

Subject overview for: Mathematics

1. Subject overview

The main aims of our mathematics curriculum is for students to:

- Enjoy and develop a love of mathematics appreciating its beauty.
- Develop fluency in their mathematical skills and develop confidence in using them effectively
- Tackle increasingly difficult problems, learn from their mistakes and develop high levels of resilience
- Apply mathematics to everyday situations and appreciate how mathematics can be used to solve real life problems
- Reason mathematically, generalising findings and develop arguments using mathematical language.

2. Year 7 – 11 Summary

In all Years a key emphasis is placed upon students mastering key ideas and concepts. Every lesson has a highly focussed lesson objective. Strategies such as concept/non-concept, directly tackling misconceptions and careful building of skills are used within the majority of lessons. In addition to covering all of the national curriculum objectives, there is an emphasis placed upon students developing their mathematical vocabulary and accurate use of mathematical notation. Students are given opportunity to develop their skills by being presented with questions that focus on fluency, reasoning and problem-solving skills.

Students in all years are taught mathematical content to extend their level of prior attainment.

Within each Year group students are working on topics and content at one of 3 levels.

Ability level	Year 7	Year 8	Year 9	Year 10	Year 11
Exceeding age-related expectations	Stage E	Stage D	Stage C	Stage B	Stage A
Working at and above age-related expectations	Stage F	Stage E	Stage D	Stage C	Stage B
Working towards age-related expectations	Stage G	Stage F	Stage E	Foundation	Foundation

Every stage is split into 14 equally sized blocks of work which are covered over roughly a two-week period. Within each stage the ordering of the blocks of work has been very carefully considered and subsequently refined. There is a strong focus on numerical and algebraic skills within the earlier blocks of each stage. These skills are then built upon within later blocks where there is a stronger focus on geometrical and data handling skills.

Stage G

This stage has been specifically put together to help students who have not been successful with their maths at Key Stage 2. There is a very heavy focus on numeracy skills. Students particularly focus on building confidence with number; this includes looking at place value, number bonds and times tables. There is also a focus on transferable maths skills to support other curriculum areas such as time and measurements.

Stage F

Again, this stage has a heavy numeracy focus; however, students now look beyond whole numbers. Students build an understanding of how fractions, decimals and percentages are used to represent parts of numbers. They are also introduced to pictorial representations of parts and wholes using 'bar models' and 'double lines'. Later in the stage students apply these skills in geometry and data representation topics.

Stage E

This is the first stage that all students will complete at some point in their time at JMHS. After developing an understanding of negative numbers students are formally introduced to algebra and how to manipulate algebraic expressions. This leads on to other related topics such as solving equations. In addition to these algebraic skills students are taught how to use formal geometry notation such as how to identify line segments and angles using labelled vertex positions.

Stage D

This stage builds upon student's introduction to algebra with students now beginning to manipulate expressions they have formed, rearranging equations and formulae. This one core skill is applied frequently throughout the rest of the stage with blocks of work on compound measures, perimeter and area and Pythagoras' Theorem. Students also continue to build their repertoire of numerical skills looking at significant figures and how multipliers can be used to solve percentage problems.

Stage C

This stage marks the beginning of a student's preparation for higher level GCSE. Early on in this stage students are introduced to manipulating quadratic expressions, index laws, simultaneous equations and mathematical proof. These skills are then revisited in many of the other units throughout the year. In the second half of the year higher level geometry skills are introduced such as trigonometry and vectors, building upon earlier foundations. There is also a stronger focus on data handling than earlier stages. Students are taught set notation, how to deal with probabilities involving multiple events and techniques linked to cumulative frequency.

Stage B

Students are now expected to use their higher-level algebra techniques fluently. These skills are then honed through topics such as manipulating algebraic fractions and 'completing the square'. There is also a focus on students being able to fluently move between an algebraic and graphical representation of various functions. Links are created between geometric techniques such as working with Pythagoras, trigonometry and vectors in three dimensions. In addition, this stage builds upon students understanding of proof, this is extended to looking at geometric proof involving circle theorems.

Stage A

This stage has a significantly reduced content as it will only be completed by the highest attaining students in Year 11 before they move onto their revision. Key algebraic techniques will be extended and there is a focus on interlinking between various higher-level techniques.

Foundation

This stage has been designed for students whom we have identified will definitely sitting their Maths GCSE at foundation level. There is a strong focus on further developing core numeracy and algebra skills. Students are continually challenged to improve both their fluency with these skills and their ability to apply them in problem solving scenarios. All topics covered in the foundation GCSE exam are covered within this stage.

3. Sixth Form courses

Mathematics A level

The first six weeks of the Mathematics course focus on 'bridging the gap' from GCSE. Core skills such as work on simultaneous equations, indices, surds, quadratics, proof and coordinate geometry are revisited and built upon introducing higher level techniques. During this initial phase of the course an emphasis is placed upon students developing note taking skills; a number of assessments are open notebook to reflect this. The principle of students practicing skills after every lesson is also instilled upon students to build fluency and resilience. As the year moves on more advanced techniques are introduced such as calculus and trigonometric equations, before one teacher teaches the statistics section of the course whilst the other teaches mechanics. Throughout Year 12, weekly written assignments provide students with an opportunity to develop their written communication skills to exam standard and receive regular feedback on their mastery of newly acquired skills. Autumn term of Year 13 has a heavy algebraic focus, with students looking at advanced calculus techniques, using trigonometric identities and algebraic fractions. These skills are then applied in the final sections of the course and the applied statistics and mechanics units. After Easter in Year 13, students then hone the mathematical skills they have learnt, linking ideas and applying skills and techniques in differing contexts to help prepare for final exams.

