

# Mathematics Department

## Curriculum Overview:

### Curriculum Overviews

## Inclusion (Learning Diversity & Support, EAL & SEN, Curriculum Enrichment)

The Mathematics Department works within the whole [school policy for Learning Diversity](#). We believe in providing an equal opportunity for every student to fulfil their potential. We recognise that this does not mean the same curriculum for all. We also recognise that we have a duty to provide a sufficiently challenging and differentiated learning environment to allow the gifts of our learners to develop and flourish.

Extra study support sessions are offered to extend the learning of able students and support the learning of less able.

In class support for students with special education needs is available through the SEN coordinator as per the SEN policy. The SEN department is a school-based service designed to help students who have mild to moderate learning and behavioural difficulties.

## Curriculum Enrichment

The Mathematics Department provides a balanced curriculum that is sequenced in a way to promote students' access and progression. The Mathematics curriculum promotes the development of global citizenship, intercultural learning and assists students to become well resourced digital citizens. Further details are available within the mid-term plans (MTPs) for each subject and year level.

The curriculum is reviewed and evaluated in line with the requirements of Cambridge International Assessment and Examinations and the International Baccalaureate Organisation.

## Child Protection / Health and Safety

In line with whole school policy the science department upholds the standards and responsibilities for ensuring health and safety standards are met and that pupils and staff are able to work in a safe and secure

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*The challenging curriculum enables our students to become adaptable lifelong learners in an increasingly changing world. Our intercultural ethos promotes respect for all within the community.*

environment. Ascot has a school nurse in the case of referrals for minor injury or illness. For an accident that happens in lessons, staff will fill in the student accident form and will send it to the nurse before the end of the day. [Click here for the form](#)

The class teacher is responsible for the safety of pupils in classrooms.

Class teachers are expected to:

- Set a good example by adopting good health and safety practices, and procedures.
- Supervise the pupils and ensure that they know the emergency procedures in respect of fire, bomb scare and first aid, and any special safety measures for the teaching area / activity.
- Give clear instructions and warning whenever necessary (notices, handouts etc. are not enough).
- Ensure that pupils' bags are safely stored, and good housekeeping is maintained. Ensure cables and equipment do not provide unnecessary obstruction or hazards.
- Include all relevant aspects of safety in the curriculum, if necessary in special lessons.
- Ensure that relevant risk assessments are performed, the results recorded and any necessary actions undertaken. This includes school visits and exchange trips

The Mathematics department follows [Ascot's Child Protection policy](#)

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Year 7 SOW overview

Term 1.1	Term 1.2
4/6 figure grid reference Calculations with metric units Proportion/ratio/scale drawing Exchange rates Inequalities Reading decimals from scales Rounding Multiple/composite/grouped bar charts/histograms Divisibility tests	Stem and leaf charts Drawing/reading line graphs Scatter graphs Money Conversion graphs Time/timetables Negative numbers

Term 2.1	Term 2.2
Estimating Coordinates Patterns in numbers Multiply/divide fractions Fractions percentages, decimals Calculate percentages Simplifying/forming expressions Substitution	Equations/forming equations Sequences Area/compound area Nets/surface area/volume Angles Accurate drawing

Term 3.1	Term 3.2
Transformations Compass points Constructions	Comparing distributions Probability Working with statistics in context

Year 8 SOW overview

Term 1.1	Term 1.2
<p>form and simplify an expression  expand brackets  Maths challenge questions.  factorise a trinomial  Solve equations with fractions  Solve a problem by constructing and solving an equation using deductive reasoning  To be able to solve an inequality  Substitute numerical values into formulae and expressions, including scientific formulae.  To be able to change the subject of a formula  To investigate straight line equations and recognise/draw the horizontal/vertical lines  To identify <math>y = mx + c</math> and identify the equation from a straight line graph.  To be able to find and use the <math>n</math>th term of a linear sequence  To be able to simplify using index notation  To be able to combine different indices rules.  To be able to read and write a number written in standard form</p>	<p>To be able to calculate with bounds.  To be able to find the mode, mean, median and range from a frequency table  To find an estimate of the mean, mode and median from a grouped frequency table  To be able to estimate probability from experiments.  To be able to find the probability using sample space diagram  To be able to carry out and describe a reflection and carry out a translation  To recognise and draw the graph from a quadratic equation and draw tangent.</p>

