

BERLIN BRITISH SCHOOL

Course overview

MATHEMATICS

Grade 6	
Autumn term	<p>Number: Multiples and factors, Negative numbers and order of operations.</p> <p>Algebra: Algebraic expressions and equations.</p> <p>Geometry: Angles facts, Angles in triangles, Quadrilaterals, Symmetry, 3D shapes.</p>
Spring term	<p>Fractions, decimals and percentages.</p> <p>Statistics: Mean, median, mode and range, diagrams and charts, questionnaire design.</p> <p>Units of scale, ratio and proportion: units, conversions and scales</p> <p>Ratio and proportion.</p>
Summer term	<p>Geometry: Area and Perimeter, Volume of cuboids.</p> <p>Graphs and transformations: basic transformations, Straight lines using a table of results, Speed distance time graphs.</p> <p>Probability.</p>

Grade 7	
Autumn term	<p>NUMBER (PART ONE): Integers, Powers and Roots, Negative numbers</p> <p>ALGEBRA: Simplifying expressions, Algebraic manipulation, Equations and Number sequences.</p> <p>SHAPE AND GEOMETRIC REASONING: Angle identification and calculations, Use of geometrical equipment, Properties of 2D and 3D shapes.</p>

Spring term	<p>NUMBER (PART TWO): Fractions, Decimals and Percentages equivalence, Finding either fractions or percentages of amounts.</p> <p>STATISTICS: Collecting data both discrete and continuous, Representing data in charts and graphs, Summarising data including finding averages and the range.</p> <p>LENGTH, MASS AND CAPACITY: Reading appropriate scales and converting between metric units.</p> <p>TIMES AND RATES OF CHANGE: Units of time and Use of timetables in context.</p> <p>RATIO AND PROPORTION: Expressing quantities in a ratio; Dividing in a given ratio; and solving direct proportion problems.</p>
Summer term	<p>AREA PERIMETER AND VOLUME: Area of 2D shapes (including circles and compound shapes); Volume and surface area of cuboids.</p> <p>TRANSFORMATIONS</p> <p>FUNCTIONS AND GRAPHS: Coordinate plane and plotting straight lines using an algebraic approach.</p> <p>PROBABILITY: Expressing likelihood in words, fractions, decimals and percentages; Assigning probabilities for equally likely outcomes and Estimating probabilities based on experiments.</p>

Grade 8	
	<p>Number.</p> <p>Number sets. Standard form. Ratio and proportion. Percentages, decimals and fractions. Speed, time, distance. Financial maths.</p>
	<p>Algebra.</p> <p>Algebraic manipulations. Equations, linear and quadratic. Simultaneous equations. Indices. Variations. Surds. Sequences. Rearranging formulae.</p>
	<p>Geometry.</p> <p>Vocabulary. Angles with parallel lines and in polygons. Bearings.</p>

Grade 9

Pythagoras' theorem. Symmetry. Similar shapes. Angles in circles.

Trigonometry.

Trigonometric ratios and rules. Applications to two- and three-dimensional problems. Trigonometric equations.

Mensuration.

The circle. Area, volume and surface area.

Functions.

Straight lines and their graphs. Concept of a function, range and domain. Composite and inverse functions. Logarithms.

Families of functions and their graphs.

Grade 10

Geometry.

Pythagoras' theorem. Symmetry. Similar shapes. Angles in circles.

Trigonometry.

Trigonometric ratios and rules. Applications to two- and three-dimensional problems. Trigonometric equations.

Mensuration.

The circle. Area, volume and surface area.

Functions.

Straight lines and their graphs. Concept of a function, range and domain. Composite and inverse functions. Logarithms.

Families of functions and their graphs.

IB HL Analysis and Approaches	
Grade 11	<p>Topic 1: Sequences and Series</p> <p>Arithmetic and Geometric Series. The Binomial Theorem. Counting principles.</p> <p>Topic 2: Algebra and Basic Functions</p> <p>Simultaneous equations. Concept of a function. Composite functions. Inverse functions. Graph transformations.</p> <p>Topic 3: Advanced Functions</p> <p>Polynomial functions and their graphs. Factor and remainder theorem. Sum and product of roots. Quadratic functions. Rational functions. Partial fractions. Equations and inequalities.</p> <p>Proofs.</p> <p>Topic 4: Logarithmic and Exponential Functions</p> <p>Exponential and logarithmic functions and their respective graphs. Properties of logarithms. Solving equations with logarithmic and exponential expressions.</p> <p>Topic 5: Geometry and Trigonometry</p> <p>Radian measure, Arc length and area of a sector.</p> <p>Identities. The graphs of sin, cos and tan functions. Trigonometric equations and application of trigonometry to real life situations. Reciprocal and inverse trigonometric functions and graphs.</p> <p>2D and 3D trigonometry. Bearings. Volume and Surface area of 3D shapes.</p> <p>Topic 6: Complex Numbers:</p> <p>Complex numbers in Cartesian, Polar and Euler form. Sum, products and quotients of complex numbers. Complex roots of quadratic equations. De Moivre's theorem.</p> <p>Topic 7: Vectors and Planes</p> <p>Vector algebra.</p>

