

# Programme of Learning – Mathematics

	Year 7	Year 8	Year 9	Year 10	Year 11	Post 16
<b>Knowledge and Understanding</b>	Year 7 develops fluency in which numerical and mathematical capability from key stage 2 is consolidated. Beginning the year with a focus on numeracy pupils will look to select and use appropriate calculation strategies to solve increasingly complex problems. Algebraic skills will be incorporated into application of angles, area and perimeter. The year will then extend to pupils developing their proportional fluency including looking at pie charts, percentages and scales.	Year 8 begins with pupils developing their understanding of the number system and making connections between number relationships, proportionality and measures. Formalising mathematical knowledge and beginning to reason deductively in geometry and algebra. Pupils will begin to model situations and select appropriate methods and techniques to apply to unfamiliar and real life contexts.	Year 9 consolidates and strengthens pupils numerical and mathematical capability from Key Stage 3. Selecting suitable calculation strategies for complex problems will be a key feature of this year. Pupils will move to consolidate their algebraic and geometrical fluency, making and testing of conjectures, looking for proofs and counter examples. Retention of key formulae will be essential and assessed. Data handling methods will be explored and developed in which pupils will construct and interpret diagrams and analyse and compare distributions of data sets.	In year 10 pupils apply all previously learnt numerical methods within abstract and real life scenarios. This will empower pupils to extend their algebraic ability to identify variables and express relationships both algebraically and graphically. Within statistics pupils will explore and infer looking to express their arguments formally. Formal reasoning in geometry will be strengthened. Pupils must assess the validity of a solution or argument and should efficiently present their written communication.	The expectation of Year 11 will be that pupils apply formal mathematical knowledge to interpret and solve multi-step problems. Pupils will model and test situations as well as evaluating outcomes. Pupils will be encouraged to make connections between different parts of mathematics by selecting appropriate concepts, methods and techniques. Interpretation of solutions to non-routine problems in the context of given problems will be a key feature of the year. Exam preparation and retention of key skills will be crucial in the run up to terminal exams.	At A-Level, mathematics focuses within 3 areas. The Core content will aim to develop pupils' ability to reason logically, generalise situations and construct mathematical proofs. Pupils will look for coherence and progression in their mathematics, communicating effectively with confidence and enjoyment. The Statistics and Mechanics modules aim to raise the awareness of the relevance of Maths to other fields of study, the world of work and society in general. Pupils will acquire the skills to use technology effectively and understand its limitations.
<b>Skills &amp; Application</b>	<b>Autumn 1: Add/Subtract/Perimeter</b> Add & Subtract, Perimeter, Collect like terms, Estimation, Word problems, Negatives, Conversion of metric lengths <b>Autumn 2: Multiply/Divide/Area</b> Multiply & Divide, Area of rectangles, Factors/HCF/Primes Squares & roots, Simplifying simple algebra, Calculating Mean, Negatives <b>Spring 1: Geometry</b> Angles measuring/ estimating, Angle Rules, Properties of 2D Shapes, Interior and Exterior Angles, Area Trapeziums and Parallelograms <b>Spring 2: Fractions</b> Equivalent, Compare FDP, Multiples and LCM, Simplify, Add and Subtract, Mixed numbers & Improper, Fractions of quantities <b>Summer 1: Sequences</b> Coordinates, Linear Graphs, Term to Term rule, Substitution, Scales <b>Summer 2: % and Pies</b> FDP, Percentages of amounts Drawing Pie charts, Interpreting Pie Charts, Word problems with proportion, Find the whole given %	<b>Autumn 1: Powers &amp; Rounding</b> Indices, Prime Factors, Volume of cuboids & Prisms, Rounding, Estimation, inequalities Use of Calculator, Decimals <b>Autumn 2: Algebra</b> Algebraic Manipulation, Solving Equations & inequalities, Order of operations, Word Problems <b>Spring 1: Proportional reasoning</b> FDP, Finding % of amounts, & increase/decrease, Ratio, Speed, Distance & Time, Multiply & Divide Fractions <b>Spring 2: Geometry</b> Nets, Conversion between length & area units, Area of circles, Conversion between volume, units, Surface Area & Volume of prisms, Weight, Capacity, Density <b>Summer 1: Statistics</b> Collecting & organising data, Pictograms, Bar charts, Pie charts Cumulative Frequency, Box plots Stem and Leaf diagrams, Interpretation, Averages <b>Summer 2: Quadratics</b> Linear graphs & equations, Plot Quadratic Graphs, Expand double brackets, Simultaneous Equations two linear graphically.	Pupils will work interchangeably with terminating decimals and fractions. <i>Extended learners will change recurring decimals into their corresponding fractions, whilst beginning to calculate with standard form and fractional indices.</i>  Simplifying and manipulating algebraic expressions is a key skill and the application of mathematical formulae will be assessed. Graphical interpretation of linear and quadratic graphs alongside the ability to solve linear equations will be advanced. <i>Extended learners will manipulate quadratic expressions including surds and will recognise and advanced graphs such as circles, inverse functions, exponentials and reciprocal graphs.</i>  Interpreting and constructing tables, charts and diagrams pupils will analyse these using appropriate measures of averages and spread. Geometrical rules and properties will need to be derived alongside the understanding of how to solve geometrical problems.	Pupils will develop methods of algebraic manipulation and apply this to ever increasing complex situations. Factorising, solving quadratics, inequalities and simultaneous equations will be key algebraic skills. Proportional relationships play a key role in pupils' confidence at this level numerically and algebraically. <i>Extended learners will develop further their graphical skills including gradients of complex graphs and areas underneath curves.</i>  Mensuration methods will be extended and geometric properties and formulae of the triangle will be explored including extension to trigonometric conjectures. <i>Extended learners will know and apply advanced formulae such as cosine and sine rules.</i> Appropriate graphical representation of data sets will be explored and analysed alongside theories of probability.	The challenge within Year 11 is a personalised set of objectives aimed at developing pupils' fluency across all mathematical skills. Application and inference of knowledge applied to functional scenarios in which written communication and both geometrical and graphical representation is developed. A rigorous tracking and assessment programme supports pupils individually towards aspirational success in terminal exams.	The core content begins with a focus on algebra and functions coordinate geometry and sequences and series. These areas develop upon GCSE knowledge. Pupils will be introduced to the theories behind differentiation and integration. As the course progresses trigonometry, exponentials and logarithms become a running theme throughout the modules.  This Statistics module looks at advancing representations of data and statistical measures. Pupils are introduced to regression and correlation, also looking at distributions. Finally, the Mechanics module looks at the kinematics and dynamics of a particle moving in a straight line or plane. Pupils will be introduced to the statics of a particle, vectors and moments.  With the increasing demands on seeking connections within mathematics pupils will need to take increasing responsibility for their mathematical development.

