



Mathematics Curriculum

Intent

Curriculum Vision

Maths is the universal language by which we make sense of the world around us and the means by which its problems are solved.

Students are supported in becoming mathematically competent and functionally numerate through a curriculum that challenges pupils to build stronger conceptual understanding of maths – enabling them to reason formally, connect ideas and solve problems by selecting appropriate techniques. They become accurate and efficient problem solvers who can use their maths skills in unfamiliar contexts and in real-life situations. By encouraging creative, mathematical thinking students are able to make cross-curricular links which promote deeper learning.

Students develop the ability to investigate the world around them through developing the statistical skills required in order to collect, analyse, interpret and present data, whilst honing their analytical and logical reasoning skills.

The curriculum develops a level of data literacy and fluency in interpreting statistics that equip pupils for the modern world. Living life to the full in a mathematical context means knowing sophisticated techniques that provide precise ways of analysing things but also being able and willing to consider why and what we should model quantitatively as well as how we should do this.

Students will be Mathematically fluent, financially numerate and statistically competent.

Concepts and Skills

We have identified eight Big Ideas for students to explore.

1. Numerical Fluency: describing, representing and estimating the different types of numbers fundamental to all aspects of life. Calculating with mental and written methods, using formulae, problem solving and checking.
2. Proportionality: recognising, comparing and investigating equivalence and proportionality
3. Exploring & Visualising Shape & Position: investigating, comparing, classifying, visualising, constructing and reasoning. Enhancing understanding of position and direction in mathematical

contexts.

4. Thinking Algebraically: patterns and sequences, generalised arithmetic, developing analytical thinking through, manipulation, calculation, solving and checking.
5. Mathematical Modelling: developing interpretation and prediction through graphs and functions (including real-life scenarios) ; the measuring and graphing skills underpinning practical, real-life applications including units, compound measures and rates of change.
6. Analysing and Summarising Data: creating and interpreting data, tables, statistical charts and diagrams.
7. Statistical Inference and Probability Theory: developing the skills required to successfully analyse and evaluate conclusions based on uncertain data and chance.
8. Applied Mathematics: developing specialist applications of mathematical concepts in real-life contexts (e.g. personal finance, the use of Fermi estimations to solve real-life problems, aspects of Decision Maths, topical issues etc.).

This is how we see our students' skills developing during their seven-year journey

Key Stage 3 pupils will broaden their understanding of the basic mathematical concepts that they were taught in Key Stage 2. They will have opportunities to develop a conceptual understanding through application and problem solving including real-life concepts. In addition, the introduction of new topics including algebra, graphs and statistics, will strengthen their skills in reasoning and interpretation. Key Stage 3 pupils will independently model mathematical situations and start to make connections between different areas of mathematics alongside their other subjects. Pupils will begin to become confident in their use of mathematical language to reason in number, geometry and algebra problems.



Key Stage 4 pupils will demonstrate a deeper understanding of mathematical concepts. Pupils will be more confident, secure and fluent in interpreting diagrams and solutions, selecting the appropriate method to break down and solve problems and reason geometrically. They will be able to independently apply, interpret and evaluate their solution to complex problems. They will leave The Bishop of Winchester Academy confident in their ability to relate their knowledge to real-life contexts, from personal finances to managing their own business, solving every-day problems and prepared for further mathematical studies and/or the modern workplace.

Key Stage 5 pupils will follow the mathematical pathway that best fits how they wish to specialise academically in their post-16 studies. We hope that all pupils who meet the prior attainment criteria will choose to study a formal Level-3 Mathematics course and we will always ensure we offer a comprehensive formal curriculum that supports as many pupils as possible to successfully study Mathematics at an advanced level. For pupils not choosing to study a level 3 qualification we will provide bespoke support in developing the mathematical skills they need to support their current and future studies. Where necessary we will provide a bespoke curriculum to support pupils who need to work on filling in gaps in their mathematical toolbox in order to develop general mathematical fluency and/or to introduce them to the more advanced Mathematical skills that are specific to the context of their chosen Level-3 option subjects.

Vocabulary

Whole-school literacy strategies, such as the Frayer model, will be used in Mathematics in a way consistent with the teaching of vocabulary in other subject areas to enable pupils to develop cross-curricular, linguistic schema.

Conventions such as the use of Latin and Greek prefixes in geometric terms and other tier

3 mathematical vocabulary will be explicitly explored so that knowledge of the etymology of mathematical vocabulary that they already know can help pupils when encountering new terms in their studies of Mathematics, Statistics and other subject areas.