Term 2.1	Term 2.2
<p>to plot and interpret distance vs. time graphs  To be able to calculate interior and exterior angles in polygons.  To be able to solve with area and perimeter in context  To be able to find the volume of a right prism including cuboid, triangular prism and cylinder.  TOK story</p>	<p>To be able to use Pythagoras' Theorem to calculate the length of any side.  To be able to apply Pythagoras' Theorem to problem solving questions  To know the difference between congruent and similar shapes.  be able to calculate missing lengths for two similar shapes.  Find missing angles and sides in right-angled</p>

	<p>triangles</p> <p>To be able to understand and use 3 figure bearings.</p> <p>be able to identify simple loci</p> <p>be able to find a percentage increase and decrease with and without a calculator.</p> <p>To be able to calculate compound and simple interest.</p>
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Term 3.1	Term 3.2
<p>divide a quantity into a given ratio</p> <p>apply ratio to real contexts and problems.</p> <p>be able to convert from one currency to another using given exchange rates.</p> <p>use direct proportion in context.</p> <p>be able to solve simultaneous equations graphically, simultaneously and by substitution</p>	<p>Plot and interpret from a cumulative frequency graph</p> <p>be able to draw and interpret a boxplot</p> <p>be able to draw and interpret histograms with unequal class widths.</p> <p>Use and look at various statistical representations of data and assess why they are appropriate and their limitations.</p>

Year 9 SOW overview

TERM 1.1	TERM 1.2
algebraic expressions Expanding brackets Factorization of an expression. Expand two linear brackets Factorise a trinomial/difference of two squares Algebraic fractions Equations with fractions Derive and solve equations Rearrange formula Substitution Indices Standard form Surds	Quadratic equations Simultaneous equations Inequalities Linear programming Bounds Map scales Foreign exchange Proportional division Unit cost Proportion - direct/indirect variation - direct/indirect

TERM 2.1	TERM 2.2
Pythagoras Straight line Speed, distance and time Distance time graph Graphs	Differentiation Sketch quadratics Percentages Interest Profit and loss Scale drawing Transformations Similarity

TERM 3.1
Trigonometry Trigonometric rules Trigonometric graphs Trigonometric equations Polygons Circle theorems

Year 10 accelerated SOW overview

TERM 1.1	TERM 1.2
<p>Fraction of a circle Volume and area Statistics Venn diagrams probability</p>	<p>Patterns Functions vectors</p>

TERM 2.1	TERM 2.2
<p>Revision in preparation for the examination and this will include revision lessons, past papers done with the focus on correcting weak spots. There will also be examination practice by doing the papers under examination conditions. Preparation for the IB will take place in the form of developing skills such as trial and error, knowing to take a simpler example when trying to find a pattern</p>	<p>Revision in preparation for the examination and this will include revision lessons, past papers done with the focus on correcting weak spots. There will also be examination practice by doing the papers under examination conditions. Preparation for the IB will take place in the form of developing skills such as trial and error, knowing to take a simpler example when trying to find a pattern</p>

TERM 3	
<p>This term will focus on preparing for the IB in the form of practice exploration where the students will develop their research skills.</p>	

Year 10 SOW overview

TERM 1.1	TERM 1.2
algebraic expressions Expanding brackets Factorization of an expression. Expand two linear brackets Factorise a trinomial/difference of two squares Algebraic fractions Equations with fractions Derive and solve equations Rearrange formula Substitution Indices Standard form Surds	Quadratic equations Simultaneous equations Inequalities Linear programming Bounds Map scales Foreign exchange Proportional division Unit cost Proportion - direct/indirect variation - direct/indirect

TERM 2.1	TERM 2.2
Pythagoras Straight line Speed, distance and time Distance time graph Graphs	Differentiation Sketch quadratics Percentages Interest Profit and loss Scale drawing Transformations Similarity

