

Exam Board and syllabus code

**Year 12 Starting September 2017 / Year 13 Starting September 2018**

MEI

- Level 3 Advanced Subsidiary GCE in Mathematics (B)
- Level 3 Advanced Subsidiary GCE in Further Mathematics (B)
- Level 3 Advanced GCE in Mathematics (B)
- Level 3 Advanced GCE in Further Mathematics (B)

**Legacy – Current Year 13 only**

Edexcel

- Level 3 Advanced Subsidiary GCE in Mathematics (8371)
- Level 3 Advanced Subsidiary GCE in Further Mathematics (8372)
- Level 3 Advanced GCE in Mathematics (9371)
- Level 3 Advanced GCE in Further Mathematics (9372)

**Year 12 and Year 13**

AQA

- Level 3 Certificate Mathematical Studies (1350)

**Content AS/A Level from September 2017**

**AS/A Level Mathematics**

Pure Mathematics

- **AS & A level:** Pure mathematics includes proof, algebra, graphs, sequences, trigonometry, logarithms, calculus and vectors.
- **A level only:** Learners study these topics in more depth and also study functions, numerical methods and differential equations.

Statistics

- **AS & A level:** Statistics includes working with data from a sample to make inferences about a population, probability calculations, using a binomial distribution as a model, and statistical hypothesis testing.
- **A level only:** Learners study these topics in more depth and also study the Normal distribution.
- There is a pre-release data set for both AS and A level. The purpose of the large data set is that learners experience working with real data in the classroom and explore this data using appropriate technology.

Mechanics

- **AS & A level:** Mechanics includes kinematics, working with forces and Newton's laws.
- **A level only:** Learners study these topics in more depth and also study motion under gravity, friction and simple moments.

**AS/A Level Further Mathematics**

Core Pure Mathematics

- **AS and A level:** Some pure topics from AS level Mathematics are studied in greater depth, while some new topics are introduced. Algebraic work with series is extended. The powerful technique of proof by induction is used in various contexts. Complex numbers are introduced, including their geometrical representation. Matrices are used to solve systems of equations and to explore transformations. Scalar products of vectors are applied to problems involving planes.

- **A level only:** In addition to studying these topics in more depth, learners also applied vector methods to problems involving lines and planes and calculus techniques are extended, including the use of hyperbolic functions and polar coordinates, and culminate in the solution of differential equations.

Statistics a

- In this option, situations are modelled by discrete random variables; the suitability of models is tested using chi-squared tests. Bivariate data are investigated, with tests for correlation and association and modelling using regression.

Mechanics a

- In this option, basic principles of forces and their moments, work and energy, impulse and momentum and centres of mass are used to model various situations. These include rigid bodies in equilibrium; particles moving under gravity, on a surface, in a circle, attached to springs; bodies colliding with direct or oblique impact.

The final option for A level Further Mathematics will be chosen from Mechanics b, Statistics b, Modelling with Algorithms, Numerical Methods, Extra Pure, Further Pure with Technology

### Legacy Content A2 – Current Year 13 only

The A2 Mathematics course consists of units Core 3, Core 4 and Mechanics 1.

Building on AS Mathematics, these units include work on:

- C3** Algebra and functions; trigonometry; exponentials and logarithms; differentiation; numerical methods.
- C4** Algebra and functions; coordinate geometry in the  $(x, y)$  plane; sequences and series; differentiation; integration; vectors.
- M1** Mathematical models in mechanics; vectors in mechanics; kinematics of a particle moving in a straight line; dynamics of a particle moving in a straight line or plane; statics of a particle; moments.

A2 Further Mathematics consists of units Further Pure 2, Statistics 2 and Mechanics 2.

Building on AS Further Mathematics and AS and A2 Mathematics, these units include work on:

- FP2** Inequalities; series, first order differential equations; second order differential equations; further complex numbers, Maclaurin and Taylor series.
- S2** The Binomial and Poisson distributions; continuous random variables; continuous distributions; samples; hypothesis tests.
- M2** Kinematics of a particle moving in a straight line or plane; centres of mass; work and energy; collisions; statics of rigid bodies.

### Content Mathematical Studies

The Mathematical studies course is diverse, engaging and essential in equipping students with the right skills to reach their future destination and shape their success in maths. This is a linear course so students will sit exams at the end of their two years.

