

INTENT:

Our aim in the Mathematics Department at GWA is to guide and support the growth of confident and competent mathematicians. Our development of confident and competent mathematicians is rooted in providing students with excellent procedural skills, conceptual understanding, and problem-solving ability. Providing pupils with a high-quality maths education not only allows proficient development of skills and language acquisition, but also gives pupils the opportunity to make the links between content they are studying and other areas of maths and, where appropriate, to content in other subjects.

We strive to ensure pupils are equipped with the skills to be numerate in their everyday lives, while also having an appreciation of the logical nature of mathematics. This allows them to solve abstract problems, whether this is within a classroom or beyond. In our lessons, we emphasise the importance of how and why we reach an answer, rather than simply just the answer itself, demonstrating the importance of reasoning which leads to a conclusion.

We are passionate in our support of the school's overarching vision: Achievement, Care and Excellence. We focus on Achievement, supporting students to make rapid progress from every starting point, and we develop this through showing that making mistakes ultimately leads to learning. To demonstrate Care, we encourage students to lead happy, safe, and successful lives – particularly through supporting them to deal with situations where they do not know how to approach or answer a problem. Excellence is achieved through supporting students to be truly aspirational and explore the joy of mathematics that comes not from finding maths easy but enjoying how difficult it can be.

Key Stage 3

Our Key Stage 3 provision is allied to the National Curriculum in England in its aims to promote the fluency of procedural mathematics, making generalisations through reasoning mathematically, and solving non-routine problems.

This means that they will be able to:

Develop fluency

- ♣ consolidate their numerical and mathematical capability from Key Stage 2 and extend their understanding of the number system and place value to include decimals, fractions, powers, and roots
- ♣ select and use appropriate calculation strategies to solve increasingly complex problems
- ♣ use algebra to generalise the structure of arithmetic, including to formulate mathematical relationships
- ♣ substitute values in expressions, rearrange and simplify expressions, and solve equations
- ♣ move freely between different numerical, algebraic, graphical, and diagrammatic representations (for example, equivalent fractions, fractions and decimals, and equations and graphs)
- ♣ develop algebraic and graphical fluency, including understanding linear and simple quadratic functions
 - ♣ use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability, and statistics.

Reason mathematically

- ♣ extend their understanding of the number system; make connections between number relationships, and their algebraic and graphical representations
 - ♣ extend and formalise their knowledge of ratio and proportion in working with measures and geometry, and in formulating proportional relations algebraically
 - ♣ identify variables and express relations between variables algebraically and graphically

- ♣ make and test conjectures about patterns and relationships; look for proofs or counterexamples
- ♣ begin to reason deductively in geometry, number, and algebra, including using geometrical constructions
- ♣ interpret when the structure of a numerical problem requires additive, multiplicative, or proportional reasoning
- ♣ explore what can and cannot be inferred in statistical and probabilistic settings and begin to express their arguments formally.

Solve problems

- ♣ develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems
- ♣ develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics
- ♣ begin to model situations mathematically and express the results using a range of formal mathematical representations
- ♣ select appropriate concepts, methods, and techniques to apply to unfamiliar and nonroutine problems

In addition, the Mathematics department is committed to supporting whole school Enterprise Skills. We have planned into our schemes of learning the explicit teaching of 'SkillsBuilder' steps across Years 7-11 in all six skills – Teamwork, Leadership, Creativity, Problem Solving, Listening and Presenting. Mathematical thinking most aligns with the Problem Solving aspect of the SkillsBuilder. This can be explicitly seen within maths lessons through 'Reflect, Expect, Check, Explain' (RECE) tasks along with opportunities for applying mathematical procedures to unfamiliar problems. These skills are further honed through specific careers projects that take place during half-term 6, allowing students to apply their knowledge of mathematics to problems that arise in various careers settings.

Skill	Year 7	Year 8	Year 9	Year 10	Year 11
Teamwork	Careers project	Careers project	Careers project	Careers project	
Leadership	Careers project	Careers project	Careers project	Careers project	
Creativity	Careers project	Careers project	Careers project	Careers project	
Problem Solving	Throughout (e.g. RECE tasks)				
Listening	Throughout	Throughout	Throughout	Throughout	Throughout
Presenting	Careers project	Careers project	Careers project	Careers project	

Key Stage 4

Key stage 4 will follow the Edexcel GCSE Syllabus;

1 Number

2 Algebra

3 Ratio, proportion, and rates of change

4 Geometry and measures

5 Probability

6 Statistics

There are two tiers of entry – Higher tier and Foundation tier. It will be decided which tier is most appropriate for each student based on their prior attainment and progress during KS3 and 4.

The GCSE provides clear progression to A Level through similar approaches to assessment, which creates a clear thread running through KS4-5.

