

Year 12

Autumn 1	Complex Numbers Can I perform arithmetic with complex numbers? Can I solve equations involving complex numbers? Can I represent complex numbers on an Argand diagram? Can I interpret modulus and argument geometrically? Matrices Can I multiply matrices? Can I calculate determinants? Can I find inverse matrices? Can I solve simultaneous equations using matrices? Maritime: Navigation Careers: Electrical engineering, Signal processing, Physics, computer graphics, engineering, robotics
Autumn 2	Proof by Induction Can I prove statements using mathematical induction? Can I identify the base case? Can I complete the inductive step? Can I write a clear mathematical proof? Polynomial Functions Can I use the Factor Theorem? Can I use the Remainder Theorem? Can I solve higher-order polynomial equations? Can I sketch polynomial graphs? Eco Futures: Scientific Modelling Careers: Computer science, Cryptography, Mathematics, Engineering, Finance
Spring 1	Further Calculus Can I differentiate implicit functions? Can I differentiate parametric equations? Can I solve first-order differential equations? Can I apply calculus in modelling problems? Eco Futures: Climate Modelling, Population Modelling Careers: Enigneering
Spring 2	Random Variables Can I calculate expectation? Can I calculate variance? Can I work with discrete random variables? Can I interpret probability models? Discrete Distributions Can I use the Poisson distribution? Can I use the Geometric distribution? Can I model real-life situations using probability? Eco Futures: Environmental Stastics Careers: Insurance, Risk Analysis, Operations Research, Quality Control, Data Science
Summer 1	Momentum Can I calculate impulse? Can I apply conservation of momentum? Can I model collisions? Can I solve problems involving connected particles? Work, Energy and Power Can I calculate work done? Can I use conservation of energy? Can I calculate power? Can I solve modelling problems? Maritime: Ship Collisions, Marine Engineering Eco Futures: Renewable Energy Careers: Mechanical Engineer, Vehicle Safety
Summer 2	Motionin Two Dimensions Can I resolve vectors? Can I analyse projectile motion? Can I solve motion problems involving vectors? Can I apply Newton's Laws in two dimensions? Maritime: Navigation Careers: Ballistics, Aerospace Engineering
Autumn 1	Advanced Complex Numbers Can I use De Moivre's Theorem? Can I find the roots of complex numbers? Can I solve complex polynomial equations? Can I interpret loci on an Argand diagram? Further Calculus Can I solve first-order differential equations? Can I model real-world situations using differential equations? Can I interpret mathematical solutions? Can I apply calculus in unfamiliar contexts? Eco Futures: Climate Modelling Careers: Signal Processing, Electrical Engineering, Communications, Scientific Research
Autumn 2	Numerical Methods Can I use numerical methods to solve equations? Can I apply iterative methods? Can I determine whether an iterative method converges? Can I justify the accuracy of an approximation? Coordinate Geometry and Vectors Can I solve geometrical problems using vectors? Can I interpret vector equations? Can I apply vector methods in modelling? Can I combine vector techniques with calculus? Maritime: Navigation Careers: Robotics, Computer Graphics, Engineering, Scientific Computing, Computer Simulation
Spring 1	Continuous Random Variables Can I work with probability density functions? Can I calculate probabilities using integration? Can I calculate expectation and variance? Can I model continuous random variables? Eco Futures: Environmental Science Careers: Risk Analysis
Spring 2	Statistical Inference Can I carry out hypothesis tests? Can I interpret p-values? Can I make conclusions in context? Can I evaluate statistical evidence? Eco Futures: Enivonmental Monitoring Careers: Quality Assurance, Acturial Science
Summer 1	Circular Motion Can I analyse motion in a circle? Can I calculate centripetal force? Can I solve modelling problems involving circular motion? Can I interpret physical assumptions? Maritime: Ship Manoeuvring Careers: Rollercoaster Design, Mechanical Engineer
Summer 2	Centres of Mass Can I determine centres of mass? Can I solve equilibrium problems? Can I interpret physical models? Can I apply moments in unfamiliar contexts? Maritime: Naval Architecture Careers: Structural Engineering, Civil Engineering, Data Science, Mathematics Exam Preparation Can I combine ideas from Core Pure, Mechanics and Statistics? Can I select appropriate techniques independently? Can I communicate complete mathematical arguments? Can I evaluate my answers critically?