3, N4, N8, N9] SS15 Converting units (metric and imperial) [SS3, SS5, SS12, A2, A5, N2] SS16 Basic trigonometry [SS2, SS3, SS5, SS7, A1, N3]	SS17 Read, write, calculate and proof with vectors [SS7, SS10, SS13, SS16, A1, A6, N2, N7, N12, N13] SS18 Constructions and loci [SS1, SS2, SS6, SS13, N12] SS19 Identify, use and reason with similar/congruent triangles [SS7, SS8, SS9, SS10, SS11, SS12, N2] SS20 $\frac{1}{2}ab\sin(C)$ [SS3, SS16]	SS21 Sine and cosine triangle formulae [SS2, SS7, SS13, SS16, SS20 A2, A7, A15, N3] SS22 Exact trigonometric ratios [SS7, SS8, SS16, A15]
<b>Algebra</b>						
A1 Simple co-ordinate geometry A2 Working with expressions, formulas and identities and manipulating simple formulas. A3 Sequences	A4 Reading, writing and plotting linear functions including calculating gradient [A1, A2, N2, N3] A5 Plotting and interpreting real life graphs including interpreting gradient as a rate of change [A1, N1]	A6 Simplifying expressions including expanding and factorising [A2, N2] A7 Forming and solving linear and simultaneous equations (linear only) and manipulating more complex formulas. [SS1, SS3, SS5, A2, A3, N2, N3, A4]	A8 Solving linear inequalities [A1, A2, A4, A6, A7, N2, N3] A9 Strategies for solving quadratic equations (factorisation) [SS3, SS5, SS7, A2, A6, A7, N2, N5]	A10 Strategies for solving quadratic equations (completing the square) [SS3, SS4, SS7, A2, A6, A7, A9, N2, N3, N5] A11 Strategies for solving quadratic equations (quadratic formula) [SS3, SS4, SS7, A2, A7, A9, N2, N3, N5]	A12 Plotting, sketching and using quadratic and cubic graphs [A1, A2, A4, A6, A9, A10, N2, N3, N5] A13 Solving quadratic simultaneous equations algebraically and graphically (no circles) [A2, A4, A6, A7, A9, A11] A14 Graphical transformations [SS10, A1, A4, A6, N2, N3, N5] A15 Recognising/sketching graphs [SS16, A1, A3, A4, A7, N2, N3, N11]	A16 Circle functions [A1, A4, A9, A11, A13, A14, N2, N3] A17 Gradient and area under curves [SS3, SS14, A4, A5, N1, N2] A18 Numerical methods [A2, A3, A6, A7, A10, N2, N3] A19 Quadratic inequalities [A6, A8, A9, A11, A12, N2] A20 Exponential growth/decay [A2, A3, A5, A7, A15, N2, N3, N5] A21 Reading, writing and manipulating functions [SS10, A2, A4, A6, A7, A9, N2, N3] A22 Algebraic fractions [A6, A7, A9, N1, N3, N9] A23 Algebraic proof [A2, A3, A6, A9, N2, N10]
<b>Number and proportion</b>						
N1 Reading/writing fractions and using equivalent fractions N2 Using the 4 operations confidently including with negatives and decimals N3 Calculate in order inc. efficient calculator use.	N4 Reading and writing proportion (fractions, decimals and percentages) [N1, N2] N5 Higher order powers and roots [N2, N3] N6 Rounding and estimation [N2, N3]	N7 Interpreting proportion as an operator [N1, N2, N4, N5] N8 Using bounds to represent the inaccuracy of measurement [N2, N3, SS3, SS4, SS5, N6]	N9 Using the 4 operations confidently with fractions [N1, N2, N3, N5, N7] N10 Multiples, factors and primes including LCM/HCF [A3, A6, N1, N5] N11 Laws of indices [SS3, SS5, A3, A6, N3, N5]	N12 Reading, writing and using equivalent ratio including comparing ratio and proportion. [SS6, SS12, A4, N1, N2, N7, N10] N13 Sharing in a ratio [N1, N2, N7]	N14 Direct and inverse proportion [SS3, SS5, SS12, A2, A4, A7, N2, N3, N5, N12] N15 Standard form [N2, N3, N5, N6, N11]	N16 Surds [SS3, SS5, SS7, SS6, A6, A9, A11, N1, N2, N3, N5]
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D1 Classifying, collecting and sorting data D2 Interpreting discrete bi-variate data in two-way tables inc. conditional probability	D3 Calculating measurers of central tendency and spread including using these to compare distributions [N2, N3, D1]	D4 Displaying discrete and continuous frequency distributions [D1, D3, A1, SS3, SS4] D5 Plotting and interpreting continuous bi-variate data in scatter graphs [D1, A1, A4, A5, SS4]	D6 Reading, writing and interpreting probability [N1, N4, D2, D4] D7 Drawing and interpreting pie charts [SS8, N1, N2, N4, N7, D1] D8 Systematic listing including permutations and combinations between/within groups [N2]	D9 Experimental probability and expectation [N1, N4, N7, D6] D10 Drawing and interpreting time-series graphs [A5, SS4, D1] D11 Interpreting, drawing and using cumulative frequency [SS4, D3, D4, N4, N7]	D12 Compound probability using probability trees [A6, A9, N1, N2, N3, N9, D6, D8]	D13 Reading, writing and drawing Venn diagrams inc. conditional probability [A3, A7, N10, D1, D6] D14 Sampling including inferences about a population [N1, N4, N7, D1, D2]
10 topics	9 topics	9 topics	12 topics	11 topics	11 topics+wk experience	13 topics