

Mathematics Topic Lists 2017-2018

A Level Upper Sixth Form

| Unit | Topics | Unit | Topics |
|-------------------------|--|---|--|
| 1: Sequences & Series | Arithmetic Sequences inc. Prove the Formula for Sum of Arithmetic Series Geometric Sequences inc. Prove the Formula for Sum of Geometric Series Sum to Infinity of Geometric Series and Convergent Conditions inc. Proof of Formula Sigma Notation Recurrence Relations Determine if a Sequence is Increasing, Decreasing or Periodic Modelling Real Life With Series | 8: Applications of Forces | Static Particles Modelling with Statics Friction & Static Particles Static Rigid Bodies Dynamics & Inclined Planes Connected Particles |
| 2: Differentiation | Differentiate Sin x & Cos x (Inc. From First Principles) Differentiate Exponentials & Logarithms Chain Rule Product Rule Quotient Rule Differentiating Trig Functions with Chain / Product / Quotient Rules Parametric Differentiation Implicit Differentiation Determine Whether a Function is Convex or Concave Using Second Derivatives Rates of Change | 9: Further Kinematics | Vectors in Kinematics Vector Methods with Projectiles Variable Acceleration in one Dimension Differentiating Vectors Integrating Vectors |
| 3: Integration | Integrating Standard Functions: x^n (inc. when $n = -1$), Exponentials & Trig Functions Integrating Standard Functions of the Form $f(ax+b)$ Using Trig Identities To Integrate Reverse Chain Rule Integration by Substitution Integration by Parts Using Partial Fractions to Integrate Finding Areas Under Graphs or Between 2 Curves (inc. understanding the area is the limit of a sum using sigma notation) Finding Areas Under Curves Defined Parametrically The Trapezium Rule Solving Differential Equations Modelling With Differential Equations | 1: Trigonometric Functions | Secant, Cosecant and Cotangent: Definitions and Graphs Using $\sec x$, $\operatorname{cosec} x$ and $\cot x$ to Simplify Expressions, Prove Identities and Solve Equations Derive and Use: $1 + \tan^2 x = \sec^2 x$ and $1 + \cot^2 x = \operatorname{cosec}^2 x$ Inverse Trig Functions: $\arcsin x$, $\arccos x$ and $\arctan x$ |
| 4: Parametric Equations | Parametric Equations Using Trigonometric Identities Curve Sketching Points of Intersection Modelling with Parametric Equations | 2: Trigonometry & Modelling | Addition Formulae (inc. Geometric Proofs) Using Addition Formulae Double Angle Formulae Solving Trig Equations Involving Compound Angles $R \cos(x \pm \alpha)$ or $R \sin(x \pm \alpha)$ Proving Trigonometric Identities Modelling with Trigonometric Functions |
| 5: Moments | Moments of Forces About a Point Resultant Moments Equilibrium Centre of Mass Tilting | 3: Functions & Graphs | The Modulus Function: Solving Equations & Inequalities Functions & Mappings Composite Functions Inverse Functions Sketching Graphs of Modulus Functions Combining Transformations Solving Modulus Problems |
| 6: Forces and Friction | Resolving Forces Inclined Planes Friction | 4: Numerical methods | Locating Roots Iteration Newton-Raphson Method Applications to Modelling |
| 7: Projectiles | Horizontal Projection Horizontal & Vertical Components Projection at Any Angle Projectile Motion Formulae | 5: Regression, Correlation & Hypothesis Testing | Exponential Models Measuring Correlation Hypothesis Testing for Zero Correlation |
| | | 6: Conditional Probability | Set Notation Conditional Probability Conditional Probabilities in Venn Diagrams Probability Formulae Tree Diagrams |
| | | 7: The Normal Distribution | Introducing the Normal Distribution Finding Probabilities for Normal Distributions The Inverse Normal Distribution Function The Standard Normal Distribution Finding μ and σ Approximating Binomial Distribution Hypothesis Testing with the Normal Distribution |