A Guide to the Curriculum at Key Stage 3 (Years 7, 8 & 9)

Mathematics

The Mathematics department's aims are:

- To create a balanced and supportive culture in which students are confident to work collaboratively, to apply logic and reasoning to mathematical problems and to apply methods that are efficient and reliable without engendering a fear of failure or derision. Through this students are able to see the connections between different areas of Mathematics and the relevance of their skills to the world and their future life.
- To make mathematics enjoyable, exciting and interesting for all students, regardless of their ability, gender or ethnicity. To promote interest in science, engineering and other careers and to help students set high expectations for their future achievements.
- To enable students to appreciate that mathematics is more than "sums", so that they consider its omnipresence and aesthetic qualities as well as raise their own expectations about their learning. Students are encouraged to work collaboratively and to appreciate that vital learning takes place throughout the problem solving process and not just in the solution.
- To enhance the teaching and learning of Mathematics through Media and Technology, engaging students' understanding through moving image, animation and interactive technologies.

The Mathematics curriculum is designed to effectively prepare students for entry to the GCSE course with the fundamental skills, knowledge and understanding to be successful. The Mathematics faculty uses a mixture of teaching methods to create a varied and exciting environment for students, helping them develop their communication and team working skills, as well as independent working skills.

Course outline

Key Stage 3 students are introduced to a number of new topics and given opportunities to consolidate and build upon the topics covered in their primary schools. The course is split into 10 units and there are 2 tiers, Theta and Delta. Theta challenges students to be consistently working at what would be seen as a minimum of a good pass at Maths GCSE whereas Delta is aimed at the upper challenge in relation to the Maths GCSE. During Y9 students begin work on the topic and skills required for KS4 (see KS4 Curriculum outline)

Below is an indication of the units covered, for more detailed information please feel free to contact your child's Maths teacher.

Year 7

Unit 1 Analysing and displaying data
- interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms
- interpret, analyse and compare the distributions of data sets from univariate empirical distributions

Unit 2: Number skills
- order positive and negative integers, decimals and fractions
- apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers
- recognise and use relationships between operations, including inverse operations
- use the concepts and vocabulary of prime numbers, factors (divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation theorem
- use positive integer powers and associated real roots
- estimate answers; check calculations using approximation and estimation
- round numbers and measures to an appropriate degree of accuracy

Unit 3: Expressions, functions and formulae
- use and interpret algebraic manipulation
- substitute numerical values into formulae and expressions, including scientific formulae

Unit 4: Decimals and measures
- order positive and negative integers, decimals and fractions

Unit 5: Fractions
- calculate exactly with fractions, **surds** and multiples of π
- work interchangeably with terminating decimals and their corresponding fractions
- identify and work with fractions in ratio problems

Unit 6: Probability
- relate relative expected frequencies to theoretical probability

Unit 7: Ratio and proportion
- express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1
- use ratio notation, including reduction to simplest form

Unit 8: Lines and Angles
- use conventional terms and notation
- apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles
- derive and apply the properties and definitions of special types of quadrilaterals

Unit 9: Sequences and graphs
- work with coordinates in all four quadrants
- plot graphs of equations that correspond to straight-line graphs in the coordinate plane
- generate terms of a sequence from either a term-to-term or a position-to-term rule
- recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions, Fibonacci type sequences, quadratic sequences, and simple geometric progressions

Unit 10: Transformations
- plot graphs of equations that correspond to straight-line graphs in the coordinate plane
- generate terms of a sequence from either a term-to-term or a position-to-term rule

Year 8

Unit 1: Number
- apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers – all both positive and negative
- recognise and use relationships between operations, including inverse operations
- use the concepts and vocabulary of prime numbers, factors (divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation
- use positive integer powers and associated real roots

Unit 2: Volume
- use standard units of measure and related concepts
- know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)
- know the formulae: circumference of a circle = $2\pi r = \pi d$, area of a circle = πr^2; calculate: perimeters of 2D shapes, including circles