TERM 3.1
Trigonometry Trigonometric rules Trigonometric graphs Trigonometric equations Polygons Circle theorems

Year 11 SOW overview

TERM 1.1	TERM 1.2
<p>Fraction of a circle Volume and area Statistics Venn diagrams probability</p>	<p>Patterns Functions vectors</p>

TERM 2.1	TERM 2.2
<p>Revision in preparation for the examination and this will include revision lessons, past papers done with the focus on correcting weak spots. There will also be examination practice by doing the papers under examination conditions. Preparation for the IB will take place in the form of developing skills such as trial and error, knowing to take a simpler example when trying to find a pattern</p>	<p>Revision in preparation for the examination and this will include revision lessons, past papers done with the focus on correcting weak spots. There will also be examination practice by doing the papers under examination conditions. Preparation for the IB will take place in the form of developing skills such as trial and error, knowing to take a simpler example when trying to find a pattern</p>

TERM 3	
<p>This term will focus on preparing for the IB in the form of practice exploration where the students will develop their research skills.</p>	

Y11 Additional Maths overview

Term 1.1	Term 1.2
<p>Sets</p> <ul style="list-style-type: none"> <li>• Notation</li> <li>• Venn diagrams</li> </ul> <p>Functions</p> <ul style="list-style-type: none"> <li>• Mappings</li> <li>• Know the terminology domain, codomain and range</li> <li>• Composition of functions</li> <li>• Inverse functions</li> <li>• Modulus functions</li> </ul> <p>Quadratics</p> <ul style="list-style-type: none"> <li>• Solve quadratic equations</li> <li>• Use the discriminant</li> <li>• Sketch parabolas</li> </ul> <p>Inequalities</p> <p>Surds and indices</p> <p>Polynomials</p> <p>logarithms</p>	<p>Transforming straight lines</p> <p>Finding the equation of parallel and perpendicular straight lines</p> <p>Vectors</p> <ul style="list-style-type: none"> <li>• Adding and multiplying by a scalar</li> <li>• Position vectors</li> <li>• Components</li> <li>• Resolution of vectors</li> <li>• Relative velocity</li> </ul> <p>Differentiation</p> <ul style="list-style-type: none"> <li>• Differentiation of polynomials</li> <li>• Chain rule</li> <li>• Second derivative</li> <li>• Product/quotient rule</li> <li>• Find the equations of tangents and normal</li> <li>• Stationary point</li> <li>• Optimization</li> <li>• Related rates</li> </ul> <p>Matrices</p> <ul style="list-style-type: none"> <li>• Add and multiply matrices</li> <li>• Find the inverse of a matrix</li> <li>• Solve matrix equations</li> </ul>

Term 2.1	Term 2.2
<p>Combinations and permutations</p> <p>Binomial theorem</p> <p>Integration</p> <ul style="list-style-type: none"> <li>• indefinite and definite integral</li> <li>• area under a curve</li> <li>• area above and below the axis</li> <li>• area between curves</li> </ul> <p>Trigonometry</p> <ul style="list-style-type: none"> <li>• radians</li> <li>• calculate arc length and area of sector using radians</li> <li>• trigonometric equations</li> <li>• trigonometric graphs</li> <li>• trigonometric identities</li> </ul>	<p>Differentiate trigonometric functions</p> <p>Integrate trigonometric functions</p> <p>Differentiate logarithm and exponential function</p> <p>Integrate exponential function</p> <p>Kinematics</p> <p>Speed-time graphs</p> <p>Mechanics</p>

Term 3	
<ul style="list-style-type: none"><li>• This term will focus on preparing for the IB in the form of practice exploration where the students will develop their research skills.</li></ul>	

