Maths curriculum

The Vision for all our students who study Mathematics *(Curriculum Intent)*

Mathematics is important in everyday life. It is integral to all aspects of life and with this in mind we endeavour to ensure that students develop a healthy and enthusiastic attitude towards mathematics that will stay with them to encourage economic wellbeing. Mathematical experiences help develop skills such as communication, generalizing, evaluating and enquiry, we recognise this importance and therefore provide our students with a wide range of mathematical experiences. It will be expected that students are able to critically think logically and explain their reasoning through speaking and listening, mental mathematics and informal / formal written methods. We aim to provide a mathematics curriculum, which will produce individuals who; become fluent in the fundamentals of mathematics, reason mathematically following a line of enquiry, an solve problems by applying their mathematics, know and understand the importance of mathematical language to develop mathematical vocabulary within justification, argument and proof and are creative, inquisitive, enquiring and confident and have an appreciation of mathematics.

Rationale *(What the curriculum is based on / Implementation)*

Our curriculum is based on the key elements of mathematics in the 2014 National curriculum
Number
Algebra
Ratio, proportion and rates of change
Geometry and measures
Probability
Statistics

Throughout KS3 we endeavour to cover all aspects of these elements to solidify the knowledge that pupils will need in order to access the curriculum in KS4. Our KS3 curriculum builds upon the 2014 National Curriculum and deepens their knowledge throughout the course. This allows us to create confident and numerate students able to progress to KS4 and beyond.

In 2020 we adopted the White Rose Maths Scheme of Work

In our secondary curriculum, we start with algebra as this is key to the secondary curriculum as well as being comparatively new for pupils. Again we carefully order the skills – understanding notation, one-step equations, then two-step equations etc., revisiting the concepts in other areas of the curriculum and making sure that topics are covered so pupils experience variety as well as consolidation.

The fundamental idea behind our curriculum design is to support pupils to be able to perform simpler tasks so they can then move on to perform more complex tasks. For example, we cannot expect pupils to add two numbers together before they understand what each individual number represents.

This thinking gives rise to a typical sequence of 'blocks' of mathematics that you will see in most of our year groups. Within each of these blocks we then have **'small steps'** which are again sequenced in order of difficulty and dependency.

Our curriculum is designed to use skills that have already been learnt in different contexts (sometimes called 'interleaving') whenever we can. This helps pupils to remember and to make connections between different parts of the curriculum.

For example, in Year 8, fractions and percentages will feature in:

- Standard index form
- Area of trapezia and circles
- The data handling cycle

…before being built on and extend in Year 9 and beyond.

We try to include this revisiting in our example questions, and also in the worksheets that accompany our small steps and with other resources to help pupils remember:

- **Flashback 4** – a daily starter activity consisting of one question each from a topic covered last lesson, last week, two or three weeks ago and last term or last year
- **True of False** – a question for each step that can be used whenever the teacher wants to bring that topic back to the front of pupils' minds

Feedback to students

Work is taught in short units or blocks and at the end of each block there is an assessment and students are given feedback on the skills that have achieved – an example is given below.

Qu	WRM Y7 Block 1 Sequences	☺	☹
1	I can describe and continue a sequence given in a diagram		
2,3	I can predict and check the next term(s) of a sequence		
4	I recognise the difference between linear and non-linear sequences		
5	I can continue a linear sequence		
6,7	I can continue a non linear sequence		
8	I can represent sequences in tabular and graphical forms		
9, 10, 11	I can find missing numbers within sequences		

Enrichment:
We offer entries to the UKMT Maths challenges at key stage 3 and have accessed the Royal Institute of Mathematics Masterclasses for our more able students.

KS4 exam courses
In year 9 we start delivering the GCSE course – we follow the Edexcel scheme of work and classes follow either the route map for either Foundation or Higher Tier. We are flexible with our entry policy and final decisions on tiers of entry are made in March of year 11 leaving the door open for those borderline students to sit Higher tier for as long as possible.

