



Year 12 Syllabus in a nutshell

IB Maths AA SL



CHALLENGE • NURTURE • INSPIRE





Year 12 Syllabus in a nutshell – IB Maths Analysis and Approaches SL

NB The * denotes sections of the course that are covered by both routes i.e. Analysis and Approaches AND Applications and Interpretation

Topic	Guide Reference	Summary
Sequences and Series	SL1.2* SL1.3* SL1.4* SL1.6 SL1.8 SL1.9	Arithmetic sequences and series , use of the formulae for the n th term and the sum of the first n terms of the sequence, use of sigma notation for sums of arithmetic sequences, Applications of arithmetic sequences, analysis, interpretation and prediction where a model is not perfectly arithmetic in real life. Geometric sequences and series, Use of the formulae for the n th term and the sum of the first n terms of the sequence , Use of sigma notation for sums of geometric sequences, Applications of geometric sequences, Sum of infinite convergent geometric sequences Financial applications of geometric sequences and series: compound interest and annual depreciation Simple deductive proof, numerical and algebraic; how to lay out a left-hand side to right-hand side (LHS to RHS) proof , The symbols and notation for equality and identity The binomial theorem: expansion of $(a + b)^n$, $n \in \mathbb{N}$
Linear Geometry	SL2.1* SL2.4*	Different forms of the equation of a straight line , Gradient; intercepts, Lines with gradients, m_1 and m_2 Parallel lines $m_1 = m_2$, Perpendicular lines $m_1 \times m_2 = -1$ Determine key features of graphs, Finding the point of intersection of two curves or lines using technology
Geometry and Trigonometry in 2D and 3D	SL3.1* SL3.2* SL3.3*	The distance between two points in three- dimensional space, and their midpoint , Volume and surface area of three-dimensional solids including right-pyramid, right cone, sphere, hemisphere and combinations of these solids , The size of an angle between two intersecting lines or between a line and a plane Use of sine, cosine and tangent ratios to find the sides and angles of right-angled triangles , The sine rule: $a / \sin A = b / \sin B = c / \sin C$, The cosine rule: $c^2 = a^2 + b^2 - 2ab \sin C$; $\cos C = a^2 + b^2 - c^2 / 2ab$, Area of a triangle as $1/2 ab \sin C$ Applications of right and non-right-angled trigonometry, including Pythagoras' theorem , Angles of elevation and depression , Construction of labelled diagrams from written statements
Statistics	SL4.1* SL4.2* SL4.3* SL4.4* SL 4.10	Concepts of population, sample, random sample, discrete and continuous data , Reliability of data sources and bias in sampling , Interpretation of outliers , Sampling techniques and their effectiveness Presentation of data (discrete and continuous): frequency distributions (tables) , Histograms , Cumulative frequency; cumulative frequency graphs; use to find median, quartiles, percentiles, range and interquartile range (IQR) , Production and understanding of box and whisker diagrams. Measures of central tendency (mean, median and mode) , Estimation of mean from grouped data , Modal class , Measures of dispersion (interquartile range, standard deviation and variance) ,



