

## Curriculum Intent

The Mathematics department aims to challenge each student and has high expectations of all its students. We make full use of bespoke Google Sites to deliver the curriculum through students' use of 1:1 devices.

### Key Stage 3

In Year 7, we ensure that all students have covered and are competent in topics that are described in the Key Stage 2 curriculum by assessing their prior knowledge. This allows for a smooth transition between further Key Stages and ensures progression in teaching and learning throughout their time at AHS.

In Year 8 and 9, we build on the knowledge from Year 7 and take the concepts further in preparation for the Higher GCSE course.

We offer a variety of teaching and learning activities such as independent tasks, online activities including Mymaths and Desmos, as well as practical group tasks. This aims to seamlessly bridge the gap from Primary to Secondary level Mathematics and develop the students' fluency in performing and applying key mathematics skills. This helps to engage and motivate our students through full participation in lessons. We typically build in extension material where students can explore enrichment opportunities both within and outside of the curriculum to enhance students' enjoyment of Mathematics, such as Nrich and Mathematics challenge problems.

We aim to nurture students' ability to reason and problem-solve through exposure to a variety of strategies by making this a regular feature in lessons and assessments. Challenge is provided through depth rather than acceleration.

Students are assessed regularly through tests and homework where feedback is given either in lessons, orally or written onto their work. Students are organised by ability from the start of Year 8 by splitting the Year group in two to make three Set 1 groups and three Set 2 groups and this continues into Year 9. There can still be a wide range of ability within a class so we aim to establish a classroom climate where all students feel that they can contribute and which secures their motivation and concentration. We adapt teaching strategies to keep all students suitably challenged, such as the use of Desmos for graphing topics. If intervention is required, we will provide appropriate support within lessons or suggest making use of the maths clinic to ensure students do not fall behind the rest of their peers.

All students will be given the opportunity to partake in the UKMT maths challenge events with support given at a lunchtime club. There is also the House Mathematics competition where students create videos on Mathematics in the real world and posters of inspiring female mathematicians.

### Key Stage 4

The Mathematics department organises the students by ability at the start of Year 10. We stream the students into two set 1 groups, two set 2 groups and three set 3 groups. All students will study for the AQA Higher GCSE Mathematics with the students in sets 1 and 2 having the opportunity to study the Further Maths Level 2 qualification. The aims of this are to give students the time to become fluent in the skills at GCSE and to stretch and challenge the more able students. We have adapted our schemes of work to reflect the changing nature of Mathematics assessments by including more problem-solving activities. We regularly assess prior knowledge using diagnostic questions allowing us to focus our teaching on areas that require the time.

We run revision sessions for Pupil Premium students between their mocks and summer exams.

All students will be given the opportunity to partake in the UKMT maths challenge events with support given at a lunchtime club.

The students revise throughout Year 11 by working through past papers for homework and in class. They can seek help from the Maths Clinic at lunchtimes.

### Key Stage 5

At Key Stage 5 we offer two A Levels and one AS Level: AS and A Level Mathematics and A Level Further Mathematics, following the Edexcel Specifications 8MA0, 9MA0 and 9FM0. Students are taught in small groups by two teachers where they are taught a linear programme with a deeper emphasis on developing and assessing reasoning, problem-solving skills and modelling. There is also a focus on the use of technology in teaching and learning and students will have to analyse data using Google Sheets, Excel and other programmes as well as familiarising themselves with the more advanced statistical uses of their calculators. The large data set is referred to from early on in Y12 so that our students become familiar with it and are able to use it throughout the course. This allows a thorough understanding by the end of the two years. Throughout the course we aim to cover topics in Pure Maths and Applied Maths simultaneously so that our students remain confident in all core skills and are better prepared for their final exams.

We offer Further Mathematics in order to challenge our more capable mathematicians and enable them to move on to Maths and Engineering based courses at university or to higher level apprenticeships with a strong mathematical understanding. In this A Level, students are taught a linear programme with the same emphasis as in Mathematics A Level. They will advance their knowledge of the number system to include complex numbers and explore how these can be used to solve many otherwise impossible problems. We will also extend their learning with modules in Further Decision and Further Mechanics.

All A Level Mathematicians are encouraged to participate in both the individual and group Maths Challenges.

