



Year 12 Syllabus in a nutshell

IB Maths AA SL





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	<p>Arithmetic sequences and series , use of the formulae for the nth 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.</p> <p>Geometric sequences and series, Use of the formulae for the nth 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</p> <p>Financial applications of geometric sequences and series: compound interest and annual depreciation</p> <p>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</p> <p>The binomial theorem: expansion of $(a + b)^n$, $n \in \mathbb{N}$</p>
Linear Geometry	SL2.1* SL2.4*	<p>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 $m_1 \times m_2 = -1$</p> <p>Determine key features of graphs, Finding the point of intersection of two curves or lines using technology</p>
Geometry and Trigonometry in 2D and 3D	SL3.1* SL3.2* SL3.3*	<p>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</p> <p>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 $1/2 ab \sin C$</p> <p>Applications of right and non-right-angled trigonometry, including Pythagoras' theorem , Angles of elevation and depression , Construction of labelled diagrams from written statements</p>
Statistics	SL4.1* SL4.2* SL4.3* SL4.4* SL 4.10	<p>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</p> <p>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.</p> <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) ,</p>



		<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 $f(x) = \frac{ax+b}{cx+d}$ 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 $\sin x$, $\cos x$, 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 inflexion 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: $P(A/B) = P(A \cap B)/P(B)$ 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>