

# What will I study ?

## Algebra

Students will explore how real world data sets and problems can be modelled by algebraic expressions and graphs, using familiar functions (e.g. linear, quadratic) and new ones (e.g. exponential, logarithmic). Students will learn how to analyse and critique these models, make practical predictions and understand the nature of the problems and their underlying mathematics. Students will also learn new techniques for more complex problem solving.

## Data Analysis

Students will build on their mathematical skills from GCSE, exploring further uses of familiar diagrams and summary statistics. They will learn more powerful techniques for finding lines of best fit and assessing correlation, and will explore the different shapes that data sets follow. This will have a particular emphasis on the properties and uses of the Normal distribution. They will also explore analysing the methods used in published statistics. Students will consider the most appropriate methods for collecting data for different surveys and apply these practically.

## Dynamics

Students will explore the mathematical side of a number of key ideas in Physics. Problems will involve equations of motion, Newton's laws of motion, forces, friction, equilibrium, momentum, collisions and projectiles amongst others. Students may wish to undertake some experiments to generate data to test the theory and their understanding.

## Decision Mathematics

Students will be introduced to a relatively new branch of mathematics that will enable them to deal confidently with problems concerning networks and the use of algorithms. They will learn how to find a minimum connector and a shortest path for any network. Students will also investigate algorithms to solve the Route Inspection and Travelling Salesman problems – i.e. how to travel along every path and/or visit every point whilst travelling the shortest distance. Students will also analyse Critical Path problems to decide how to organise the tasks required and the minimum completion times of complex projects.

## Mathematical Principles for Personal Finance

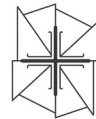
Students will be introduced to the mathematical techniques utilised by financial institutions in measuring financial information such as inflation and interest rates. Students will learn how to interpret financial information given in tables and diagrams and how to use that information to make optimum decisions e.g. which credit card offers them the best deal.

## Modelling with Calculus

Using the techniques of differentiation, integration and solving differential equations, students will explore how physical, real world problems can be modelled and solved. This will include the investigation of the physical significance of gradients, maximum and minimum values and areas for a variety of functions both using algebra and numerical methods (e.g. the trapezium rule).

## Mathematical Comprehension

This module picks up where the Algebra and Calculus modules left off, covering much of the same material, with an emphasis on using mathematics to model real world situations and make predictions. The exam assesses the students' ability to apply the mathematics they have learnt in context, through a comprehension paper. The student is given a published article containing mathematical ideas in context to read and comprehend in advance. The exam then tests the students' ability to understand and interpret this article (and a brief unseen article) using a variety of mathematical techniques, and to communicate their findings.



FOR FURTHER INFORMATION CONTACT:

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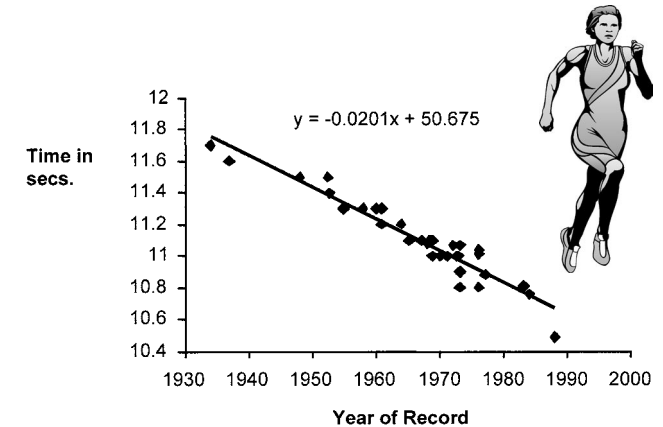
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# Use of Maths

## A new A Level in Mathematics



Use of Maths is a brand new A Level course that is being piloted from September 2008, to build on its popularity since its introduction as a new AS Level six years ago.

