Year 13 A-Level Further Maths Overview 2023-24

	Term 1	Term 2	Term 3
Unit Title	• Further Vectors • Complex Numbers • Series and Induction • Maclaurin Series • NM: Approximating Functions • NM: The Solution of Equations • NM: Numerical Differentiation • NM: Numerical Integration • Revision of Year 1 Modelling with Algorithms & Pure	• Further Calculus • Hyperbolic Functions • Applications of Integration • First Order Differential Equations • Revision & Mock Exams • Second Order Differential Equations • NM: Rates of Convergence in Numerical Processes	• Polar Coordinates revision & areas. • Second Order Differential Equations • Revision of Year 12 & 13 content for exams.
Approximate Number of Lessons	28	26	14
Curriculum Content	• Learning how to find a vector product and using this to find distances. • Learn de Moivre's theorem and how to apply it to solve a variety of problems including real trig. Problems. • Sum series using partial fractions and use proof by induction to prove divisibility. • Learn how to find Maclaurin Series and use them. • Finding errors and working with errors. • Learn how to use Newton's forward difference interpolation and Lagrange's method to find polynomial approximations to fit data points.	• Learn how to integrate improper integrals and integrals involving inverse trig. Functions. Use of partial fractions (including quadratic denominators), completing the square and trig. Substitutions to integrate further functions. • Define hyperbolic functions, prove identities, solve equations with hyperbolic functions and differentiate & integrate hyperbolic functions. Inverse hyperbolic functions and integrals involving these. • Learn how to find volumes of revolution and applications. Find the mean of a function. • Modelling using differential equations and solving using either separation of variables or an integrating factor.	• Revise how to sketch polar curves and find areas of sectors. • Learn how to solve homogeneous and non-homogeneous second order differential equations and use these to solve systems of differential equations. • Revision of all content from the 2 year Further Maths course and exam practice.

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	• Learn numerical methods to solve equations that cannot be solved algebraically. • Learn numerical methods to differentiate expressions that cannot be solved using calculus methods. • Learn numerical methods to integrate expressions that cannot be solved using calculus methods.	• Revision for mock exams- 4 papers -Core Pure (2hrs 40mins) -Statistics Minor (1hr 30mins) -Modelling With Algorithms (1hr 30mins) -Numerical Methods (1hr 30mins) • Find rates of convergence of sequences and numerical differentiation and integration.	
Links to prior learning	• Vectors from Maths and Further Maths. Know the form of the equation of a plane. • Extends complex number work from Year 12. • Reviews and extends year 12 proof by induction and finding sums of series using the method of differences & standard series. • Differentiation of polynomials, exponentials, logs, trig. Functions & inverse trig. Functions. • Rounding and lower and upper bounds from GCSE Maths. • Polynomials from AS Maths. • Solving polynomial equations and differentiation from AS Maths. • Differentiation from AS Maths. • Integration from AS Maths.	• Should be confident in use of integration methods covered in A-level Maths. • Confident with all A-level Maths calculus, familiar with the language of functions, Maclaurin series from term 1 and able to manipulate exponential and log functions. Further Calculus. • Confident with all integration work covered in Maths and Further Maths. • As above. Differential equations from A-level Maths. • Trig. Functions & identities from A-level Maths. Complex numbers from term 1. Integration and areas of sectors of circles from A-level Maths. • NM: Solution of Equations, Numerical Differentiation & Integration from term 1.	• Polar coordinates, curves & how to sketch these. • Integration and areas of sectors of circles from A-level Maths. • First order differential equations from Further Maths. • All content from the 2 year course.

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Cultural Capital Opportunities	• Book: The Man Who Knew Infinity by Robert Kanigel. • Film: The Man Who Knew Infinity	• Videos: Numberphile Best Videos	
Assessment Focus	• Private Study: Topic quiz/tests • Chapter Assessments	• Private Study: Topic quiz/tests • Chapter Assessments • Mock Exams	• Exams

Mrs Smith (2.5 Hours)

Mrs Mantle (2.5 Hours)

Unit	Chapter	Topic	Weeks	Integral Link
Core	2	Matrices	2	Matrices
Core	5	Polar Coordinates Part 1	2	Polar coordinates
Core	11	Vectors 2	4	Further vectors
Core	10	Complex Numbers	6	Complex numbers
Core	3	Series & Induction	2	Series and induction
Core	6	Maclaurin Series	2	Maclaurin series
Core	4	Further Calculus	3	Further calculus
Core	7	Hyperbolic Functions	3	Hyperbolic functions
Revision		Revision & Mock Exams	3	
Core	12	Second Order Differential Equations	2	Second order differential equations
Core	12	Second Order Differential Equations	2	Second order differential equations
		Pure Revision		Revision
		Statistics Revision		Statistics Revision

Summer Term Year 12

Autumn Term Year 13

Spring Term Year 13

Mock Exams & Preparation

Summer Term Year 13

Revision

Unit	Chapter	Topic	Weeks	Integral Link
Core	1	Vectors 1	2	Vectors
Numerical Methods	1	Approximation	2	Approximations
Numerical Methods	4	Approximating Functions	2	Approximating functions
Numerical Methods	2	The Solution of Equations	5	Solution of equations
Numerical Methods	5	Numerical Differentiation	2	Numerical differentiation
Numerical Methods	3	Numerical Integration	3	Numerical integration
Revision		MwA &/or Pure	2	
Core	8	Applications of Integration	2	Applications of integration
Core	9	First Order Differential Equations	2	First order differential equations
Numerical Methods	6	Rates of Convergence in Numerical Processes	2	Rates of convergence
Revision		Revision & Mock Exams	3	
Core	5	Polar Coordinates Part 2: Revision & Areas	2	Polar coordinates
		Numerical Methods Revision		
		Modelling With Algorithms Revision		Algorithms Revision
		Pure Revision		Revision