We offer the Edexcel Entry level certificate for students who need that extra support or confidence to gain their grade 1.

For our more able students we have offered a variety of opportunities from Edxcel Level 2 Awards in Year 9 to Level 2 Certificate in Further Mathematics in year 11 depending on the cohort.

We have attended Maths Fest and Maths Inspiration Theatre shows promoting the understanding of the wider uses of Maths in everyday life and within different careers

KS5 exam courses
In Key Stage 5 we offer Edexcel Maths A level which is split into 2/3 Pure Mathematics and 1/3 Applied (Mechanics and Statistics). We follow the Edexcel scheme of work and the 6 taught lessons a week are split as follows: 4 lesson Pure, 1 lesson Mechanics, 1 lesson Statistics.

SMSC

Spiritual development in Mathematics
The study of mathematics enables students to make sense of the world around them and we strive to enable each of our students to explore the connections between their numeracy skills and every-day life. Developing deep thinking and an ability to question the way in which the world works promotes the spiritual growth of students. Students are encouraged to see the sequences, patterns, symmetry and scale both in the man-made and the natural world and to use maths as a tool to explore it more fully.

Moral development in Mathematics
The moral development of students is an important thread running through the mathematics syllabus. Students are provided with opportunities to use their maths skills in real life contexts, applying and exploring the skills required in solving various problems. For example, students are encouraged to analyse data and consider the implications of misleading or biased statistical calculations. All students are made aware of the fact that the choices they make lead to various consequences. They must then make a choice that relates to the result they are looking for. The logical aspect of this relates strongly to the right/wrong responses in maths.

Social development in Mathematics
Problem solving skills and teamwork are fundamental to mathematics through creative thinking, discussion, explaining and presenting ideas. Students are always encouraged to explain concepts to each other and support each other in their learning. In this manner, students realise their own strengths and feel a sense of achievement which often boosts confidence. Over time they become more independent and resilient learners.

Cultural development in Mathematics
Mathematics is a universal language with a myriad of cultural inputs throughout the ages. Various approaches to mathematics from around the world are used and this provides an opportunity to discuss their origins. This includes different multiplication methods from Egypt, Russia and China, Pythagoras' Theorem from Greece, algebra from the Middle East and debates as to where Trigonometry was first used. We try to develop an awareness of both the history of maths alongside the realisation that many topics we still learn today have travelled across the world and are used internationally.

British Values
Democracy – we learn how Maths is used to help make decisions such as during elections and Census' and through the Office of National Statistics
Individual Liberty - we encourage students to take ownership of their own learning and responsibility for consolidating the work we do during lessons
Tolerance and Respect of opinions and diversity - we discuss the different cultural origins of maths, we learn multiplication methods which stem from different cultures, including Chinese and English, and we study Pythagoras and Fibonacci which originate from different countries.

Concept of cultural capital
- In maths we provide knowledge and understanding of financial matters, teaching pupils explicitly about such things as compound interest and depreciation, as well as concepts such as tax, deposits and mortgages.
- We teach students to use exchange rates for foreign travel and the calculations of VAT.
- Through work on representing and analysing data pupils begin to think critically about information that is presented to them as well being exposed to situations where data may be misleading, examples are used that draw attention to key issues such as debates around climate change and deforestation.

- When teaching standard form pupils' attention is drawn to the wonders of the solar system and the wider universe by using examples based around the speed of light and distances between celestial bodies. Speed, distance and time and mass, density and volume problems make strong links with Science and help pupils understand mathematics as the language of Science.
- The history of mathematics is explored which demonstrates the universal nature of the subject and the notion that different cultures have, at different times, been at the forefront of development in the subject.
- Pupils learn about famous mathematicians, such as Pythagoras and Fibonacci, along with the theories or rules they are famous for.

Cross-curricular opportunities, literacy and numeracy

We encourage cross curricular Mathematical links through our schemes of work and teaching. Literacy links are important in Mathematics to support students with their reasoning.