We also offer two enrichment courses:

- 1) Statistics in context is designed to aid students who are not studying A Level Maths but are studying A Levels with a high statistical content such as Biology, Geography, Psychology
- 2) Personal Finance is designed to help students understand money matters in the real world

## Curriculum Implementation

### Key Stage 3

**Calculators are not to be used in year 7. We want to make sure all girls can competently perform calculations. All tests and the end of year exam will be non-calculator.**

Year 7	Year 8	Year 9
<ul style="list-style-type: none"> <li>Sequences</li> <li>Area and perimeter</li> <li>Negative numbers</li> <li>BIDMAS</li> <li>Introduction to algebra</li> <li>Fractions, decimals and percentages</li> <li>Probability</li> <li>Fraction operations</li> <li>Coordinates and transformations</li> <li>Solving linear equations</li> <li>Angles and polygons</li> <li>Averages and displaying data</li> <li>Construction</li> <li>3D shapes</li> </ul>	<ul style="list-style-type: none"> <li>Negative numbers</li> <li>Multiplication and Division</li> <li>Powers, roots, rules of indices; standard form</li> <li>Expanding and factorising with single brackets</li> <li>Reverse percentages and percentage change</li> <li>Sample Spaces/Tree Diagrams</li> <li>Functions and Graphs</li> <li>Circumference and area of circles</li> <li>Volume and surface area of prisms</li> <li>Transformations and Congruence</li> <li>Multiplicative Reasoning</li> <li>Equations and Formulae</li> <li>Stem &amp; Leaf and Scatter Diagrams</li> <li>Inequalities</li> <li>Dimensions and Scales</li> </ul>	<ul style="list-style-type: none"> <li>Linear and Simultaneous Equations and Trial and Improvement</li> <li>Geometrical reasoning</li> <li>Bias, Cumulative Frequency and Comparing</li> <li>Distributions</li> <li>Proportional Reasoning</li> <li>Simplification and Double Brackets</li> <li>Perimeter, Area and Volume</li> <li>Calculations with Compound</li> <li>Measures, Surds and Recurring Decimals</li> <li>Statistical Investigation</li> <li>Transformations and Congruence</li> <li>Further Graphs</li> <li>Tree Diagrams and Relative Frequency</li> <li>Formulae and Expressions</li> <li>Introducing Trigonometry</li> </ul>

### Key Stage 4: GCSE (AQA)

Year 10	Year 11
<ul style="list-style-type: none"> <li>Factorising Quadratics</li> <li>Percentages</li> <li>Equations and Formulae</li> <li>Statistics</li> <li>Straight line graphs</li> <li>Indices and Standard Form</li> <li>Surds</li> <li>Solving Quadratics</li> <li>Different types of curved graphs</li> <li>Trigonometry and trig graphs</li> <li>Angles in circles</li> <li>Equation of a circle</li> <li>Algebraic Fractions</li> <li>Functions</li> <li>Factor Theorem (sets 1 and 2 only) □</li> <li>Calculus (sets 1 and 2 only)</li> <li>Bearings and Trigonometry</li> <li>Shape</li> <li>Pythagoras and Trigonometry in 3D</li> <li>Volume and Surface Area of Pyramids and Spheres</li> <li>Proportion</li> </ul>	<ul style="list-style-type: none"> <li>Sine and Cosine rules</li> <li>Iteration</li> <li>Probability</li> <li>Congruency and Similar Shapes</li> <li>Sequences</li> <li>Shape</li> <li>Upper/lower bounds</li> <li>Compound measures</li> <li>Construction</li> <li>Recurring decimals</li> <li>Transforming graphs</li> <li>Vectors</li> <li>Geometric Proof</li> <li>Graphs</li> <li>Loci</li> <li>Converting units</li> </ul>

### Key Stage 5: A Level (Edexcel)

In Year 12 and 13, we are studying the new Edexcel 8MA0, 9MA0 AS and A Level Mathematics, and 9FM0 A Level Further Mathematics courses.