	<p>Scalar product. Equation of a line, coincident, parallel and intersecting lines.</p> <p>The vector product. The vector equation of a plane. Angles between lines and planes.</p> <p>Topic 8: Calculus (differentiation I)</p> <p>Differentiation. The derivative of polynomial, exponential, logarithmic and trigonometric functions. Rules of differentiation.</p> <p>Tangents and normals. Stationary points. Optimisation problems.</p>
Grade 12	<p>Topic 9: Calculus (differentiation II)</p> <p>Implicit Differentiation, rates of change. The graphs of functions and their derivatives. Kinematic problems.</p> <p>Topic 10: Calculus (Integration)</p> <p>Integration. Definite integrals, the area under a curve. Volume of revolution. Kinematic problems.</p> <p>Topic 11: Calculus (Maclaurin Series and Differential Equations)</p> <p>First order differential equations.</p> <p>Maclaurin Series.</p> <p>Topic 12: Statistics</p> <p>Presentation of data. Mean, mode, median, standard deviation from grouped data tables. Cumulative frequency distribution, calculation of quartiles. Linear correlation.</p> <p>Topic 13 Probability</p> <p>Discrete random variables and their probability distributions. Revision and exam preparation.</p>

	IB SL Analysis and Approaches
Grade 11	<p>Topic 1: Algebra and functions</p> <p>Numbers, rounding and scientific notation. Linear functions; the concept of a function. Composite functions. Inverse functions. Transformations of graphs.</p> <p>Topic 2: Families of functions</p> <p>Quadratic functions. Rational functions and their graphs. Asymptotes. Solving equations and inequalities, both analytically and graphically.</p> <p>Topic 3: Sequences and series</p> <p>Arithmetic and geometric sequences and series. Sigma notation. The binomial theorem.</p> <p>Topic 4: Exponential and logarithmic functions</p> <p>Exponential and logarithmic functions and their graphs. Properties of logarithms. Solving equations involving exponential and logarithmic functions.</p> <p>Topic 5: Trigonometry</p> <p>The radian measures of angles. Length of an arc and area of a sector. Trigonometric identities. Graphs of trigonometric functions. Trigonometric equations in a finite interval.</p> <p>Topic 6: Geometry</p> <p>Distance and midpoint between two points in a 3D space. Volume and surface area. Angle between two lines. Trigonometric ratios. Sine rule and the cosine rule. Bearings.</p> <p>Topic 7: Differential calculus I</p> <p>The concept of a limit. Derivative. Stationary points. Tangents and normal.</p> <p>Topic 8: Differential calculus II</p> <p>Derivatives of various functions. Rules of differentiation. Applications.</p>

Grade 12	<p>Topic 9: Integral calculus</p> <p>Integration. Definite integrals. Areas under curves (between a curve and the x-axis) and between curves. Antidifferentiation with a boundary condition. Kinematic problems.</p> <p>Topic 10: Statistics</p> <p>Concepts of population, sample, random sample, and frequency distribution of discrete and continuous data. Sampling. Presentation of data. Measures of central tendency and spread. Bivariate data.</p> <p>Topic 11: Probability.</p> <p>Topic 12: Probability distributions.</p> <p>Discrete random variables and their probability distributions.</p> <p>Revision and exam preparation.</p>
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	IB SL Applications and Interpretations.
Grade 11	<p>Topic 1: Probability and statistics</p> <p>Descriptive Statistics. Bivariate data. Probability. Binomial and normal distributions.</p> <p>Statistical testing. Data ranking.</p> <p>Topic 2: Number and algebra</p> <p>Standard form. Approximation and estimation. Arithmetic and geometric sequences and series.</p> <p>Amortization and annuities. Exponents and logarithms. Systems of linear equations in up to 3 variables and polynomial equations</p> <p>Topic 3: Functions</p> <p>Straight lines and their equations. Concept of a function and its graph.</p> <p>Modelling with various functions.</p> <p>Modelling skills.</p>

<p>Grade 12</p>	<p>Topic 4: Geometry and trigonometry</p> <p>3-D Geometry. Trigonometric ratios. Applications of trigonometry. The circle: length of an arc; area of a sector. Voronoi diagrams.</p> <p>Topic 5: Calculus</p> <p>Concept of a limit and a derivative. Derivative of functions of the form of polynomials.</p> <p>Tangents and normals. Investigation of curves. Introduction to integration as anti-differentiation. Optimisation problems in context</p> <p>Revision and exam preparation.</p>
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