		<p>Effect of constant changes on the original data , Quartiles of discrete data</p> <p>Linear correlation of bivariate data , Pearson's product-moment correlation coefficient, r , Scatter diagrams; lines of best fit, by eye, passing through the mean point , Equation of the regression line of y on x , Use of the equation of the regression line for prediction purposes , Interpret the meaning of the parameters, a and b, in a linear regression $y = ax + b$</p> <p>Equation of the regression line of x on y , Use of the equation for prediction purposes</p>
Functions	SL2.2* SL2.3* SL2.4* SL2.5 SL2.6 SL2.7 SL2.8 SL2.10 SL2.11	<p>Concept of a function, domain, range and graph , Function notation, for example $f(x)$, $v(t)$, $C(n)$, The concept of a function as a mathematical model , Informal concept that an inverse function reverses or undoes the effect of a function , Inverse function as a reflection in the line $y = x$, and the notation $f^{-1}(x)$</p> <p>The graph of a function; its equation $y = f(x)$, Creating a sketch from information given or a context, including transferring a graph from screen to paper , Using technology to graph functions including their sums and differences</p> <p>Determine key features of graphs , Finding the point of intersection of two curves or lines using technology</p> <p>Composite functions , Identity function , Finding the inverse function $f^{-1}(x)$</p> <p>The quadratic function $f(x) = ax^2 + bx + c$: its graph, y-intercept $0, c$, Axis of symmetry , The form $f(x) = a(x - p)(x - q)$, x intercepts $(p, 0)$ and $(q, 0)$, The form $f(x) = a(x - h)^2 + k$, vertex (h, k)</p> <p>Solution of quadratic equations and inequalities , The quadratic formula , The discriminant $\Delta = b^2 - 4ac$ and the nature of the roots, that is, two distinct real roots, two equal real roots, no real roots</p> <p>The reciprocal function $f(x) = 1/x$, $x \neq 0$: its graph and self-inverse nature , Rational functions of the form $f(x) = ax+b / cx+d$ and their graphs , Equations of vertical and horizontal asymptotes</p> <p>Solving equations, both graphically and analytically , Use of technology to solve a variety of equations, including those where there is no appropriate analytic approach , Applications of graphing skills and solving equations that relate to real-life situations</p> <p>Transformations of graphs , Translations: $y = f(x) + b$; $y = f(x) - a$, Reflections (in both axes): $y = -f(x)$; $y = f(-x)$, Vertical stretch with scale factor p: $y = pf(x)$, Horizontal stretch with scale factor $1/q$: $y = f(qx)$, Composite transformations</p>
Basic Differentiation	SL5.1* SL5.2* SL5.3* SL5.4* SL5.6 SL5.7 SL5.8 SL5.9	<p>Introduction to the concept of a limit , Derivative interpreted as gradient function and as rate of change</p> <p>Increasing and decreasing functions , Graphical interpretation of $f'(x) > 0$, $f'(x) = 0$, $f'(x) < 0$</p> <p>Derivative of $f(x) = ax^n$ $f'(x) = anx^{n-1}$, $n \in \mathbb{Z}$, The derivative of functions of the form $f(x) = ax^n - bx^{n-1} \dots$ where all exponents are integers</p> <p>Tangents and normals at a given point, and their equations</p> <p>Derivative of x^n ($n \in \mathbb{Q}$), $\sin x$, $\cos x$, e^x and $\ln x$, Differentiation of a sum and a multiple of these functions , The chain rule for composite functions , The product and quotient rules</p> <p>The second derivative ,Graphical behaviour of functions, including the relationship between the graphs of f, f' and f''</p> <p>Local maximum and minimum points , Testing for maximum and minimum , Optimization , Points of inflection with zero and non-zero gradients</p>



		Kinematic problems involving displacement s , velocity v , acceleration a and total distance travelled
Probability	SL4.5* SL4.6* SL4.11	<p>Concepts of trial, outcome, equally likely outcomes, relative frequency, sample space (U) and event , The probability of an event A is $P(A) = n(A)/ n(U)$, The complementary events A and A' (not A) , Expected number of occurrences</p> <p>Use of Venn diagrams, tree diagrams, sample space diagrams and tables of outcomes to calculate probabilities , Combined events: $P(A \cup B) = P(A) + P(B) - P(A \cap B)$, Mutually exclusive events: $P(A \cap B) = 0$ Conditional probability: $P(A/B) = P(A \cap B)/ P(B)$</p> <p>Independent events: $P(A \cap B) = P(A)P(B)$.</p> <p>Formal definition and use of the formulae: $P(A B) = P(A \cap B)/ P(B)$ for conditional probabilities, and $P(A B) = P(A) = P(A B')$ for independent events</p>
Trigonometry	SL3.4 SL3.5 SL3.6 SL3.7 SL3.8	<p>The circle: radian measure of angles; length of an arc; area of a sector.</p> <p>Definition of $\tan \theta$ as $\sin \theta / \cos \theta$</p> <p>Exact values of trigonometric ratios of $0, \pi/6, \pi/4, \pi/3, \pi/2$ and their multiples , Extension of the sine rule to the ambiguous case</p> <p>The circular functions $\sin x, \cos x$, and $\tan x$; amplitude, their periodic nature, and their graphs , Composite functions of the form $f(x) = a \sin(b(x + c) + d)$, Transformations , Real-life contexts</p> <p>Solving trigonometric equations in a finite interval, both graphically and analytically , Equations leading to quadratic equations in $\sin x, \cos x$, or $\tan x$</p>
Probability Models	SL4.3* SL4.7* SL4.8* SL4.9* SL4.12	<p>Measures of central tendency (mean, median and mode) , Estimation of mean from grouped data , Modal class , Measures of dispersion (interquartile range, standard deviation and variance) , Effect of constant changes on the original data , Quartiles of discrete data</p> <p>Concept of discrete random variables and their probability distributions , Expected value (mean), for discrete data , Applications</p> <p>Binomial distribution , Mean and variance of the binomial distribution</p> <p>The normal distribution and curve , Properties of the normal distribution , Diagrammatic representation , Normal probability calculations , Inverse normal calculations</p> <p>Standardization of normal variables (z-values) , Inverse normal calculations where mean and standard deviation are unknown</p>