Analysis and approaches

IB Year 1

Term 1.1 SL	Term 1.1 HL
<p>Arithmetic and geometric sequences Applications in real life</p> <ul style="list-style-type: none"> <li>• Compound interest calculated yearly, half yearly, quarter yearly and monthly</li> <li>• Depreciation</li> <li>• Interest/inflation rate</li> <li>• Use of technology</li> <li>• Spread of disease</li> <li>• Population growth</li> <li>• Salary increase/decrease</li> <li>•</li> </ul> <p>Determine the validity of a model Sum of series Work with surds and indices Use the laws of logarithms</p>	<p>Simultaneous equations in three variables Vectors</p> <ul style="list-style-type: none"> <li>• Addition multiplication by a scalar</li> <li>• Use of directed line segments</li> <li>• Collinearity</li> </ul> <p>Know the properties of the scalar product Use the scalar product in context Proofs using vectors Know the properties of the cross product Use the cross product in context Find the vector equation of a line, including the parametric and Cartesian form Apply the scalar product to kinematics</p>

Term 2.1 SL	Term 2.1 HL
<p>Binomial theorem Statistical concepts Reliability and bias Sampling techniques Display data Use boxplots to compare data Interpret different representations of data Find measures of central tendency Find measures of dispersion Bivariate graphs Correlation Regression Venn diagrams</p>	<p>Distinguish between coincident, parallel, intersecting and skew lines and find points of intersection. Use row reduction Use the cross product to find the closest approach Find the equation of a plane in the vector form and using the normal Find the intersection of lines and planes and three planes Find the angles between planes and lines Partial fractions Combinations and permutations Binomial theorem</p>

Term 3 SL	Term 3 HL
Calculate probabilities for combined events Use a variety of techniques to determine sample spaces Independent and mutually exclusive events Conditional probability Random variables Expected value of random variables Binomial distribution and expected value Normal distribution	Arithmetic using complex numbers Use the Argand diagram Solve quadratics with complex roots Convert between the Cartesian, polar and Euler form of complex numbers Use De Moivre's theorem Find powers and roots of complex numbers Proof by induction Proof by contradiction Use of counter-example

IB Year 2

Term 1.1 SL	Term 1.1 HL
<p>Find the equation of a straight line</p> <p>Use the terms domain, codomain and range</p> <p>Find the inverse of a function</p> <p>Find the composition of functions</p> <p>Sketch functions</p> <p>Identify key features of graphs</p> <p>Find the intersection of two curves</p> <p>Solve quadratic equations</p> <p>Know the features of a parabola</p> <p>Transform graphs</p> <p>Solve equations analytically and using technology</p>	<p>Baye's theorem</p> <p>Find the variance of discrete random variables</p> <p>Probability density functions</p> <p>Find the mode and median of continuous random variables</p> <p>Find the mean, variance and standard deviation of both discrete and continuous random variables</p> <p>Use the effect of linear transformations</p> <p>Use the remainder theorem</p> <p>Use the factor theorem</p> <p>Graph polynomials</p> <p>Use sums and products of polynomials</p> <p>Sketch rational functions</p> <p>Work with odd and even functions</p> <p>Find inverse function using domain restriction</p> <p>Graph a variety of graphs</p> <p>Solve modulus equations</p>

Term 1.2 SL	Term 1.2 HL
<p>Volume and surface area of three dimensional objects</p> <p>Pythagoras' theorem in three dimensions</p> <p>Find the angle between a line and a plane</p> <p>Trigonometric ratios in a right-angled triangle</p> <p>Trigonometric rules in non-right angled triangle including area of a triangle</p> <p>Applications of right and non-right angled triangles</p> <p>Use radians to calculate the arc length and the area of a sector of a circle</p> <p>Exact trigonometric ratios</p> <p>Use the Pythagorean identity</p> <p>Graphs of circular functions in degrees and radians</p> <p>Know the amplitude and periodic nature</p> <p>Graphs composite circular functions</p> <p>Transform circular functions</p> <p>Solve trigonometric equations</p>	<p>Graph the reciprocal trigonometric functions</p> <p>Graph the inverse trigonometric functions</p> <p>Use compound angle identities</p> <p>Use Understanding of continuity and differentiability at a point</p> <p>Understand limits and convergence</p> <p>Higher derivatives</p> <p>Derivatives of all trigonometric functions and inverse trigonometric functions</p> <p>Research project</p>