This course consists of critical analysis of data, personal finance and estimations. There is further an option between Statistical Analysis, Critical paths and risk analysis or Graphical techniques. Students will be expected to develop and demonstrate confidence in the understanding and application of mathematical modelling in the solution of problems towards these disciplines.

### **Assessment AS (year 12 from September 2017)**

- Students submit at least one written task each week and receive constructive feedback on their work.
- Students are assessed at the end of each of the topics given above. If they do not reach the required standard, they will attend extra lessons before attempting the assessment again.
- In addition to this, students sit two rounds of pre-public examinations. The outcomes of these examinations are analysed by teaching staff alongside each student.
- At the end of the course, students sit two 90 minute external examinations (Paper 1 – Pure Mathematics and Mechanics; Paper 2 – Pure Mathematics and Statistics). These are equally weighted and the aggregate score results in an AS grade being awarded by the exam board.

#### **For A Level Mathematics - examinations**

- Paper 1 – Pure and Mechanics, 1 ½ hours, worth 50%
- Paper 2 – Pure and Statistics, 1 ½ hours, worth 50%

#### **For A Level Further Mathematics – examinations**

- Core Pure, 1 hours 15 minutes, worth 33.3%
- Mechanics a, 1 hour 15 minutes, worth 33.3%
- Statistics a, 1 hour 15 minutes, worth 33.3%

### **Assessment A Level (year 12 from September 2017; year 13 from September 2018)**

- Students submit at least one written task each week and receive constructive feedback on their work.
- Students are assessed at the end of each of the topics given above. If they do not reach the required standard, they will attend extra lessons before attempting the assessment again.
- In addition to this, students sit two rounds of pre-public examinations. The outcomes of these examinations are analysed by teaching staff alongside each student.

#### **For A Level Mathematics – examinations (covering Yr 12 and Yr 13 work)**

- Paper 1 – Pure and Mechanics, 2 hours, worth 36.5%
- Paper 2 – Pure and Statistics, 2 hours, worth 36.5%
- Paper 3 – Pure Mathematics and Comprehension, 2 hours, worth 27%

#### **For A Level Further Mathematics – examinations (covering Yr 12 and Yr 13 work)**

- Core Pure, 2 hours 40 minutes, worth 50%
- Mechanics a, 1 hour 15 minutes, worth 16.6%
- Statistics a, 1 hour 15 minutes, worth 16.6%
- Option, 1 hour 15 minutes, worth 16.6%

### **Legacy Assessment A2 (current Year 13 only)**

- Students submit at least one written task each week and receive constructive feedback on their work.
- Students are assessed at the end of each of the topics given above. If they do not reach the required standard, they will attend extra lessons before attempting the assessment again.
- In addition to this, students sit two rounds of pre-public examinations. The outcomes of these examinations are analysed by teaching staff alongside each student.
- At the end of the course, students sit a 90 minute external examination in each of the three units. These are equally weighted and the aggregate score results in an AS grade being awarded by the exam board.

### **Skills/Aptitudes needed to succeed**

Students wishing to start AS Mathematics will need a minimum of a grade 6 at GCSE, although a 7 is preferred. Further level 2 qualifications in Statistics and Additional Maths are welcomed and encouraged. Learners starting the Mathematical Studies MS will need at least a grade 4 at GCSE. In particular, students will need to be competent in dealing with the algebraic content of the higher tier of GCSE mathematics. The ability to work in organised fashion, think logically and to visualise mathematical concepts will be most beneficial.

Students wishing to start AS Further Mathematics will need a minimum of a grade 7 in GCSE Mathematics, although an 8 and/or a good pass in Additional Maths are preferred.

### **Benefits and Uses**

Mathematics is used in many contexts to explain the world in which we live and to support endeavours in other disciplines. Mathematical knowledge and understanding is sought after by both employers and universities.

A level mathematics is a highly regarded qualification in the fields of business, technology, science and engineering. As well as preparing students to study Mathematics at undergraduate level, is also an essential qualification for entry to courses such as Accounting, Actuarial Studies, Aeronautics, Biomedical Sciences, Chemical Engineering, Computer Science, Economics, Electronic Engineering, Mechanical Engineering and Physics. It is often required or preferred for other courses from Management to Optometry, Dentistry to Computer Science, and from Architecture to Meteorology.

See [www.mathscareers.org.uk](http://www.mathscareers.org.uk)