Curriculum Overview: Further Mathematics

	Year 12	Year 13
HT1	**Complex number (4) introduction and** basic manipulations **The Argand diagram, Modulus and argument (8)** Mod-Arg form of complex numbers Loci and Regions in the argand diagram **Graphs and networks (4)** **Planarity algorithm** **Algorithms on graphs (5)**	**COMPLEX NUMBERS (6)** De Moivre's theorem and nth roots Solving geometric problems **HYPERBOLIC FUNCTIONS (6)** Definitions, inverse hyperbolic Differentiating hyperbolic functions Integrating hyperbolic functions **Introduction to momentum and impulse (3)** **Introduction to work, energy, power (6)**
HT2	**Roots of polynomials (8)** Roots of a quadratic equation Roots of a cubic equation Roots of a quartic equation **Series (6)** Sums of natural numbers Sums of squares and cubes **Floyd's algorithm (2)** **Route inspection algorithm (6)** **Travelling salesman problem (4)**	**POLAR COORDINATES (6)** Sketching curves, areas enclosed Tangents to polar curves **SERIES (6)** The method of differences Maclaurin series and expansions **Power (1)** **Hooke's law and equilibrium problems (6)**
HT3	**Introduction to matrices (5), multiplication** Determinant, Inverting a 2x2 matrix, 3x3 matrix Solving systems of equations using matrices **Linear transformations in 2D (9):** **Reflections and Rotations** **Enlargements and stretches** **Critical path analysis (3)** **Activity networks/precedence tables (2)** **Earliest and latest times (2)**	**METHODS IN CALCULUS (12)** Improper integrals The mean value of a function Differentiating inverse trig functions Integrating with inverse trig Integrating using partial fractions **Problem solving involving elastic energy (3)** **Collisions and Newton's law of restitution (6)**

	Gantt charts (3)	
HT4	**Proof by induction (8)** for summation **Proof by induction for divisibility** **Proof by induction for matrices** **Volumes of revolution (7)** Modelling with volumes of revolution **Scheduling diagrams (4)** **Resource histograms** **Linear programming** **Formulating the problem** **Graphical methods** **Locating the optimal point (5)**	**VOLUMES OF REVOLUTION (12)** **Vol of revolution around the x-axis** **Vol of revolution around the y-axis** **Volumes of revolution of parametric** **Modelling with volumes of revolution** **Oblique impact of a sphere with a plane surface (3)** **Successive oblique impacts of a sphere with plane surfaces (3)**
HT5	**Vectors (8)**, Equation of a line in 3D **Equation of a plane in 3D** **Scalar product** **Angles between lines and planes** **Finding perpendiculars** **Integer only solutions (2)** **Algorithms and flow charts** **Sorting algorithms** **Bin packing algorithms** **Order of an algorithm (5)**	**METHODS IN DIFF EQUATIONS (10)** **First-order differential equations** **Second-order homogeneous diff equations** **2nd-order non-homogeneous diff equations** **Using boundary conditions** **MODELLING WITH DIFFERENTIAL EQUATIONS (8)** **Modelling with 1st order diff equations** **Simple harmonic motion** **Damped and forced harmonic motion** **Coupled 1st order simult. diff equations** **Oblique impact of smooth spheres (3)**

HT6	**Simplex algorithm - introduction** **Simplex algorithm - one stage** **Simplex algorithm - two stage** **Big-M method (6)**	