Maths

Curriculum Intent

Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. The Maths Department at Bolton Islamic Girls School, in line with the National Curriculum, seeks to provide a high- quality mathematics education that therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject. Our ethos is to believe, achieve and you will succeed. Respect is at the heart of everything we do**.** Respect for a culture of lifelong learning and its power to transform lives is our secret for success.

Aims:

The aims of the Maths Curriculum at BIGS, in line with the National Curriculum for mathematics aims to ensure that all pupils:

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

The Maths Department at Bolton Islamic Girls School follow the Edexcel 5-year scheme of learning that is purposefully designed to create a strong foundation of knowledge and allow a seamless transition from KS3 to KS4 where students follow the Edexcel (9-1) GCSE and to prepare students for the demands of KS5. Students start Year 7 being taught in their mixed ability tutor groups. We will spend the first few weeks doing a variety of tasks and activities specifically designed to assess students' prior knowledge and ability levels. This includes a series of baseline tests (a one-hour non-calculator test and a one-hour calculator test). These tests will take place in the first term of school). After this time and assessment, students can have the teaching tailored to their needs and prior knowledge.

Implementation

We deliver lessons of high quality and foster engagement and a curiosity of learning. Each lesson will be highlighted with a learning objective, prior skills/knowledge and future learning. Lessons will also be linked to job opportunities in industry to highlight the importance that mathematics will play in students' futures. Assessments are meaningful and thoughtfully analysed to enhance future individual learning opportunities. The curriculum is constantly quality assured, monitored and improved upon. Additional intervention is provided to those students who are 'not on target on entry'.

Impact

We aim to nurture a positive perception of Mathematics where students are developed as fluent and confident mathematicians, able to apply their understanding to unfamiliar contexts. Aspirations of continuing mathematical study beyond GCSE are encouraged through the constant application of mathematical ideas to industrial contexts and preparation for the use of Mathematics in everyday life.

We can see and measure the effect of the Maths Curriculum through a range of profoundly important strategies delivered routinely in our lessons. These include reflection work, green and purple pen feedback, regular Maths challenges, and End of Unit tests as well as end of term assessments. Our students learn how to recognise strengths as well as what needs to be done to make progress. Through our relentless determination to improve the quality of education in the Maths department, we expect every student to achieve and enjoy their experiences with us.

The impact of our work on the progress and attainment of students can be clearly seen in the progress of students. In Year 7 and 8, this is through internal assessments. In Years 9, 10 and 11, this is through PPEs. Ultimately, our impact is seen through the GCSE grades for Maths. These have shown an improving picture.

KS3 Maths Curriculum

The programme of study for key stage 3 is organised into distinct domains, but pupils will build on key stage 2 and connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They will also apply their mathematical knowledge in science, geography, computing and other subjects.

The expectation is that the majority of pupils will move through the programme of study at broadly the same pace. However, decisions about when to progress will always be based on the security of pupils' understanding and their readiness to progress. Pupils who grasp concepts rapidly will be challenged through being offered rich and sophisticated problems before any acceleration through new content in preparation for key stage 4. Those who are not sufficiently fluent will consolidate their understanding, including through additional practice, before moving on.

KS4 Maths Curriculum

The programme of study for key stage 4 is organised into distinct domains, but pupils will develop and consolidate connections across mathematical ideas. They will build on learning from key stage 3 to further develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They will also learn to apply their mathematical knowledge wherever relevant in other subjects and in financial contexts.

The expectation is that the majority of pupils will move through the programme of study at broadly the same pace. However, decisions about when to progress will always be based on the security of pupils' understanding and their readiness to progress. Pupils who grasp concepts rapidly will be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material will consolidate their understanding, including through additional practice, before moving on.

Careers using maths

Finance careers offer a good opportunity to apply maths skills to real-world situations and problems. For most roles in finance, you don't actually need a degree in maths but you do need to be good with numbers. Options include:

- accountancy – helping businesses, public sector organisations and charities to look after their money and use it legally
- actuarial work – calculating risk for insurance companies
- investment management – helping organisations and wealthy individuals to invest their money wisely
- investment banking – buying and selling on the financial markets to make a profit or advising companies on taking each other over, raising money or floating on the stock exchange
- retail banking – helping banks to provide services to ordinary customers
- defence and intelligence roles (for example at GCHQ)
- working as a statistician (for example in the civil service)
- operational research (using maths to help businesses make management decisions)

- being an academic mathematician (working at a university to teach students and carry out your own original maths research)
- teaching in a primary or secondary school as a maths specialist.

Famous mathematicians:

Islamic scientists in the 10th century were involved in three major mathematical projects: **the completion of arithmetic algorithms, the development of algebra**, and the extension of geometry.

Medieval Muslims made invaluable contributions to the study of mathematics, and their key role is clear from the many terms derived from Arabic. Perhaps the most famous mathematician was **Muhammad ibn Musa al-Khwarizmi** (ca. 800-ca. 847), author of several treatises of earth-shattering importance.

Muhammad ibn Musa al-Khwarizmi, a Persian scholar in the House of Wisdom in Baghdad was the founder of algebra, is along with the Greek mathematician Diophantus, known as the father of algebra.

Alan Turing: Regarded as the father of computer science and artificial intelligence, Alan Turing was a distinguished mathematician and logician. During WWII, he successfully broke the challenging German Enigma machine codes thereby reducing the duration of war by a couple of years.

Srinivasa Ramanujan: A self-taught genius Indian mathematician, Srinivasa Ramanujan is known for his contributions to mathematical analysis, number theory and continued fractions. Born into a humble family, the celebrated mathematician struggled with poverty but still managed to publish first of his papers in the Journal of the Indian Mathematical Society. Later, his collaboration with English mathematician G. H. Hardy proved very productive.

Ada Lovelace: Ada Lovelace was a mathematician known for her work on the *Analytical Engine*, a mechanical general-purpose computer proposed by Charles Babbage. Many believe that Lovelace was the first to recognize the potential of computers. It is also believed that she published the first algorithm after realizing that the algorithm could be carried out by a machine like the *Analytical Engine*.

Maryam Mirzakhani: Iranian-born Maryam Mirzakhani was one of the greatest mathematicians of her generation, making exceptional contributions to the study of the dynamics and geometry of mathematical objects called Riemann surfaces.
She was a professor at Stanford University and held a PhD from Harvard University. In 2014, she was the first woman, and first Iranian, to be awarded a Fields Medal (also known as the International Medal for Outstanding Discoveries in Mathematics) for “her outstanding contributions to the dynamics and geometry of Riemann surfaces and their moduli spaces”.