

## MATHEMATICS DEPARTMENT CURRICULUM STATEMENT

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### INTENT:

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Our aim in the Mathematics Department at GWA is to guide and support the growth of confident and competent mathematicians. A firm basis of our development of confident and competent mathematicians is rooted in providing students with good procedural skills and providing them with opportunities to develop outstanding mathematical vocabulary. Providing pupils with a high-quality maths education not only allows proficient development of skills and language development, but also giving pupils the opportunity to make the links between content they are studying and other areas of the subject and, where appropriate, to content in other subjects.

We strive to ensure pupils are equipped with the skills to be numerate in their every day lives while also having a love of the algorithmic nature of mathematics and solving abstract problems that will ultimately lead to the further study of the subject. In our lessons we emphasise the importance of how and why we reach an answer, rather than simply just the answer itself.

We are passionate in our support of the school's overarching vision; for students to be ACE. We focus on Attainment, supporting students to make rapid progress from every starting point and we develop this through showing that getting things incorrect ultimately leads to learning; on Care, encouraging students to lead happy, safe and successful lives – particularly through supporting them to deal with situations where they do not know to approach or answer a problem; and on Excellence, supporting students to be truly aspirational and explore the enjoyment 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

We aim also to prepare students for success at GCSE and beyond. As such, students are challenged to respond to GCSE style questions from the very beginning of KS3 and will receive advice and guidance about how to improve their answers in line with GCSE success criteria.

In addition, the Mathematics department is committed to supporting whole school Enterprise Skills. We have planned into our schemes of learning explicit teaching of 'Skillsbuilder' steps across years 7-11 in all six skills – Teamwork, Leadership, Creativity, Problem Solving, Listening and Presenting. In Maths, we consider Mathematical Thinking to be in line with the Problem Solving aspect of Skillsbuilder and therefore incorporate it into the work we do throughout each half term. In Maths, this is through 'Reflect, Expect, Check, Explain' which we use as often as is appropriate in class.

Skill	Year 7	Year 8	Year 9	Year 10	Year 11
Teamwork					
Leadership					
Creativity					
Problem Solving	Embedded as 'mathematical thinking' through Reflect, Expect, Check, Explain	Embedded as 'mathematical thinking' through Reflect, Expect, Check, Explain	Embedded as 'mathematical thinking' through Reflect, Expect, Check, Explain		
Listening					
Presenting					

### 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. This new content alongside a revisiting and deepening of knowledge of content and skills studied previously. The GCSE provides clear progression to A Level through provision of similar approaches to assessment to better ensure a clear, coherent approach from KS3 to KS5.

We have chosen for our pupils to study a 3 year key stage 4 for mathematics, here is why:

- To allow us to use the assessment and indicative markbooks/progress maps from the exam board, given we are a new school this is even more appropriate to give our students the very best support and indicative grades will allow us to support students who are not making expected progress quicker
- To give enough time for each topic to be taught in the depth it deserves and that is required for a strong understanding
- To ensure students are on the correct path for their outcome, this allows for greater focus on the most relevant skills – foundation tier (numeracy for life, study of core maths) or higher tier (further study in mathematics or mathematics related areas)
- Similar to KS3: Taught in a way that mirrors our KS3 curriculum, it interweaves content, focuses on mathematical terminology, strong procedural skills, extension & challenge
- Different to KS3: A bigger focus on exam style questions and worded (application) questions and ‘mathematical thinking’, intelligent practice, diagnostic questions & eedi, quizzes are different style – exam questions, ssdd, GFPS + free recall to encourage retrieval and to show students what they know.

## **Key Stage 5**

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

### **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**

Pure Core Mathematics, Optional Modules: Further Mechanics, Decision Mathematics

### **Level 3 Core Mathematics**

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### **IMPLEMENTATION:**

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Schemes of learning are designed to outline what we teach to ensure the intent of our curriculum is delivered across each key stage.

Our schemes of learning include:

#### **Long term overviews:**

- Clear links to prior learning (Y7 linked to KS2, Y7 to Y8 and so on)
- Topic outline summarising key content

### Medium term plans:

- Root enquiry and key enquiry questions
- Key Knowledge, Skills and Understanding (delivered through know, apply, extend learning objectives/outcomes)
- Duration
- Planned assessment of student progress and impact of taught curriculum
- Assessment and improvement opportunities (DIRT) – through fortnightly quizzes
- Literacy and Numeracy
- Opportunities to extend learning
- Enterprise skills in the form of projects
- Appropriate challenge and differentiation opportunities

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### IMPACT:

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#### ONGOING TEACHER ASSESSMENT

Our lessons focus on timely and regular feedback to all students. Often in mathematics this takes the form of AfL through Mini-whiteboard questions and no-hands up questioning. We also mark fortnightly quizzes to provide students with feedback.

#### INTERNAL EXAMINATION RESULTS

Students undertake a minimum of three key assessments using GCSE or GCSE style questions each year 7-9, KS4 and 5. 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.

#### HOME LEARNING

Students complete weekly homework on the online platform 'Dr Frost Maths' where students receive immediate feedback on questions that are pitched based on their prior attainment on the system.

## IMPACT

#### WORK REVIEWS

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

#### STUDENT SURVEYS

The Mathematics department survey's 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 relative.

#### 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 are able to lead happy, successful lives, will be the ultimate measure of curriculum impact.

Read the department annual Curriculum Impact Report for more information