

KS5

Further Maths

Further Mechanics

COLLISIONS:

- Impulse
- Momentum
- Magnitude
- Principle of conservation of momentum
- Newton's Law of Restitution
- Coefficient of restitution
- Oblique impacts
- Line of centres
- Angle of deflection

WORK, ENERGY & POWER:

- Work done
- Energy
- Power
- Gravitational Potential Energy
- Kinetic energy
- Principle of conservation of mechanical energy
- Work-energy principle

ELASTICITY:

- Hooke's Law
- Modulus of elasticity
- Compressed spring (thrust)
- Extension of spring
- Natural length
- Elastic Potential Energy

Further Statistics

DISCRETE RANDOM VARIABLES:	Probability Distribution Function Expected value Variance
DISTRIBUTIONS:	Poisson Geometric Negative Binomial Parameter Mean and variance
HYPOTHESIS TESTING:	Null hypothesis Alternative hypothesis Significance level Critical region One-tailed/two-tailed
CENTRAL LIMIT THEOREM:	Sample mean
CHI-SQUARED TESTS:	Degrees of freedom Contingency tables Goodness-of-fit Observed and expected
PROBABILITY GENERATING FUNCTION:	Dummy variable
QUALITY OF TESTS:	Type I error Type II error Actual significance level Sample variance Size & power of a test Power function

Core Pure Year 12	
COMPLEX NUMBERS:	Imaginary and complex numbers Complex conjugate Argand diagram Modulus–argument form Complex loci
SERIES:	Sigma notation Standard results
ROOTS OF POLYNOMIALS:	Product pairs
VOLUMES OF REVOLUTION:	Around x and y axes
MATRICES:	Square, zero and identity matrices Element Determinant (2x2 and 3x3) Inverse matrices Matrix of minors Matrix of cofactors Transposed matrix Invariant points Invariant lines
PROOF BY INDUCTION:	Base case Assumptions Inductive stage Conclusion

Core Pure Year 12	
VECTORS:	Position vector Fixed point Direction vector Scalar parameter Cartesian equation Plane Scalar dot product Skew lines Shortest distances Intersecting planes <i>Vector cross product</i>

Core Pure Year 13	
COMPLEX NUMBERS:	Exponential form Euler's relation De Moivre's Theorem <i>n</i> th roots of complex numbers
SERIES:	Method of differences Maclaurin series expansion (<i>Taylor series expansion</i>) Standard results
METHODS IN CALCULUS:	Improper integrals Mean value of a function Differentiation & integration of inverse trigonometric functions Integration with partial fractions with irreducible quadratic factors
VOLUMES OF REVOLUTION:	Around x and y axes For curves described parametrically Modelling real life examples
POLAR COORDINATES:	Pole Initial line
HYPERBOLIC FUNCTIONS:	Sinh, Cosh & Tanh functions Arsinh, Arcosh & Arctanh inverse hyperbolic functions Osborn's rule

Core Pure Year 13	
DIFFERENTIAL EQUATIONS:	First and second order Integrating factor General solution Particular solution Homogenous & non-homogenous Auxiliary equation Complementary function Particular integral Boundary conditions
MODELLING WITH DIFFERENTIAL EQUATIONS:	Simple harmonic motion Amplitude & period Damping and forced motion Coupled first-order differential equations (systems of) Symbiotic