We encourage students to learn the definitions of key terms and allow them to discuss and derive their own understanding of that word. We support students in discussing their misconceptions and encourage clear and concise explanations for example when comparing data.
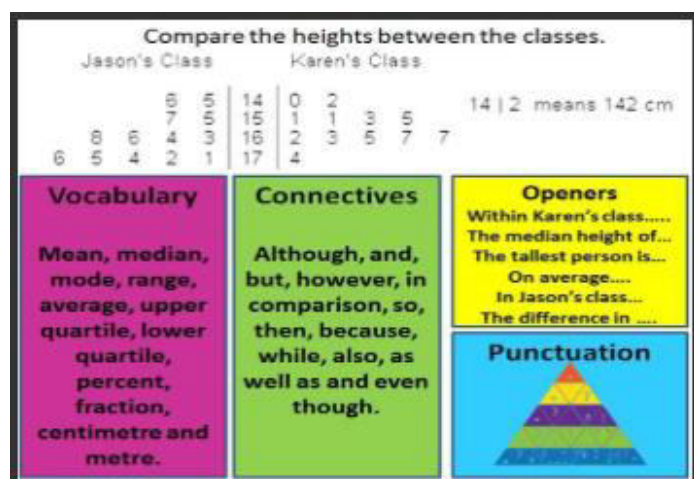
Careers (Gatsby benchmark 4 coverage)

All teachers have a role in helping students to prepare for their next steps in learning and work whether it is in further and higher education, apprenticeships or employment. We do this by providing students with information and advice about what they're good at, where the opportunities are and what skills they need to succeed such as career management, employability and enterprise skills. Maths teachers ensure that their students know about:

- What's involved in studying maths at the next level, e.g.
  - at KS4,
  - post 16.
  - at degree level
- The general value of maths in careers and everyday life, e.g.
  - Numeracy skills are needed in most jobs such as being able to do basic calculations, to make sense of data in graphs and charts, to have a basic understanding of probability
  - A qualification at level 2 such as GCSE maths A*-C is a general entry requirement for many courses and jobs

- o 'A' level maths is one of nine 'facilitating subjects' preferred or required for entry onto degree courses by leading universities in the UK
- The specific value of maths as a required or preferred subject for particular careers, e.g.
  - o Engineers and engineering technicians
  - o Surveyors and surveying technicians
  - o Systems analysts
  - o Actuaries
  - o Accountants
  - o Operational researchers
  - o Chemists
  - o Software engineers
  - o Statisticians
  - o Mathematicians
- Useful subject combinations, e.g.
  - o Maths and physics for meteorology
  - o Maths and chemistry for chemical engineering
  - o Maths, statistics and a social science subject for social scientist/researcher
  - o Maths and art and design for architecture
- Useful skill combinations, e.g.
  - o doing calculations, using ICT and relating well to people, e.g. for accountancy, banking, insurance, investment advice, clerical work
  - o teaching maths and relating well to children and young people, e.g. maths teaching
  - o handling quantitative data and physical skills, e.g. for construction, farming
  - o doing calculations, using ICT, planning and attending to detail, e.g. for transport and logistics
  - o doing mental arithmetic and treating customers well, e.g. for jobs in retail, hotel and catering,
  - o doing geometry and having creative flair, e.g. packaging and product design
  - o using logical reasoning and problem-solving and leading and organising people, e.g. for managerial jobs

We are proud of our students and their success: *(impact)*

Key Stage 4

	2017	2018	2019
Percentage of students achieving 4+	59%	59%	55%
Percentage of students achieving 5+	38%	38%	38%
Percentage of students achieving 7+	12%	16%	6%
Average P8 for Mathematics		-0.39	-0.6

Key Stage 5

	2017	2018	2019
Percentage of students achieving A*-E	100%	100%	100%
Percentage of students achieving A*-B	50%	75%	14%
Percentage of students achieving A*-A	25%	50%	14%
no. of students	8	4	7