Term 2.1 SL	Term 2.1 HL
<p>Concept of a limit</p> <p>Find the derivative in both Newtonian and Leibnitz form</p> <p>Interpret the derivative as a gradient function and as a rate of change</p> <p>Identify when a function is increasing or decreasing</p> <p>Find the equations of tangents and normals</p> <p>Find the derivative of sums and multiples of functions</p>	<p>Use of l'Hoptials rule and also repeated use thereof and the Maclaren series to evaluate limits</p> <p>Indefinite integrals of any of the above</p> <p>Use partial fractions to integrate</p>

Term 2.2 SL	Term 2.2 HL
<p>Use the chain rule</p> <p>Use the product and quotient rules</p> <p>Find the second derivative</p> <p>Graph function, first and second derivative functions</p> <p>Find local maxima and minima and determine their nature</p> <p>Optimisation</p>	<p>Integration by substitution</p> <p>Integration by parts</p> <p>Repeated integration by parts</p> <p>Area of a region enclosed by a curve and an interval on the y-axis</p> <p>Volumes of revolution about the x and y-axis</p>

Term 3 SL	Term 3 HL
<p>Points of inflections including non-zero gradients</p> <p>Kinematic problems</p> <p>Calculate the indefinite integral</p> <p>Integrate by inspection the inverse chain rule</p> <p>Find definite integrals using technology and analytically</p> <p>Find the area enclosed by a curve</p>	<p>Solve first order differential equations analytically</p> <p>Numerical solution using Euler's method</p> <p>Solve first order differential equations by separating the variables</p> <p>Solve first order differential equations by substituting <math>y = vx</math></p> <p>Solve first order differential equations using the integrating factor</p> <p>Use the the Maclaren series to obtain expansions for a variety of functions</p> <p>Maclaren series developed from differential equations</p>

Applications and interpretation

IB Year 1

Term 1.1 SL	Term 1.1 HL
<p>Arithmetic and geometric sequences Applications in real life</p> <ul style="list-style-type: none"> <li>• Compound interest calculated yearly, half yearly, quarter yearly and monthly</li> <li>• Depreciation</li> <li>• Interest/inflation rate</li> <li>• Use of technology</li> <li>• Spread of disease</li> <li>• Population growth</li> <li>• Salary increase/decrease</li> <li>• </li> </ul> <p>Determine the validity of a model Sum of series Work with surds and indices Use the laws of logarithms</p>	<p>Arithmetic using complex numbers Solve quadratics with complex roots Convert between the Cartesian, polar and Euler form of complex numbers Vectors</p> <ul style="list-style-type: none"> <li>• Addition multiplication by a scalar</li> <li>• Use of directed line segments</li> <li>• Collinearity</li> </ul> <p>Know the properties of the scalar product Use the scalar product in context Know the properties of the cross product Use the cross product in context Find the vector equation of a line, including the parametric and Cartesian form Apply the scalar product to kinematics Applications in forces Model motion with constant velocity Find the shortest distance between two objects</p>

Term 1.2 SL	Term 1.2 SL
<p>Binomial theorem Statistical concepts Reliability and bias Sampling techniques Display data Use boxplots to compare data Interpret different representations of data Find measures of central tendency Find measures of dispersion Bivariate graphs Correlation Regression Venn diagrams</p>	<p>Addition and multiplication of matrices Find the inverse of square matrices analytically and using technology Solve matrix equations Find eigenvalues and eigenvectors analytically and using technology Diagonalise a matrix Calculate powers of matrices Find the transition matrix in a Markov chain Find the steady state of a Markov chain Binomial theorem</p>