Where necessary, the implementation of the curriculum may involve extra bespoke intervention sessions to support students to reach their mathematical potential.

Key Stage 5

Studies at KS5 are through the Pearson Edexcel A Level Mathematics, Further Mathematics, and AQA Mathematical Studies (Core Mathematics). Mathematics and Further Mathematics challenge students to connect abstract and algebraic techniques, using these skills for modelling. Core Maths aims to support students who wish to further develop their numerical skills for the study of subjects which have some mathematical elements (primarily Science, Geography, Psychology, Sociology, Economics, and Business) or to support them in the workplace.

A Level Mathematics

Pure Mathematics: Topic 1 – Proof • Topic 2 – Algebra and functions • Topic 3 – Coordinate geometry in the (x, y) plane • Topic 4 – Sequences and series • Topic 5 – Trigonometry • Topic 6 – Exponentials and logarithms • Topic 7 – Differentiation • Topic 8 – Integration • Topic 9 – Numerical methods • Topic 10 – Vectors

Applied Mathematics: Section A: Statistics • Topic 1 – Statistical sampling • Topic 2 – Data presentation and interpretation • Topic 3 – Probability • Topic 4 – Statistical distributions • Topic 5 – Statistical hypothesis testing
Section B: Mechanics • Topic 6 – Quantities and units in mechanics • Topic 7 – Kinematics • Topic 8 – Forces and Newton's laws • Topic 9 – Moments

A Level Further Mathematics

To date we have catered the course for each cohort to ensure they are studying the most relevant applied modules to best support them.

- Pure Core Mathematics

Plus, two out of:

- Further Mechanics
- Decision Mathematics
- Further Statistics

Level 3 Mathematical Studies (Core Mathematics)

To complement the study of the subjects listed above, we have opted to teach the Mathematical Studies course with the Statistical element (Paper 2A).

Paper 1 – GCSE subject content, 3.1 Analysis of Data, 3.2 Maths for personal finance, 3.3 Estimation

Paper 2 – 3.4 Critical analysis of given data and models, 3.5 The normal distribution, 3.6 Probabilities and estimation, 3.7 Correlation and regression.

IMPLEMENTATION:

Our schemes of learning are designed to outline what we teach to ensure the intent of our curriculum is delivered across each key stage. We have a spiral curriculum which allows all students to see the same content, building on previous knowledge in every year of study. This means that students will have seen the same topics repeatedly, each time at a more advanced level, culminating with the GCSE exam. In this way, we can demonstrate development from one year to the next. Furthermore, lesson time is dedicated to problem-solving, to applying knowledge to unfamiliar situations, to developing mathematical thinking, and to securing links between different areas of mathematics.

IMPACT:

ONGOING TEACHER ASSESSMENT

Our lessons focus on timely and regular feedback to all students. Often in mathematics this takes the form of mini-whiteboard questions, no-hands up questioning and live-marking. We also use quizzes at the end of each topic with lesson time dedicated to the feedback on these.

HOME LEARNING

Students at KS3 complete regular homework on the online platform 'Dr Frost Maths' and 'Eedi' where students receive immediate feedback on questions that are pitched based on their prior attainment on the system. At KS4, students are given the opportunity to complete exam-style questions and compare with official solutions, tracking their progress through various GCSE topics. This is then built upon further at A-Level.

STUDENT SURVEYS

The Mathematics department surveys students in all year groups as a minimum annually, seeking student feedback on the effectiveness of the taught units from a learner point of view and harvesting student voice to ensure the curriculum is kept lively, engaging and relevant.

INTERNAL EXAMINATION RESULTS

Students undertake a minimum of three key assessments using GCSE or GCSE style questions each year 7-9, KS4 and A-Level questions for KS5. On each occasion, teaching staff evaluate the impact of the curriculum by assessing student progress against stated learning objectives. Formal exams are conducted at the end of each year, offering a further opportunity to assess student progress and make judgements about the impact of the taught curriculum.

EXTERNAL EXAMINATION RESULTS

At KS4 and 5, our results in national examinations will be a clear measure of the impact of the curriculum. These results will be the culmination of a data trail tracking from a student's first term at GWA as part of the school's annual data collection and reporting of progress cycle.

WORK REVIEWS

We learn from the 3 annual schoolwork reviews and conduct our own moderation of exercise books and assessments in a clear cycle of department meetings throughout the year.

IMPACT

GLA Testing

To seek understanding of the progress made, GLA testing allows us to see the impact of the learning in mathematics across KS3.

Where possible (and appropriate) opportunities for external moderation with other high performing schools are sought.

DESTINATIONS

The eventual destinations of students, and the extent to which they can lead happy, successful lives, will be the ultimate measure of curriculum impact.

Read the department annual Curriculum Impact Report for more information