Year 12	Year 13
<p><b>Pure Maths:</b></p> <ul style="list-style-type: none"> <li>Indices</li> <li>Surds</li> <li>Proof</li> <li>Quadratic functions</li> <li>Lines and circles</li> <li>Simultaneous equations</li> <li>Inequalities</li> <li>Polynomials</li> <li>Binomial theorem</li> <li>Sketching curves</li> <li>Trigonometry</li> <li>Differentiation</li> <li>Integration</li> <li>Logarithms</li> <li>Vectors</li> </ul> <p><b>Mechanics:</b></p> <ul style="list-style-type: none"> <li>Kinematics</li> <li>Motion under constant acceleration</li> <li>Variable acceleration</li> <li>Forces and motion</li> <li>Resolving and resultants</li> <li>Motion under gravity</li> <li>Systems of forces</li> </ul> <p><b>Statistics:</b></p> <ul style="list-style-type: none"> <li>Measures of central tendency</li> <li>Measures of spread</li> <li>Outliers</li> <li>Percentiles</li> <li>Box and whisker</li> <li>Frequency polygon</li> <li>Histogram</li> <li>Cumulative frequency graph</li> <li>Comparing data sets</li> <li>Bivariate data</li> <li>Scatter graphs</li> <li>Correlation</li> <li>Regression line</li> <li>Interpolation and extrapolation</li> <li>Sampling data</li> <li>Probability</li> <li>Binomial Distribution</li> <li>Hypothesis tests</li> </ul> <p><b>If you are studying further maths in Year 12 then you will also study the rest of the A Level in Mathematics and some components of the A Level Further Mathematics.</b></p> <p><b>Pure Maths:</b></p> <ul style="list-style-type: none"> <li>Further proof</li> <li>Functions</li> <li>Parametric equations</li> <li>Algebraic fractions</li> <li>Partial fractions</li> <li>Vectors in 3D</li> <li>Sequences</li> <li>Radians</li> <li>Trigonometric formulae</li> <li>Differentiation and Integration</li> <li>Numerical methods</li> </ul> <p><b>Mechanics:</b></p> <ul style="list-style-type: none"> <li>Kinematics in two dimensions</li> <li>Motion in 2D with constant and variable acceleration</li> <li>Motion under forces</li> </ul> <p><b>Statistics:</b></p> <ul style="list-style-type: none"> <li>Conditional probability</li> <li>The Normal distribution</li> <li>Hypothesis testing</li> </ul> <p><b>Core Pure (further maths)</b></p> <ul style="list-style-type: none"> <li>Matrices</li> <li>Complex numbers</li> </ul>	<p><b>Pure Maths</b></p> <ul style="list-style-type: none"> <li>Proof</li> <li>Algebraic methods</li> <li>Functions</li> <li>Sequences and series</li> <li>Binomial expansion</li> <li>Radians</li> <li>Trigonometry</li> <li>Parametric equations</li> <li>Integration</li> <li>Vectors</li> <li>Differential equations</li> </ul> <p><b>Statistics:</b></p> <ul style="list-style-type: none"> <li>Correlation</li> <li>Conditional Probability</li> <li>The Normal distribution</li> <li>Hypothesis testing</li> </ul> <p><b>Mechanics:</b></p> <ul style="list-style-type: none"> <li>Moments</li> <li>Force and Friction</li> <li>Application of forces</li> <li>Further kinematics</li> <li>Projectiles</li> </ul> <p><b>If you are studying further maths at A Level</b></p> <p><b>Core Pure 1 and 2:</b></p> <ul style="list-style-type: none"> <li>Introduction to differential equations</li> <li>Numerical methods</li> <li>Linear equations</li> <li>Systems of differential equations</li> <li>Calculus</li> <li>Polar coordinates</li> <li>Complex numbers</li> <li>Power series</li> <li>Matrices</li> <li>Hyperbolic functions</li> </ul> <p><b>Further Mechanics:</b></p> <ul style="list-style-type: none"> <li>Energy, work and power</li> <li>Impulse and momentum</li> <li>Hooke's law</li> <li>Elasticity</li> </ul> <p><b>Further Decision:</b></p> <ul style="list-style-type: none"> <li>Algorithm problems</li> <li>Graphs and networks</li> <li>Algorithms on graphs</li> <li>Route inspection</li> <li>The travelling salesperson problem</li> <li>Linear programming</li> <li>The simplex algorithm</li> <li>Critical path analysis</li> </ul>