

Year 13 Further Mathematics

Timing	Unit Title	Key Question	Knowledge	Assessing Understanding
Autumn	CP1 FM1 FP1	<p>What type of numbers are needed to deal with $\sqrt{-1}$?</p> <p>How do you solve an equation which does not factorise?</p> <p>Do you know how to manipulate matrices?</p> <p>How do we sum a series?</p> <p>What is proof by induction?</p> <p>Can you extend your mechanics knowledge to deal with further mechanics content?</p>	<p>For the full Further Mathematics A level 4 units are taught:</p> <ul style="list-style-type: none"> Core Pure 1 (CP1) Core Pure 2 (CP2) Further Mechanics 1 (FM1) Further Pure 1 (FP1) <p>For Further Mathematics AS level the following units are taught:</p> <ul style="list-style-type: none"> CP1 (50%) FM1 (25%) FP1 (25%) <p>Classes contain both A level and AS level students.</p> <p>The order of teaching of the topics will vary depending on the split of teachers. We start by teaching CP1 and FM1 then progress to CP2 and FP1.</p> <p>Introduction to complex numbers, real, imaginary (CP1)</p> <p>Argand diagram and modulus /argument form (CP1)</p> <p>Matrices - order, inverse, determinant, and solve simultaneous equations (CP1)</p> <p>Linear transformations – using matrices (CP1)</p> <p>Series - use of sum of squares and cubes (CP1)</p> <p>Proof by induction (CP1)</p> <p>Roots of polynomials (CP1)</p>	<p>How understanding is assessed</p> <ul style="list-style-type: none"> Through applying the theory to a range of questions and increasingly more complex situations. Discussion in lessons, sample problems. Homework and tests involving past paper questions. <p>Skills</p> <ul style="list-style-type: none"> In addition to the understanding of the concepts, significant algebraic skills are required. Mathematical modelling for FM1. <p>Assessment Point information</p> <ul style="list-style-type: none"> Timed questions on both CP1 and FM1 topics.

			<p>Vectors – equations of lines & planes, scalar product & angles, intersection & perpendiculars (CP1)</p> <p>Volumes of revolution around the x and y axes (CP1)</p> <p>Momentum and impulse (FM1)</p> <p>Work, energy and power (FM1)</p> <p>Elastic strings and springs - applying Hooke's Law to force and energy situations (FM1)</p> <p>Further inequalities (FP1)</p> <p>The t – formulae – solving trig equations (FP1)</p> <p>Numerical methods – Simpson's rule (FP1)</p>	
Spring	CP2 FM1 FP1	Can you extend your pure knowledge to deal with CP2 & FP1	<p>Extend complex numbers to trig and exponential form, de Moivre's theorem, series & nth roots (CP2)</p> <p>Vectors – vector product, areas (FP1)</p> <p>Higher derivatives, Maclaurin series (CP2)</p> <p>Further calculus – inverse trig functions (CP2)</p> <p>The coordinate geometry of the conic sections – hyperbola, parabola & ellipse (FP1)</p> <p>Introduction to hyperbolic functions sinh, cosh and tanh with their related reciprocal and inverse functions (CP2)</p> <p>First and second order differential equations (CP2)</p>	<p>How understanding is assessed</p> <ul style="list-style-type: none"> • See above <p>Skills</p> <ul style="list-style-type: none"> • In addition to the understanding of the concepts significant algebraic skills are required. Advanced calculus skills. <p>Assessment Point information</p> <ul style="list-style-type: none"> • Timed questions on both the Pure and Mechanics topics. • Mock examination (CP1/FP1 AS topics) • Spring test on FM1

			<p>Polar coordinates - finding tangents, normals and areas (CP2)</p> <p>Volumes of revolution – including parametrics (CP2)</p> <p>Elastic collisions in one dimension (FM1)</p> <p>Elastic collisions in two dimensions – oblique impact (FM1)</p> <p>Modelling with differential equations (CP2)</p> <p>Taylor series (FP1)</p>	
Summer			<p>Further calculus methods (FP1)</p> <p>Reducible differential equations (FP1)</p> <p>Completion of the Further Mathematics units as outlined above.</p>	<p>How understanding is assessed</p> <ul style="list-style-type: none"> • See above <p>Skills</p> <ul style="list-style-type: none"> • See above <p>Assessment Point information</p> <ul style="list-style-type: none"> • Timed questions on both the Pure and Mechanics topics. • Informal mocks on Core Pure topics