A level Mathematic Learning Journey

Beyond AGS

As well as underpinning a life-long love of maths, A-Level maths is vital for progression onto a high number of degree pathways and many careers including:

- **Actuarial Science**
- **Health Service**
- **Accountancy**
- **Banking**
- **Cybersecurity**
- **Energy**
- **Marketing**
- **Insurance**
- **Defence**
- **Engineering**

Differentiation 2
Convex and concave curves
Points of inflection
Small angle estimations
Trigonometric functions
Exponentials and natural logarithms
Product and quotient rules
Chain rule
Implicit differentiation
Inverse functions
Parametric functions

Trigonometric identities
Degrees and radians
Reciprocal and inverse trigonometric functions
Compound and double angles

Hypothesis testing 2
Testing for correlation
PMCC
Mean of a Normal distribution

Numerical methods
Change of sign method
Iteration
Newton-Raphson method
Trapezium rule

Probability and continuous random variables
Conditional probability
The binomial and Normal distributions
Probability models

Forces 2
Vectors in three dimensions
Frictional force
Systems
Differential equations involving f=ma
Moments

Motion in two dimensions
Constant acceleration for motion in two dimensions
Using calculus to solve problems
Projectiles
Motion of an object

Integration and differential equations
Standard functions
Area between two curves
Integration by substitution
Integration by parts
Partial fractions
Differential equations

Sequences
Binomial expansion
Arithmetic and geometric sequences

Algebra 2
Making logical deductions and prove statements directly
Functions, parametric equations and algebraic fractions
Partial fractions

Probability and discrete random variables
Understanding key vocabulary in statistics
Mutually exclusive and independent events
Probability functions and distributions
Experiments modelled by the binomial distribution

Collecting, representing and interpreting data
Sampling methods and bias
Continuous data and associated graphs
Correlation
Raw data and measures of spread

STATISTICS

MECHANICS

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Forces and Newton's laws
Particles in equilibrium
Magnitude and direction of a force
Understand the connection between weight and mass
Resolve forces for connected objects and particles

Vectors
Identify vector and scalar quantities
Solving tow dimensional problems
Displacement, forces and velocity
Component form of a vector

Hypothesis testing 1
Understanding null and alternative hypothesis
Critical values and regions to include significance levels
Calculating a p-value
Concluding a hypothesis test

Algebra 1
direct proof, proof by exhaustion and counter examples, Use and manipulate the index laws Manipulate surds and rationalise a denominator, quadratic equations, Linear and non-linear simultaneous equations

Units and kinematics
Understand and use SI units
Speed and velocity
Draw and interpret graphs of displacement and velocity against time
SUVAT equations
Using calculus to solve problems with variable acceleration

PURE

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Exponentials and logarithms
Convert between powers and logarithms
Solve problems involving powers and logarithms
Sketching exponential functions
Considering limitations of exponential models

Differentiation and integration
Basic differentiation
Find equations, tangents and Normals
Work out turning points and determine their nature. Interpret the second derivative
Basic integration
Calculate definite integrals

Trigonometry
Using and applying trigonometric identities
Sine and cosine rule

Polynomials and the binomial theorem
Manipulate, simplify and factorise polynomials
The binomial theorem
Dividing polynomials
The factor theorem
Analyse a function and sketch its graph.

Transition from Year 11

Bridging the gap between GCSE and A Level Mathematics including Algebra, Trigonometry and Graphs