Mathematics Department

Departmental overview

Mathematics is a compulsory subject for Key Stage 3 (Years 7 - 9) and Key Stage 4 (Years 10 - 11). At A Level we offer Mathematics and Further Mathematics.

At Saint Cecilia's, we believe Galileo Galilei's quote that, "Mathematics is the language in which God has written the Universe." It has empowered humanity to evolve by providing a common, elegant language with which to understand our world and solve complex problems. Mathematics is the legacy of great ancient thinkers that has been passed from generation to generation, it is our privilege and responsibility to pass that knowledge onto our pupils and students in depth.

Great mathematical knowledge can provide limitless rewards to each person and to society as a whole. To the individual, it provides the invaluable key facts and procedural fluency to prepare them to be an informed citizen, who can think critically and lead fulfilling careers. While some new topics seem hard at first, we will help pupils and student improve and grow more confident by breaking complex processes into smaller manageable chunks.. We will strive to nurture the love of learning and provide our pupils and students with the logical clarity to unlock wonderful facts – all through continuously improving our craft of teaching, using scientific approaches to learning.

Year 7:

In Number, pupils learn about properties of numbers such as prime and square numbers. They learn to reason with fractions (including mixed numbers) and cover decimals as well as percentages. In Algebra, they learn to create, interpret and manipulate algebraic expressions, solve equations as well as begin to gain an understanding of graphs. In Geometry and Measures, pupils learn about transformations, connections between area and perimeter. They consolidate their understanding of angle rules, progressing to setting up equations using angle properties.

Year 8:

In Number, pupils consolidate mental and written methods of calculating with integers, decimals and negative numbers. They also learn how to use proportional reasoning to solve problems relating to currency and measurement. They learn to use all four operations with fractions. In Algebra, pupils learn to expand brackets, manipulate more complex expressions and solve equations. They also increase their understanding of handling data and probability, using fractions to give a numerical measure of probability. In Geometry and Measures, pupils solve problems with angles on parallel lines and discover formulae for areas and volumes of common shapes.

Year 9:

In Number, pupils build on their knowledge of primes to find prime factorisations, as well as the Highest Common Factor (HCF) and Least Common Multiple (LCM) of two numbers. They are introduced to surds and begin to explore upper and lower bounds in real life situations. They also solve problems to do with percentage and proportional changes. In Algebra, pupils learn to manipulate more complex expressions involving powers, brackets and fractions. They learn to interpret real-life graphs and solve equations with more formal methods. In Statistics and

Probability, pupils construct and interpret histograms and use a wide range of techniques to compare data.

Year 10:
The GCSE course consolidates and builds on what pupils learn in Key Stage 3. In Number, pupils learn to round numbers using significant figures, solve advanced percentage problems including reverse percentages and compound interest. In Algebra, pupils learn to use gradients and intercepts with graphs. They learn to expand and factorise with double brackets and simplify algebraic fractions. In Geometry and Measures, pupils mainly consolidate their knowledge from Key Stage 3. In Statistics and Probability, pupils learn about sampling methods, Venn diagrams and tree diagrams.

Year 11:
In Algebra, pupils solve simultaneous linear and quadratic equations and inequalities. They also draw quadratic and cubic graphs. In Geometry and Measures, pupils learn about trigonometry, including knowing some exact values of sin, cos and tan. They also learn about circle geometry and how to perform different transformations. In Statistics and Probability, pupils consolidate and enhance their learning from Year 10 to include dependent events.

A Level Mathematics

Year 12:
The course consists of two core modules and one Applied Mathematics module (Statistics or Decision Mathematics). In Core 1, the major new areas are co-ordinate geometry, sequences and series and calculus. In Core 2, students study the binomial expansion, geometric series, using radians trigonometric graphs and identities, amongst other topics. In Decision Mathematics 1, students learn about modelling problems using graphs and networks. They learn techniques to solve a variety of real-world problems including minimum spanning trees, shortest distances, critical path analysis and linear programming. In Statistics 1, students learn more advanced measures of dispersion and location. They learn about correlation, regression and the normal distribution, as well as conditional probability. They study numerical methods, functions, transforming graphs and the exponential function.

Year 13:
The Year 13 course consists of two core modules and one Applied Mathematics module (Mechanics). In Core 3, students complete the module by studying advanced Trigonometry and Differentiation. In Core 4, students learn about partial fractions, vectors, binomial expansion, advanced calculus and co-ordinate geometry. In Mechanics, students learn the equations of motion and Newton's laws to solve problems involving projectiles, moving and static objects. They move on to solve problems involving moments, frictions and vectors.

A Level Further Mathematics
Further Mathematics is an excellent opportunity for students who want to study the subject in greater depth. This A Level course is very stimulating for students who take a high level of enjoyment from Mathematics. The course must be taken in tandem with A Level Mathematics.

The Further Pure modules build on the Pure modules studied in A Level Mathematics, covering topics such as complex numbers, numerical methods, mathematical proof, series, polar coordinates, advanced trigonometry and calculus.

Further Mathematics has a slightly heavier focus on the applied modules than A Level Mathematics, with a third of the modules being based on Core Pure, Further Pure and Decision Mathematics.

The A Level course (Year 12-13) consists of three units from the following:

- Core Pure Mathematics 1 and 2
- Further Pure Mathematics
- Decision Mathematics

All units are equally weighted and are assessed completely by examination.