

FURTHER MATHEMATICS

Entry Requirements: Grade 7 in Mathematics & A level Mathematics must also be taken

Exam board: Edexcel (Course Code: 9FM0)

Full Subject Specification website: <https://qualifications.pearson.com/en/qualifications/edexcel-a-levels/mathematics-2017.html>

Why study Mathematics:

Mathematics touches more aspects of modern living than ever before – communications, media, and financial management as well as the more traditional computer and physical sciences, engineering, technology and business related subjects. The list continues to grow! Mathematics has long been regarded as a 'facilitating subject' giving future employers, universities and colleges clear evidence of highly valued numeracy and problem-solving skills irrespective of the actual role/course being considered.

Here at Stratford upon Avon School, we have staff who, prior to becoming mathematics teachers, have many years direct experience of the application of mathematics within a wide variety of industrial, commercial and public sector organisations – not as mathematicians but as engineers and management accountants and scientists. In some cases, this has also involved working overseas.

An A level in Further Mathematics demonstrates mathematical reasoning of the highest order and is very highly regarded by many employers and universities particularly in the engineering, information technology and financial sectors. These will include the Russell Group universities and blue-chip companies looking for the highest calibre applicants for both specialist and general management careers.

Subject Specification Outline:

This specification (introduced in September 2017) comprises a compulsory core Pure Mathematics component (2 modules) together with a second component (also 2 modules) that can be chosen from Further Pure Mathematics, Further Mechanics, Further Statistics or Discrete Mathematics with the constraint that the second module of any option cannot be selected unless the first module has also been selected). Note that in practice, options may be limited dependent on student numbers and teaching group viability.

Compulsory content:

Core Pure Mathematics 1 and 2: intended to develop mathematical argument, language and proof in the context of problem solving and mathematical modelling. Content will include proof, complex numbers, matrices, further algebra and functions, further calculus, further vectors, polar coordinates, hyperbolic functions and differential equations.

Additional content (to be selected from)

1. Further Pure Mathematics 1 and 2: content will include further trigonometry, further calculus, further differential equations, co-ordinate systems, further vectors, further numerical methods, inequalities, groups,

further matrices, further complex numbers, number theory & further sequences and series.

2. Further Mechanics 1 and 2: content will include dimensional analysis, momentum and impulse, work and power, elastic energy, elastic collisions in one and two dimensions, circular motion, centres of mass, moments, further dynamics and further kinematics.

3. Further Statistics 1 and 2: content will include discrete probability distributions, Poisson and binomial distributions, geometric and negative binomial distributions, hypothesis testing, central limit theorem, Chi squared testing, probability generating functions, quality of testing, linear regression, continuous probability distributions, correlation, combinations of random variables and estimating confidence intervals.

4. Discrete Mathematics 1 and 2: content will include algorithms, graph theory, algorithms on graphs, critical path analysis, linear programming, transportation problems, flows in networks, dynamic programming, game theory, recurrence relations and decision analysis.

Progress Assessment:

- Formal exam-style homework on a 3-weekly cycle
- Ongoing ½ termly assessment
- Mock examinations at the end of terms 1 and 2
- End of year 12 examination.

Final Exam Format:

Four equally weighted written papers each of 90 minutes. There is no coursework. All papers to be sat on completion of the course and all must be sat within the same examination season (no individual paper resits are permitted).

Self Study Requirements:

Each taught hour will require a minimum of an additional two hours of self study (split between supervised study in school and homework). Teaching staff will give guidance as to material to be covered or completed and associated deadlines.

Progression Pathways:

A level Further Mathematics supports a wide range of university level Mathematics courses (first and second degree):-

- Pure Mathematics
- Applied Mathematics
- Single/joint honours with many other subjects

A level Further Mathematics also supports an even wider range of science, engineering, economics, business studies, computer science courses (and indeed may be an essential requirement for certain courses/universities).

It also supports a wide range of A level entry specialist and general management careers (e.g. accountancy, engineering and retail based companies).