Further Mathematics A level

The Further Maths course has been carefully written to run parallel to the A level Mathematics course. Where possible skills are linked, for example when quadratic and cubic functions are studied in A-level Mathematics the further mathematicians look at complex roots of equations and the relationships between roots of polynomials. The first term focuses on pure mathematical skills such as further proof techniques, defining and sketching new functions, matrices and vectors. An emphasis is placed upon students accurately using mathematical notation and writing rigorous mathematical arguments. The second term has more of a focus on the applied statistics and mechanics elements of the course. Year 13 continues in a similar vein with skills from A level Mathematics being substantially built upon such as calculus skills being applied to solve first and second order differential equations. By the time students have completed further statistics and mechanics units they have become highly skilled mathematicians capable of pursuing a degree or career with high levels of mathematical content.

Accounting A level

In the first term of Year 12 students develop an understanding of the accounting process from source documents, through to the production of final accounts with adjustments. This is a steep learning curve and students are encouraged to develop good study skills from the outset. There are many opportunities to develop their skills with practice questions, assignments, and tests at the end of each topic. In the second part of the year these previously learned skills are used to produce Financial Statements for limited companies and to analyse the accounts of individuals and limited companies using ratio analysis. Students will also learn about different types of business structures (PLC's, private limited companies and sole traders) including the legal requirements they need to fulfil and how businesses raise finance. There is emphasis on accuracy and working methodically at all times. The students need to develop an excellent working knowledge of 'double entry' and all of the topics taught in Year 12 to be successful in Year 13. Links between topics are developed to allow students to develop mastery of the subject, topics are revisited at every opportunity throughout the year.

Year 13 focuses on further development of double entry skills in topics such as incomplete records, partnership accounts, further Financial Statements (cashflow and change in equity), cost accounting, budgeting and financial ethics. There is an emphasis on decision making within a business and how the finance professional can influence the direction a business can take through effective calculations and clear communication. The students need to develop their writing skills to produce clear discussion on business decisions culminating in recommendations to the businesses' stakeholders. Many opportunities

are given to develop these skills. Once the syllabus has been completed in the spring term revision begins with a strong focus on exam practice for calculations and written questions.

Mathematical Studies Level 3 qualification equivalent to half an A level

There is an emphasis of developing student's confidence in mathematics during this course. Some of the topics covered in this syllabus have been covered to an extent at GCSE, and the topics are taught through investigation using an applied approach. There are strong links between the mathematical content of this syllabus and other A levels, and every effort is made to relate the subject content to other subject areas. The statistics covered in Year 12 and graph work in Year 13 are particularly applicable to the sciences. There is a strong emphasis on explaining and applying the results of calculations. The financial maths in the syllabus is designed to educate students about borrowing, saving and understanding their tax liability, these are practical life enhancing skills, and are taught with examples of real-life situations.

4. Contribution to preparing for life in modern Britain/equalities

Throughout the mathematics curriculum there is a focus placed upon money and student's financial literacy. Students of every level of prior attainment complete a specific block of work looking at interest earned on deposits, interest on loans, VAT, wages, salaries and income tax. During this section of work students are encouraged to ask questions to develop their understanding of how money will play a pivotal role in their future life.

Mathematical studies focuses on AER, APR, VAT, Income Tax and National insurance. It also looks at inflation and budgeting making students more financially literate and able to manage their own finances. Accountancy prepares students for the world of work whether in accounting of another career, understanding business finance is vital to the success of a business.

5. Contribution to careers provision

Throughout the curriculum mathematical skills and techniques are frequently induced to students through concrete examples often referencing people working within different careers; such as area and perimeter skills being used by carpet fitters, bearings being used by pilots and trigonometry being used by surveyors. Further reference to jobs and occupations also occurs where students are applying skills in problem solving questions.

The unit of work that students complete on money highlights the salaries earned by different professions. Financial role play of these differing salaries helps students understand the importance in achieving qualifications and can be aspirational for a number of students.

The accounting syllabus gives an excellent basis from which to begin a career in accounting, whether a student decides to take up further study at degree level or enter the world of work with an apprenticeship. Students choosing a career in accounting will have a very good knowledge of the skills required to be successful. Students who decide to focus on other areas of study will have gained an excellent insight into business finances, an invaluable skill in any career.

Mathematical studies bridges the gap between GCSE and A level Maths, giving students the opportunity to continue their education in maths along with other chosen A levels. This allows them to improve their maths skills, support their other subjects and tackle the maths heavy content of many other A levels. It prepares them for university studies where maths skills are often required and prepares them for the world of work. They will have developed financial skills to help them to lead a more informed financial life.