With its emphasis on the use of IT in Mathematics, and the application of Mathematics in practical real world scenarios, this new course has made significant advances in making the study of Mathematics more widely accessible to a new generation of students.

Students will enjoy the challenges of exploring a variety of mathematical models and selecting the appropriate one for their data. The scenarios explored will relate to a diverse range of contexts arising from their other subjects and also prospective careers.

Aquinas College is one of a number of colleges piloting this new A Level, and will be enrolling students for the course from September 2008.

# Who will this course appeal to ?

- **Students who enjoy Maths**

Use of Maths has been specifically designed to be more accessible to students who have gained at least a grade C at Foundation Level. With its emphasis on using the appropriate IT tools in solving mathematical problems, the course has the real world applications of mathematics, appropriate selection of techniques and interpretation of results at its heart. The emphasis is much more on the methodology rather than the underlying theory.

- **Students who enjoy IT**

This course has dragged AS/A2 Level Maths into the 21st Century! Central to the Use of Maths course is the need to recognise the power of technology in undertaking long and often arduous calculations. The course employs appropriate graphical calculator technology, software packages such as Excel and Autograph and various internet sites to support the students in undertaking mathematical investigations.

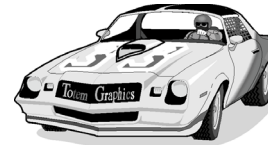
The Use of Maths exams allow the use of graphical calculators in problem solving, and the portfolio work that the students will undertake in the A2 part of the course will rely heavily on Internet research and employing the tools of the software packages appropriately.

- **Students who prefer Coursework**

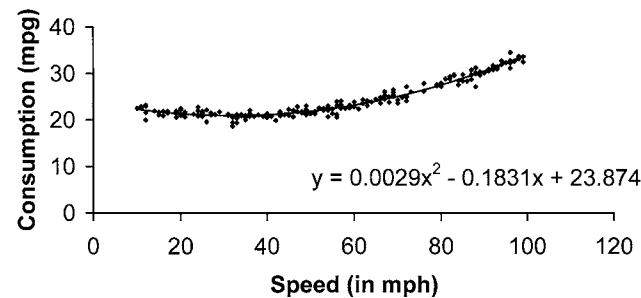
One of the modules that students study for the A2 Level Use of Maths qualification is assessed by coursework only. This coursework (or portfolio work) is integrated into the delivery of the course as students undertake two substantial investigations based on the work of the other modules they have studied. Their data may be generated from the students' other subjects or from their personal interests, hobbies or work environment. In addition, the students are provided with data sheets a week in advance of all the module exams, that give indications to the style and types of questions that will be set in the exams. This allows teacher-led investigation and question practice before the exam takes place, giving the students confidence in problem solving during the exam itself.

- **Students who need to study Maths to support their other AS Levels and/or career choice**

Some students do not wish to study mathematics for its own sake, but are likely to meet the practical applications of the subject in another field and would like to deepen their understanding of the mathematics behind these applications. Use of Maths would provide an excellent support to those students who wish to study Physics (by choosing the Dynamics option) or Psychology, Sociology, Geography and/or Biology (Data Analysis option) or Business Studies (Finance option) or Computing (Decision Maths option).



**A Scatter Diagram of Speed vs. Fuel Consumption**



# The Structure of the Course

At AS Level, all students will study three modules:

**A) Algebra**

and two from:

**B) Data Analysis**

or

**C) Dynamics**

or

**D) Decision Mathematics**

or

**E) Mathematical Principles for Personal Finance**

At A2 Level, all students will study a further three modules:

**F) Modelling with Calculus**

and

**G) Mathematical Comprehension**

and

**H) Mathematical Applications  
(Coursework module)**

Uniquely in A Levels, five of these modules are qualifications in themselves. B, C, D, E and F modules are all Free Standing Maths Qualifications (FSMQs) that each carry up to 20 points towards University entrance.