# Programme of Learning – Mathematics

## Learning Approaches

The Mathematics department approach to lessons is one in which each pupil receives the same entitlement regardless of ability. Lessons include a variety of different tasks and activities, and are challenging, rewarding and inspire pupils to consider studying the subject further. Opportunities to use new technology are relished and incorporated into lessons frequently by the Mathematics team. KS3 will be a focus on numerical fluency, whilst developing problem solving, in a mastery approach in which key skills are regularly assessed to ensure retention.

## Student Support & Development

The Mathematics department consist of a team of highly qualified teachers with varying specialism's which ensure every aspect of Mathematics is covered. Pupils will experience highly differentiated and personalised lessons ensuring they all experience the required amount of challenge and support.

Additional resources such as revision guides and workbooks, [mathswatchvle.com](http://mathswatchvle.com) and [pgslearningzone.com](http://pgslearningzone.com) allow pupils to independently get support across key stages.

## Progression

Mathematics at AS and A Level both are well respected by employers and admission to all degrees at university as well as enrolment in apprenticeships. They provide stepping stones to several career choices such as Accountancy, Engineering, Teaching, Computing, Statistics and Business.

## Subject vision

(why study this subject, what it might lead to)

## Assessment & Monitoring of Progress

Pupils are formatively assessed routinely during lessons, both written and verbally. One formal summative assessment takes place each half term, in a cumulative approach in which all previous knowledge is assessed regularly. Detailed feedback is given for all assessments and pupils are given opportunities for self assessment and Red for Reflection. Pupils' strengths and areas to move forward are provided to each pupil, and intervention strategies target any pupils who do not show the required levels of progress. Homework is set every week in KS4 whilst KS3 students complete several homework projects throughout the year. Feedback is given to pupils verbally and is written in books at least once every week whether this is teacher assessment, self or peer assessment.

## Development of Subject Specific language

Subject specific literacy and key words are used consistently and regularly across lessons to ensure pupils develop their fluency in use of mathematical language and are familiar in the ways questions can be asked in exam questions. The meaning of new words is explored whilst ensuring pupils make links to other subject areas as well as where words are used in everyday life.