

## Year 12 AS Further Maths Pure

Lesson Group	Specification coverage	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Pre-Test	Post-Test
<b>A: Complex numbers I</b>	2.1 - 2.3	Manipulation of complex numbers	Complex conjugates	Roots of quadratic equations	Solving cubic and quadratic equations	Solving quartic equations	<b>A</b>	<b>A</b>
<b>B: Complex numbers II</b>	2.4 – 2.7	Argand diagrams	Modulus and argument form	Manipulation of complex numbers in modulus argument form	Loci in the argand diagram	Finding the cartesian equation of a locus	<b>B</b>	<b>B</b>
<b>C: Roots of polynomials</b>	4.1, 4.2	Roots of quadratic equations	Roots of cubic equations	Roots of quartic equations	Expressions relating to the roots of a polynomial	Linear transformation of roots	<b>C</b>	<b>C</b>
<b>D: Matrices</b>	3.1 – 3.8	Matrix manipulation, determinant and inverse matrices	Transformations, and successive transformations using matrices	Singular, non-singular matrices and inverse matrices	Solutions of 3 linear simultaneous equations using matrices	Geometric interpretation of the solutions of 3 linear simultaneous equations using matrices	<b>D</b>	<b>D</b>
<b>E: Proof by induction</b>	1.1	Constructing proofs using mathematical induction	Summation of series	Divisibility	Matrices	-	<b>E</b>	<b>E</b>
<b>F: Vectors</b>	6.1 – 6.5	Cartesian and vector form of a straight line and planes in 3D	Scalar products and finding angles between lines and planes	Scalar product form of the equation of a plane	Determining whether lines meet and the point of intersection	Calculating the perpendicular distance between two lines, a point and a line and a point and a plane	<b>F</b>	<b>F</b>

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<b>A: Complex numbers</b>	2.8 – 2.11	De Moivre's theorem	Trigonometric identities	Sums of series	$n^{\text{th}}$ root of a complex number	Solving geometric problems	<b>A</b>	<b>A</b>
<b>B: Series</b>	4.4 – 4.6	The method of differences	Higher derivatives	The Maclaurin expansion	Series expansion of compound functions	Validity of expansions	<b>B</b>	<b>B</b>
<b>C: Methods in calculus</b>	5.2 – 5.6	Integrate improper integrals	The mean value of a function	Integration using partial fractions	Differentiate inverse trigonometric functions	Integrating functions in the form $(a^2 - x^2)^{1/2}$ and $(a^2 - x^2)^{-1}$	<b>C</b>	<b>C</b>
<b>D: Volumes of revolution</b>	5.1	Volumes of revolution around the x axis	Volumes of revolution around the y axis	Volumes of revolution of parametrically defined curves	Modelling with volumes of revolution	-	<b>D</b>	<b>D</b>
<b>E: Hyperbolic functions</b>	8.1 – 8.5	Definitions of hyperbolic functions	Differentiation and integration of hyperbolic functions	Inverse hyperbolic functions	Logarithmic form of hyperbolic functions	Integration in the $(a^2 + x^2)^{-1/2}$ and $(a^2 - x^2)^{-1/2}$ by substitution	<b>E</b>	<b>E</b>
<b>F: Differential equations</b>	9.1 – 9.9	Finding and using the integrating factor	Solutions to 2 <sup>nd</sup> order differential equations in the form $y'' + y' + by = 0$	Solutions to 2 <sup>nd</sup> order differential equations in the form $y'' + y' + by = f(x)$	Solving harmonic motion and modelling damped oscillations using 2 <sup>nd</sup> order differential equations	Solving first order coupled differential equations	<b>F</b>	<b>F</b>