The following examples illustrate how the etymology of some mathematical key terms may be explored to help support the mastery of related mathematical ideas and the learning of related academic vocabulary:

Bisect: verb, relates closely to the perhaps more familiar term 'dissect' used in a practical science context that means 'to cut' with the prefix 'bi' seen in high frequency words like bicycle explaining why the term in Mathematics means to cut in half.

Quadratic: adjective, is a mathematical adjective meaning squared, it however also includes the abbreviation 'quad' which is often used as short for 'quadrilateral' and in real-life describes buildings that form a square shape and might also be connected to other subject specific vocabulary such as the quadrant of a graph.

Fermi estimation: noun, named after the nuclear physics Enrico Fermi. It is an approach to problem solving that has broader meaning and varied applications outside Fermi's own specialist area of nuclear physics where phenomena and measurements are also named after him.

Homework

All students in years 7-11 have Knowledge Organisers as part of their homework in Maths. The Knowledge Organiser content is in line with the sequencing of the curriculum. Self-quizzing supports the retrieval of and embedding of knowledge in long-term memory. Our low stakes Do Nows at the beginning of each lesson tests cumulative knowledge of multiple previous topics, giving students the opportunity to strengthen memory through retrieval practice. This is supplemented by our cumulative multiple choice Knowledge Organiser test at the end of each term. Instead of revision being perceived as something which is crammed into a few weeks, our homework programme supports spaced practice throughout each academic year. By repeatedly returning to content covered, students' knowledge has had time to 'rest and be refreshed.'

Students in years 7,8 and 9 have weekly HegartyMaths tasks set where students watch videos, make notes and utilise the platform's builtin retrieval practice tools (MemRi).

Students in years 10 and 11 have Maths homework every week. Students continue with HegartyMaths tasks (including the regular use of MemRi and FixUp5). They are also regularly set exam practice papers in order to help prepare them for their benchmark examinations in GCSE Maths, GCSE Statistics and (for some) L2 Certificate in Further Maths.

Homework helps our students achieve mastery in Maths. Students who need extra support to achieve mastery are supported by our 10:10 programme in Maths. All students have access to the academy's daily Homework Club.

Implementation

Overview Statement

The curriculum in Maths is sequenced coherently so that concepts and skills are developed over time. This supports students of all abilities, especially SEN students including those with processing difficulties, who need early identification and additional support both inside and outside the classroom (this is especially important for those with a diagnosis of Dyscalculia and Dysgraphia). New content is thoughtfully introduced to maximise its relevance and links to cross-curricular Mathematical and Statistical skills. Planning is informed by Rosenshine's Principles of Instruction and Cognitive Theory. Cross curricular links are explicitly referenced and exploited in order to deepen understanding. Homework, daily retrieval-based 'Do Nows' and termly low stakes knowledge organisers quizzes strengthen memory as do mid-term and end-of- year assessments which are cumulative. Vocabulary is developed in Maths through the Frayer Model and students are taught to read, write and speak like a Mathematician. The use technology is employed to strengthen learning, specifically with scientific

calculators, graphing software, the use of Excel and on-line learning platforms including Hegarty, DrFrost, MyMaths and Kerboodle. Learning character is developed each lesson through the use of the six Learning Applications (LApps).

The five year overview can be found at the end of this document.

Impact

Key Stage Three

Through studying the Key Stage Three curriculum, students will be able to perform Mathematical skills including mental and written methods, the efficient use of a scientific calculator and the use of algebra to describe the world around them. They will have developed a deep knowledge of Mathematical concepts such as modelling and be able to apply this knowledge to describe and solve problems outside the classroom involving time, money, 3D representations and data. Students develop all the Lapps but especially their Awareness and Independence through Statistical analysis and inference. Students have an introduction to the disciplinary literacy required to be able to communicate like an expert Mathematician. Cognitive Theory is interleaved throughout the curriculum so that students gain a knowledge of how they learn and manage their cognitive load.

Key Stage Four

The Key Stage Four curriculum builds upon students' initial understanding, extending their knowledge in the areas of: algebra, especially quadratics; statistical analysis, for example inference and interpretation and mathematical modelling, particularly compound measures and kinematics. Through developing their knowledge of each of these areas, students can confidently make links between different mathematical areas and apply this to solve increasingly complex problems. Students also develop an understanding of the entwined nature of their studies, though explicit cross-curricular links and inter-disciplinary study. Their progress in Maths is recognised through their GCSE entries in Mathematics and Statistics and the Level 2 Certificate in Further Mathematics, which acts as a benchmark of their mastery and provides them with the national currency needed for access to further education and employment. Students use their knowledge of cognitive theory to recognise and use the most impactful methods of revision and retrieval practice.