



Year 13 Pure Mathematics Curriculum Overview

Title	
1	Proof: Examples including proof by deduction* and proof by contradiction
2	Algebraic and partial fractions
	Simplifying algebraic fractions
	Partial fractions
3	Functions and modelling
	Modulus function
	Composite and inverse functions
	Transformations
	Modelling with functions*
*examples may be Trigonometric, exponential, reciprocal etc.	
4	Series and sequences
	Arithmetic and geometric progressions (proofs of 'sum formulae')
	Sigma notation
	Recurrence and iterations
5	The binomial theorem
	Expanding $(a + bx)^n$ for rational n ; knowledge of range of validity
	Expansion of functions by first using partial fractions
6	Trigonometry
	Radians (exact values), arcs and sectors
	Small angles
	Secant, cosecant and cotangent (definitions, identities and graphs); Inverse trigonometrical functions; Inverse trigonometrical functions
	Compound* and double (and half) angle formulae
	*geometric proofs expected
	$R \cos(x \pm \alpha)$ or $R \sin(x \pm \alpha)$
	Proving trigonometric identities
	Solving problems in context (e.g. mechanics)
7	Parametric equations
	Definition and converting between parametric and Cartesian forms
	Curve sketching and modelling



Title	
8	Differentiation
	Differentiating $\sin x$ and $\cos x$ from first principles
	Differentiating exponentials and logarithms
	Differentiating products, quotients, implicit and parametric functions.
	Second derivatives (rates of change of gradient, inflections)
	Rates of change problems* (including growth and kinematics) *see Integration (part 2) – Differential equations
9	Numerical methods*
	Location of roots
	Solving by iterative methods (knowledge of ‘staircase and cobweb’ diagrams)
	Newton-Raphson method
	Problem solving *See Integration (part 2) for the trapezium rule
10	Integration (part 1)
	Integrating x^n (including when $n = -1$), exponentials and trigonometric functions
	Using the reverse of differentiation, and using trigonometric identities to manipulate integrals
11	Integration (part 2)
	Integration by substitution
	Integration by parts
	Use of partial fractions
	Areas under graphs or between two curves, including understanding the area is the limit of a sum (using sigma notation)
	The trapezium rule
	Differential equations (including knowledge of the family of solution curves)
12	Vectors (3D): Use of vectors in three dimensions; knowledge of column vectors and i, j and k unit vectors



Year 13 Statistics and Mechanics Curriculum Overview

Statistics	
1	Regression and correlation
	Change of variable
	Correlation coefficients Statistical hypothesis testing for zero correlation
2	Probability
	Using set notation for probability Conditional probability
	Questioning assumptions in probability
3	The Normal distribution
	Understand and use the Normal distribution
	Use the Normal distribution as an approximation to the binomial distribution Selecting the appropriate distribution
	Statistical hypothesis testing for the mean of the Normal distribution
Mechanics	
4	Moments: Forces' turning effect
5	Forces at any angle
	Resolving forces Friction forces (including coefficient of friction μ)
6	Applications of kinematics: Projectiles
7	Applications of forces
	Equilibrium and statics of a particle (including ladder problems)
	Dynamics of a particle
8	Further kinematics
	Constant acceleration (equations of motion in 2D; the i, j system)
	Variable acceleration (use of calculus and finding vectors $\dot{\mathbf{r}}$ and $\ddot{\mathbf{r}}$ at a given time)