A-Level Further Maths Curriculum Overview Year 12   2024-25

	Term 1	Term 2	Term 3
Unit Title	- Algorithms - Networks - Matrices & Transformations - Matrices & their Inverses - Introduction to Complex Numbers - Complex Numbers & Geometry - Bivariate Data - Regression Lines	- 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	- Revision for AS Mock Exams - AS Mock Exams: Core Pure (1hr 15mins) Statistics a (1hr 15mins) Modelling with Algorithms (1hr 15mins) Year 13 Course: - Vectors 1 - Vectors 2 - Matrices
Approximate Number of Lessons	28 Double Lessons	27 Double Lessons	22 Double Lessons
Curriculum Content	- 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 +/-/x and ÷ complex	- 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.	- 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.

	numbers. Solve all polynomial equations finding real and complex roots. Illustrate roots on an Argand diagram. • Learn how to write complex numbers in modulus-argument form and x/÷ 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.	• Learn how to do chi-squared tests for contingency tables and association and for goodness of fit tests. • 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	• 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).	• 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.	• Previous 2 terms work. • Vectors from AS and a-Level Maths and AS Further Maths. • Vectors covered so far iin Maths and Further Maths. • Determinant & inverse of a 2x2 matrix. Know the ways in which 3 planes can intersect in 3D space.

		• Vectors from AS Maths. Matrices from term 1. • Sequences from GCSE and nth terms.	
Cultural Capital Opportunities	• 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).	• Book: The Man Who Knew Infinity by Robert Kanigel. • Film: The Man Who Knew Infinity • Videos: Numberphile Best Videos	• AMSP Podcasts: FMSP Podcasts
Assessment Focus	• Private Study: Topic quiz/tests • Chapter Assessments	• Private Study: Topic quiz/tests • Chapter Assessments	• Private Study: Topic quiz/tests • Chapter Assessments • Mock Exams

Autumn Term Year 12

Unit	Chapter	Topic	Weeks	Integral Link		Unit	Chapter	Topic	Weeks	Integral Link
Algorithms	Section 1	Algorithms	3	Algorithms		Core	1	Matrices & Transformations	7	Matrices and transformations
Algorithms	Section 2	Networks	4	Modelling with graphs & networks		Core	6	Matrices & Their Inverses	3	Matrices and their inverses
				Network Algorithms		Statistics	4	Bivariate Data	3	Bivariate data
				Network Flows		Statistics	5	Regression Lines	1	Bivariate data 3: Regression
Core	2	Introduction to Complex Numbers	3	Complex numbers						
Core	5	Complex Numbers & Geometry	4	Complex numbers and geometry						

Spring Term Year 12

Unit	Chapter	Topic	Weeks	Integral Link		Unit	Chapter	Topic	Weeks	Integral Link
Algorithms	Section 3	Critical Path Analysis Continued	3	Critical Path Analysis						
Core	3	Roots of Polynomials	3	Roots of polynomials		Statistics	5	Regression Lines Continued	1	Bivariate data 3: Regression
Algorithms	Section 4	Linear Programming	5	Linear Programming		Statistics	2	Discrete Random Variables	2	Discrete random variables
				The Simplex Method		Statistics	3	Discrete Probability Distributions	4	Discrete probability distributions
				Reformulating Problems		Statistics	6	Chi-Squared Tests	3	Chi-squared tests
Core	7	Vectors & 3D Space	2	Vectors and 3-D space		Core	4	Sequences & Series	3	Sequences and series

Summer Term Year 12

Revision and Mock Exams

Unit	Chapter	Topic	Weeks	Integral Link		Unit	Chapter	Topic	Weeks	Integral Link
		Core Revision		Core Revision						
		Modelling With Algorithms Revision		Algorithms Revision				Statistics Revision		Revision

Start Year 13 Course

Unit	Chapter	Topic	Weeks	Integral Link		Unit	Chapter	Topic	Weeks	Integral Link
Core	1	Vectors 1	3	Vectors		Core	2	Matrices	4	Matrices
Core	11	Vectors 2	2	Further vectors						

Note: Integral is a subscription website so only students will be able to access these links. Links are regularly updated so please ask your teacher.