

Year 12 A-Level Further Maths Overview 2023-24

	Term 1	Term 2	Term 3
Unit Title	<ul style="list-style-type: none"> Algorithms Networks Matrices & Transformations Matrices & their Inverses Introduction to Complex Numbers Complex Numbers & Geometry Bivariate Data Regression Lines 	<ul style="list-style-type: none"> Critical Path Analysis Linear Programming Regression Lines Continued Discrete Random Variables Discrete Probability Distributions Chi-Squared Tests Roots of Polynomials Vectors & 3D Space Sequences & Series 	<ul style="list-style-type: none"> Revision for AS Mock Exams AS Mock Exams: Core Pure (1hr 15mins) Statistics a (1hr 15mins) Modelling with Algorithms (1hr 15mins) Year 13 Course: <ul style="list-style-type: none"> Vectors 1 Vectors 2 Matrices
Approximate Number of Lessons	28 Double Lessons	27 Double Lessons	22 Double Lessons
Curriculum Content	<ul style="list-style-type: none"> Learn what an algorithm and be apply these in a variety of forms. Find out how to analyse the complexity of given algorithms. Learn and be able to apply sorting algorithms. An introduction to graph theory and modelling with graphs & networks. Learn what a matrix is and how these can be used to transform shapes. Learn how to find determinants and inverses of 2x2 matrices and 3x3 (only using a calculator). Applying these to solve linear simultaneous equations. Learn what a complex number is and be able to \pm/\times and \div complex numbers. Solve all polynomial 	<ul style="list-style-type: none"> Learn how to use critical path analysis to interpret outcomes and analyse float, resourcing & scheduling. Learn how to use linear programming to solve discrete problems. Use of graphs, the Simplex method and reformulating network problems as LPs. Learn how to find and use appropriate regression lines to solve problems. Interpret probability functions given algebraically or in tables. Calculate $E(X)$ and $Var(X)$ and learn how to find combinations of random variables. Learn how to recognise Binomial, Poisson, Uniform and Geometric distributions. Calculate probabilities, expected values and variances. Learn how to do chi-squared tests for contingency tables and association and for goodness of fit tests. 	<ul style="list-style-type: none"> Revision of all work covered this academic year. Vector equations of lines in 2 and 3D. Finding points of intersections between lines and planes if applicable and interpreting geometrically. Learning how to find a vector product and using this to find distances. Learn how to find the determinant and inverse of a 3x3 matrix without a calculator. Solving simultaneous linear equations with 3 unknowns using matrices.

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	<p>equations finding real and complex roots. Illustrate roots on an Argand diagram.</p> <ul style="list-style-type: none"> Learn how to write complex numbers in modulus-argument form and x/\div numbers in this form. Learn how to draw loci of given constraints in the complex plane. Learn how to find Pearson's product moment correlation coefficient and Spearman's rank correlation coefficient & know how to identify which is more appropriate. Use of hypotheses tests for identifying correlation. Finding and using regression lines. 	<ul style="list-style-type: none"> Learn the relationships between roots and coefficients of quadratic, cubic & quartic equations. Form new equations whose roots are related (linear) to the roots of a given equation. Learn how to find the scalar product of two vectors and use this to find angles. Find the equation of a plane and angle between two planes. Learn the use of standard series and the method of differences to find sums of series. Proof by induction. 	
Links to prior learning	<ul style="list-style-type: none"> Basic algebra. No prior knowledge required. GCSE transformations and good algebraic skills. Should be confident with previous matrices work and be able to solve linear simultaneous equations. Use of the quadratic formula to solve a quadratic equation. Be confident working with complex numbers. Familiar with scatter diagrams and the idea of correlation (introduced in AS Maths). 	<ul style="list-style-type: none"> Networks & graphs from previous term. Plot straight line graphs, form inequalities and solve linear simultaneous equations. Regression lines from last half term. Understand what a probability distribution is and how to find the mean and variance of a data set from AS Maths. Binomial Distribution from AS Maths. Happy with carrying out hypothesis tests. Understand roots of polynomials and factor theorem from AS maths and complex roots from the first term. Vectors from AS Maths. Matrices from term 1. 	<ul style="list-style-type: none"> Previous 2 terms work. Vectors from AS and a-Level Maths and AS Further Maths. Vectors covered so far in Maths and Further Maths. Determinant & inverse of a 2x2 matrix. Know the ways in which 3 planes can intersect in 3D space.

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Cultural Capital Opportunities	<ul style="list-style-type: none"> Visit Bletchley Park Film: The Imitation Game Book: Things to Make and Do in the Fourth Dimension by Matt Parker. (Mrs Smith has a copy you can borrow). 	<ul style="list-style-type: none"> Sequences from GCSE and nth terms. Book: The Man Who Knew Infinity by Robert Kanigel. Film: The Man Who Knew Infinity Videos: Numberphile Best Videos 	<ul style="list-style-type: none"> AMSP Podcasts: FMSP Podcasts
Assessment Focus	<ul style="list-style-type: none"> Private Study: Topic quiz/tests Chapter Assessments 	<ul style="list-style-type: none"> Private Study: Topic quiz/tests Chapter Assessments 	<ul style="list-style-type: none"> Private Study: Topic quiz/tests Chapter Assessments Mock Exams

Mrs Mantle (2.5 Hours)

Mrs Smith (2.5 Hours)

Autumn Term Year 12									
Unit	Chapter	Topic	Weeks	Integral Link					
Algorithms	Section 1	Algorithms	3	Algorithms					
Algorithms	Section 2	Networks	4	Modelling with graphs & networks					
				Network Algorithms					
				Network Flows					
Core	2	Introduction to Complex Numbers	3	Complex numbers					
Core	5	Complex Numbers & Geometry	4	Complex numbers and geometry					
Spring Term Year 12									
Algorithms	Section 3	Critical Path Analysis Continued	3	Critical Path Analysis					
Core	3	Roots of Polynomials	3	Roots of polynomials					
Algorithms	Section 4	Linear Programming	5	Linear Programming					
				The Simplex Method					
				Reformulating Problems					
Core	7	Vectors & 3D Space	2	Vectors and 3-D space					
Summer Term Year 12									
		Core Revision		Core Revision	Revision and Mock Exams				
		Modelling With Algorithms Revision		Algorithms Revision					
					Start Year 13 Course				
Core	1	Vectors 1	3	Vectors					
Core	11	Vectors 2	2	Further vectors					