

GCSE MATHEMATICS

Key Stage 4 Curriculum

Mathematics Department Aims and Philosophy

Mathematics is the means of looking at the patterns that make up our world and the intricate and beautiful ways in which they are constructed and realised. Numeracy is the means of making that knowledge useful. Mathematics contributes to the school curriculum by developing students' abilities to calculate; to reason logically, algebraically, and geometrically; to solve problems and to handle data. Mathematics is important for students in many other areas of study, particularly Science and Technology. It is also important in everyday living, in many forms of employment, and in decision-making. As a subject in its own right, Mathematics presents frequent opportunities for creativity and can stimulate moments of pleasure and wonder when a problem is solved for the first time, or a better solution to a problem is discovered, or when hidden connections suddenly appear.

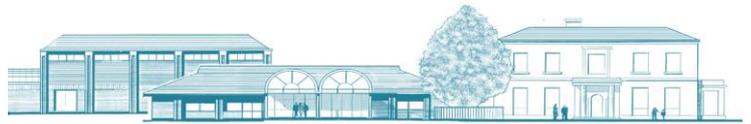
It enables students to build a secure framework of mathematical reasoning, which they can use and apply with confidence. The power of mathematical reasoning lies in its use of precise and concise forms of language, symbolism and representation to reveal and explore general relationships. These mathematical forms are widely used for modelling situations in many other areas. Its importance is universally recognised.

Aims of the department

- To set challenging targets with high expectations for all students.
- To offer a variety of approaches to teaching and learning to engage and motivate students and demand their active participation.
- To explore enrichment opportunities outside the curriculum to enhance students' enjoyment of mathematics.
- Value every student as an individual and give equality of opportunity to develop their potential to the full.
- Provide quality education in Mathematics to all students.
- Encourage every student to develop self-discipline in a friendly and safe, learning environment.
- Improve confidence levels of all students when working in Mathematical situations.
- Encourage social skills and responsibilities when working with others.
- Develop Numeracy skills across all areas of mathematics
- Develop Mathematical skills necessary throughout school life and for the future.
- To target and achieve appropriate success in attainment targets set by the National Curriculum and in public examinations.
- To provide opportunities in order to develop understanding and progress in Literacy, Citizenship, ICT and Functional Maths.
- To support school aims through the implementation of the department objectives and the schools' Teaching & Learning Policy.
- To develop staff and student skills and understanding, in order to enhance the teaching and learning of Mathematics.

The Mathematics GCSE course is designed to help students in three important ways.

The first is to equip them with Mathematical Knowledge and skills for later life. It will help students develop a knowledge and understanding of problem solving, reasoning, applying Mathematics in context and the functional elements of Mathematics.



A Guide to the Curriculum at Key Stage 4 (Years 10 & 11)

Secondly, it is also to help them succeed as they continue their education. This could be doing a vocational course, A level Mathematics or in an Apprenticeship.

Thirdly, it is to prepare them for their final examination. So that they can achieve the best grade possible to enable them to have a greater choice of careers available to them.

The course is assessed solely by final examination in June of Year 11. The students will sit the AQA GCSE examination. Students are entered at the Higher or Foundation tier. The final examination consists of 3 1.5 hour examinations, two calculator and one non- calculator.

Foundation and Higher Tier have six areas of Mathematics - Number, Algebra, Geometry and measures, Ratio proportion and rates of change, Probability and Statistics.

At Foundation Tier students will revisit topics already met but also meet new areas of mathematics including:-

Number

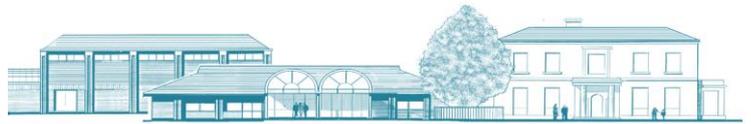
Basic number calculations
Fractions, decimals and percentages
Types of numbers
Indices
Rounding significant figures and estimation
Standard form

Algebra

Formulae, expressions and identities
Algebraic manipulation
Coordinates
Straight line and quadratic graphs
Real life graphs
Linear, quadratic and simultaneous equations
Inequalities

Geometry and measures

Perimeter and area including area and circumference of a circle
Volume
Units of metric measure
Construction and loci
Measuring and drawing angles
Scale drawing and bearings
Properties of polygons
Congruence and similarity
Transformations
Pythagoras' Theorem
Trigonometry
Vectors
2D representation of 3D shapes



A Guide to the Curriculum at Key Stage 4 (Years 10 & 11)

Ratio, proportion and rates of change

Calculations involving percentages
Direct and inverse proportion
Growth and decay
Ratio

Probability

Basic probability

Statistics

Collecting and representing data
Statistical measures
Interpreting data

At Higher Tier students will revisit topics already met but also meet new areas of mathematics including:-