Term 2.1 SL	Term 2.1 SL
<p>Calculate probabilities for combined events</p> <p>Use a variety of techniques to determine sample spaces</p> <p>Independent and mutually exclusive events</p> <p>Conditional probability</p> <p>Random variables</p> <p>Expected value of random variables</p> <p>Binomial distribution and expected value</p> <p>Normal distribution</p> <p>Calculate Spearman's rank coefficient</p> <p>Determine validity of conclusion using the null hypothesis.</p> <p>Use the Chi-squared test to determine independence, contingency table, degrees of freedom and critical values</p> <p>Use the p-value to compare the means of two populations</p>	<p>Know the terminology used in graph theory</p> <p>Find the number of k-walks</p> <p>Construct a transition matrix for a strongly connected, undirected or directed graph</p> <p>Determine whether an Eulerian trail exists</p> <p>Hamiltonian graphs and cycles</p> <p>Minimum spanning trees</p> <p>Use Kruskal's and Prim's algorithm for finding minimum spanning trees</p> <p>Use the Chinese postman problem</p> <p>Use the nearest neighbor algorithm for determining an upper bound for the TSP</p> <p>Use the deleted vertex for determining a lower bound for the TSP</p> <p>Use the TSP to determine the Hamiltonian cycle of least weight in a weighted complete graph.</p>

Term 2.2 SL	Term 2.2 HL
<p>Find the equation of a straight line</p> <p>Use the terms domain, codomain and range</p> <p>Find the inverse of a function</p> <p>Find the composition of functions</p> <p>Sketch functions</p> <p>Identify key features of graphs</p> <p>Find the intersection of two curves</p> <p>Voronoi diagrams</p> <p>Apply the nearest neighbour interpolation</p> <p>Mathematical modeling using linear, quadratic and cubic functions</p> <p>Solve linear equations in three variables using technology</p>	<p>Sampling theory</p> <p>Choose relevant and appropriate data to analyse</p> <p>Chi squared testing</p> <p>Reliability tests - test-retest, parallel forms</p> <p>Validity tests - content, criterion related.</p> <p>Evaluate least squares regression curves using technology</p> <p>Use the sum of square residuals as a measure of best fit for a model.</p> <p>Random variables</p> <p>Unbiased estimates</p> <p>Linear combinations of random variables</p> <p>Confidence intervals</p> <p>Poisson distribution</p> <p>Calculate the mean and variance of the Poisson distribution</p> <p>Work with two independent Poisson distributions</p> <p>Test for population mean for normal</p>

	<p>distribution</p> <p>Test for proportion using the binomial distribution</p> <p>Test for population mean using the Poisson distribution using one tailed tests only</p> <p>Hypothesis testing</p> <p>Find type I and II errors and calculate their probabilities</p>
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Term 3 SL	Term 3 HL
<p>Modeling skills</p> <ul style="list-style-type: none"> <li>• Develop and fit the model</li> <li>• Find the parameters of the model</li> <li>• Test and reflect on the model</li> <li>• Use the model</li> </ul> <p>Apply the above to a variety of applications</p>	<p>Use radians to calculate the arc length and the area of a sector of a circle</p> <p>Graphical methods of solving trigonometric equations</p> <p>Geometric transformations using matrices</p> <p>Research project</p>

IB Year 2

Term 1.1 SL	Term 1.1 SL
<p>Volume and surface area of three dimensional objects</p> <p>Pythagoras' theorem in three dimensions</p> <p>Find the angle between a line and a plane</p> <p>Trigonometric ratios in a right-angled triangle</p> <p>Trigonometric rules in non-right angled triangle including area of a triangle</p> <p>Applications of right and non-right angled triangles</p>	<p>Use Understanding of continuity and differentiability at a point</p> <p>Understand limits and convergence</p> <p>Higher derivatives</p> <p>Derivatives of all trigonometric functions and inverse trigonometric functions</p> <p>Research project</p> <p>Find local maxima and minima and determine their nature</p>

Term 1.2 SL	Term 1.2 SL
Find equations of perpendicular bisectors Concept of a limit Find the derivative in both Newtonian and Leibnitz form Interpret the derivative as a gradient function and as a rate of change	Indefinite integrals including negative and rational powers Integrate by inspection Area of a region enclosed by a curve and an interval on the y-axis Volumes of revolution about the x and y-axis Kinematic problems

Term 2.1 SL	Term 2.1 HL
Identify when a function is increasing or decreasing Find the equations of tangents and normals Find the derivative Approximating an area using the trapezoidal rule	Solve first order differential equations by separating the variables Numerical solution using Euler's method Slope fields and their diagrams Numerical solution of a coupled system Phase portrait for the solution of coupled differential equations Solutions of second order differential equations by Euler's method