Unit 3: Expressions and equations
- use and interpret algebraic manipulation
- substitute numerical values into formulae and expressions, including scientific formulae
- understand and use the concepts and vocabulary of expressions, equations, formulae, <u>identities</u>, inequalities, terms and factors
- simplify and manipulate algebraic expressions
- understand and use standard mathematical formulae; rearrange formulae to change the subject
- where appropriate, interpret simple expressions as functions with inputs and outputs

Unit 4: Real life graphs
- plot graphs of equations that correspond to straight-line graphs in the coordinate plane; use the form $y = mx + c$,
- identify and interpret gradients and intercepts of linear functions graphically and algebraically

- plot and interpret graphs (<u>including reciprocal graphs</u> **and exponential graphs**) and graphs of non-standard functions in real contexts

Unit 5: Decimals and ratio
- order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, > , ≤, ≥
- apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers
- round numbers and measures to an appropriate degree of accuracy

Unit 6: Lines and angles
- apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles; understand and use alternate and corresponding angles on parallel lines
- derive and apply the properties and definitions of special types of quadrilaterals, including square, rectangle, parallelogram, trapezium, kite and rhombus; and triangles and other plane figures using appropriate language

Unit 7: Fractions
- calculate exactly with fractions, **surds** and multiples of π;
- work interchangeably with terminating decimals and their corresponding fractions

Unit 8: Straight line graphs
- plot graphs of equations that correspond to straight-line graphs in the coordinate plane; use the form $y = mx + c$

Unit 9: Percentages, decimals and fractions
- work interchangeably with terminating decimals and their corresponding fractions
- interpret fractions and percentages as operators
- define percentage as 'number of parts per hundred'; interpret percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively

Unit 10: Statistics, graphs and charts
- interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms
- interpret, analyse and compare the distributions of data sets from univariate empirical distributions
- se and interpret scatter graphs of bivariate data; recognise correlation and know that it does not indicate causation

Assessment
Students are given summative assessments during each assessment period, which consists of a formal test. They are given revision lists and questions to help them revise effectively. All teaching staff are involved in setting, marking and recording information from these assessments on the department computerised records. Summaries of these assessments are recorded in the front of students' books with detailed summaries and targets written into their books at appropriate points.

As well as these formal assessments, students receive formative feedback on homework tasks which includes a personalised follow-on task designed to help the student work on developing a specific skill as determined by the feedback, some practicing key skills developed in lessons and some developing problem-solving and investigative skills.

Other information and resources

There is no set textbook used within the Mathematics; but there are plenty of good Key Stage Three revision guides available which can be used. There are also lots of good online resources that we use, and the students can use at home for revision or extra practice.

- https://hegartymaths.com/ uses interactive animation to review core subjects, including questions that give immediate feedback on the answer. This website is where your child's homework will be found.
- www.bbc.co.uk/bitesize interactive revision material from year 1 through to A level.
- https://corbettmaths.com is a website full of questions, QR codes and exam papers for students to build on their confidence.
- www.cgpbooks.co.uk offers a range of revision guides and workbooks for sale at all levels

Our teachers offer various clubs such as Homework club and have ICT equipment such as laptops available very lunchtime and after school.

How to help your child in Key Stage 3

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. However, the methods are the same but we teach using a child-centred approach that draws on their own understanding of maths. We then use discussion and sharing to create a method or methods that we can all use. This means that there may be more than one way to solve a problem. The most important thing for us is that the children 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.
- Talk to teaching assistants in the learning centre who can also go over the methods and reasons as well.
- Go online to https://hegartymaths.com where they will find notes, videos and questions on all the topics we study.

To help them solve problems, you could:

- 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

Mathematics is taught using a problem-solving approach. As part of this, we use exploration so that students discover mathematics for themselves. As a result, it would be counter-productive to give definitions of all the terms that will be covered during Year 7. However, these 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.
Square	When you multiply a number by itself. This is denoted using a superscript 2, e.g. 4^2.