Number

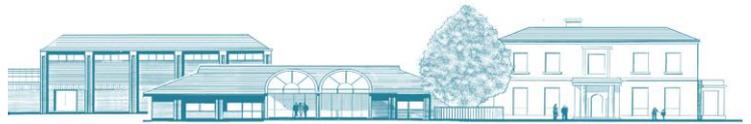
Basic number calculations
Fractions, decimals and percentages
Types of numbers
Indices
Rounding significant figures and estimation
Standard form
SURDS

Algebra

Formulae, expressions and identities
Algebraic manipulation including rearranging of equations
Algebraic fractions
Coordinates
Straight line and quadratic graphs
Real life graphs
Linear, quadratic and simultaneous equations
Inequalities
Equation of a circle
Transforming functions
Pre-calculus and area under a graph
Numerical methods including iterative processes

Geometry and measures

Perimeter and area including area and circumference of a circle
Volume
Construction and loci
Measuring and drawing angles
Scale drawing and bearings
Properties of polygons
Circle theorems
Congruence and similarity
Transformations
Pythagoras' Theorem



A Guide to the Curriculum at Key Stage 4 (Years 10 & 11)

Trigonometry

Sine Rule and Cosine Rule

Vectors

2D representation of 3D shape

Ratio, proportion and rates of change

Calculations involving percentages

Direct and inverse proportion

Growth and decay

Ratio

Gradients and rates of change

Probability

Probability

Statistics

Collecting and representing data

Statistical measures

Interpreting data

Detailed information on the AQA GCSE Mathematics 8300 can be found at www.aqa.org.uk

Other information and resources

There are lots of good online resources that we use, and the students can use at home for revision or extra practice.

- www.mymaths.co.uk uses interactive animation to review core subjects, including questions that give immediate feedback on the answer
- www.bbc.co.uk/bitesize interactive revision material from year 1 through to A level

Our teachers offer various clubs including Homework club

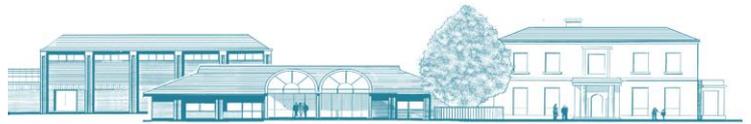
How to help your child in Mathematics

You may feel unsure about helping your child with Maths, when it may seem that we aren't teaching Maths in the same way that you were taught. Don't worry as there may be more than one way to solve a problem. The most important thing for us is that the students understand the methods that they are using and why they work.

Talk to them about how they work in their maths classes. By doing this you could help them to help themselves by encouraging them to:

- Show working out. This will give them something to look at to remind them of the methods they need.
- Check their work and make sure that their answers make sense to them. This helps them to develop their problem solving skills and raise their confidence.
- During lessons, discuss the maths work with others at their table. This will help to develop a positive atmosphere in the classroom where students are happy to talk and support each other.
- Ask the teacher/ Teaching Assistant to go over the methods and reasons with them.
- Go online to www.mymaths.co.uk where they will find notes and questions on all the topics we study.

To help them solve problems, you could:



A Guide to the Curriculum at Key Stage 4 (Years 10 & 11)

- Ask them to tell you about the method that they've used in class.
- Get them to explain why it works and what they did in class when learning about it. The detail that they will be able to give you will help you to identify how much they did or didn't understand.
- Discuss any methods that you know with your child, explaining why it works. If this method is different to the one they did in class, it won't matter as long as they understand it.
- Work through the revision materials that are available online with your child. See the section above on revision materials for further guidance.

Glossary of terms

There are terms that your child should be familiar with but may not be totally sure of their meaning.

Calculate	work out an answer to (not necessarily with a calculator) e.g. calculate the value of $15 + 9$
Consecutive	Following on from e.g. 5,6,7,8 are consecutive whole numbers
Denominator	The lower part of a fraction. This is the number of equal parts you need to divide the object into.
Difference	The amount between two numbers, calculated by subtracting the smaller number from the larger.
Factors	A number that divides into another a whole number of times e.g. 2 is a factor of 20
Fraction	Part of a whole. This is defined by dividing each whole object into parts, the denominator, and then choosing a certain number of them, the numerator.
Inverse	Opposite operation – e.g. the inverse of adding is subtracting
Mathematics	The study of patterns arising from structure, change or space – to be distinguished from Numeracy
Multiple	A number in the times table of another number e.g. 10 is a multiple of 2
Numeracy	The handling of numbers and their basic operations
Numerator	The upper part of a fraction. This is the number of equal parts that you need.
Operation	a process done to numbers or other mathematical objects e.g. addition, subtraction, etc
Parallel	When two lines never cross.
Percentage	Part of an amount, using 100 as the unit base.
Perpendicular	Where two lines cross at a Right Angle.
Prime	A number with exactly two factors e.g. 7 is a prime number since only 7 and 1 are factors of 7
Probability	How likely something is to happen.
Product	multiply
Square	When you multiply a number by itself. This is denoted using a superscript 2, e.g. 4^2 .
Sum	Add
SURD	SURD is a square root that is not equivalent to a fraction, or integer.