# ADVANCED MATHEMATICS

AS LEVEL MATHEMATICS FOR OCR A

A LEVEL MATHEMATICS FOR OCR A

AS LEVEL FURTHER MATHEMATICS FOR OCR A

A LEVEL FURTHER MATHEMATICS FOR OCR A

# WHY MATHS IN THE SIXTH FORM?

1. Maybe because you need it
2. Maybe because you are really good at it
3. Maybe because you love it

- Whatever your reason – our goal is to get all our students to reason 3

# HOW ARE THE COURSES DELIVERED?

## NORMAL MATHS

- 4 lessons a week
- 2 teachers
- Core Maths
- Statistics
- Mechanics

## FURTHER MATHS

- 8 lessons a week
- 3 teachers
- Further Core Maths
- Further Statistics
- Discrete Maths
- + Normal Maths content

# THE MATHS DEPARTMENT

- Most teaching is done in the T rooms with small classes
- 3 specialist A level teachers who can teach all elements of the A level course
- 2 Further Maths teachers who can teach all elements of the Further Maths course
- Our sixth form provide a large amount of support to lower school students through Maths Clinic, Wednesday morning mentoring of Y11 students and some additional help in form time when organised by Heads of House.
- Annual entry to UKMT Challenges and other G&T opportunities (Maths on Merseyside, MOG, Team Challenges)

# HOW ARE THE COURSES ASSESSED

## LINEAR ASSESSMENT WITH 100% EXAMINATION

### NORMAL MATHS

- AS Level
  - 2 Papers of 90 minutes each
    - Pure with Statistics & Pure with Mechanics
  - Equal weighting @ 75 marks each
- A Level
  - 3 Papers of 2 hours each
    - Pure, Pure with Statistics & Pure with Mechanics
  - Equal weighting @ 100 marks each

### FURTHER MATHS

- AS Level
  - 3 Papers of 75 minutes each
    - Further Pure, Statistics & Discrete
  - Equal weighting @ 60 marks each
- A Level
  - 4 Papers of 90 minutes each
    - Pure 1, Pure 2, Statistics & Discrete
  - Equal weighting @ 75 marks each

# WHAT SKILLS DOES THE COURSE GIVE ME?

- Analytical thinking
- Problem solving
- Quantitative reasoning
- Ability to manipulate precise and intricate details
- Construct logical arguments and expose illogical arguments

# PURE MATHEMATICS CONTENT AT AS LEVEL

## GCSE

- Indices & Surds
- Quadratics
- Graph Sketching & Coordinate Geometry
- Trigonometry
- Vectors

## EXTENDED GCSE

- Discriminant
- Graph Transformations
- Sketching inequalities
- Trig Identities
- Circles

## NEW

- Proof
- Factor Theorem
- Algebraic Long Division
- Logarithms and Exponentials
- Binomial Theorem
- Calculus – differentiation and integration

# STATISTICS CONTENT AT AS LEVEL

## GCSE

- Histograms
- Cumulative Frequency
- Box Plots
- Scatter diagrams
- Correlation
- Probability
- Sampling

## EXTENDED GCSE

- Probability formulae
- More sampling techniques

## NEW

- Standard Deviation
- The PERFECT best fit line
- Binomial Distribution and Probability
- Hypothesis Testing
- Significance Levels

# MECHANICS CONTENT AT AS LEVEL

## GCSE

- Kinematics
- Travel Graphs

## EXTENDED GCSE

- Variable Acceleration

## NEW

- Modelling
- Calculus for displacement, velocity and acceleration
- Force and Motion
- Forces in Equilibrium
- Connected Particles

# FURTHER MATHS CONTENT AT AS LEVEL

## PURE CORE

- Matrices & their applications
- Vectors
- Complex numbers
- Roots of Polynomials
- Proof

## APPLIED

- Probability Distributions
- Chi-squared tests
- Correlation and Regression
- Graphs & Networks
- Algorithms
- Critical Path Analysis
- Linear Programming
- Game Theory

# WHY STUDY MATHS?

- The Russell Group of leading UK universities published a guide to post-16 subject choices, called "Informed Choices". It describes Mathematics and Further Mathematics as facilitating subjects.

# CAREER OPPORTUNITIES

- Mathematics and Further Mathematics are versatile qualifications, well-respected by employers and are both "facilitating" subjects for entry to higher education.
- Careers for men and women with good mathematics skills and qualifications are not only well paid, but they are also often interesting and rewarding.
- There is a huge demand from science, engineering and manufacturing employers for students to have studied A level Mathematics and Further Mathematics.

# EMPLOYABILITY SKILLS

- The reason why so many employers highly value mathematics qualifications is mathematics students become better at thinking logically and analytically.
- Through solving problems you develop resilience and are able to think creatively and strategically.
- The writing of structured solutions, proof and justification of results help you to formulate reasoned arguments.
- Excellent numeracy skills give you the ability to process and interpret data.

# PREPARATION FOR HIGHER EDUCATION

- For most (STEM) degree courses A level Mathematics is a requirement and AS or A level Further Mathematics is often a preferred subject.
- Anyone applying to study a degree in a STEM subject should consider taking Further Mathematics to at least AS level as the additional content helps ensure a successful progression to university.
- AS Further Mathematics is accessible to most A level Mathematics students. Having AS level Further Mathematics on your university application is a way to make it stand out.

# SUPPORTING OTHER SUBJECTS

- The mathematical skills you learn in A level Mathematics are of great benefit in other A level subjects such as Physics, Chemistry, Biology, Computing, Geography, Psychology, Economics and Business Studies
- Studying AS or A level Further Mathematics is likely to improve your grade in A level Mathematics. The extra time, additional practice, further consolidation and development of techniques contribute to improved results in A level Mathematics

# INTERESTING COURSE

- Statistics – Collecting and analysing data and using this to make predictions about future events. Many subjects make use of statistical information and techniques. An understanding of probability and risk is important in careers like insurance, medicine, engineering and the sciences.
- Mechanics – Modelling and analysing the physical world around us, including the study of forces and motion. Mechanics is particular useful to students studying Physics and Engineering.
- A level Further Mathematics is fun and rewarding. It broadens your mathematical skills and promotes deeper mathematical thinking. You will be introduced to interesting new areas of pure mathematics such as complex numbers, matrices and vectors and apply mathematics in a wider range of contexts.
- Discrete – Using algorithms and other methods to find efficient solutions to real life problems, such as finding the shortest route around a network. The techniques are important in business, logistics and computer science.