TAUNTON SCHOOL

Year 12 Syllabus in a nutshell

IB Maths AI SL

Year 12 Syllabus in a nutshell – IB Applications and Interpretations 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 (AA only) SL1.8 (AA only) SL1.9 (AA only)	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. 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 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* SL3.5	Different forms of the equation of a straight line , Gradient; intercepts, Lines with gradients, $m1$ and $m2$ 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 Equations of perpendicular bisectors.
Geometry and Trigonometry in 2D and 3D	SL1.6 SL3.1* SL3.2* SL3.3*	Approximation: decimal places, significant figures , Upper and lower bounds of rounded numbers , Percentage errors Estimation 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*	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) , Effect of constant changes on the original data , Quartiles of discrete data 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 $y = ax + b$
Functions	SL2.2* SL2.3* SL2.4* SL2.5 SL1.8 SL2.6	Modelling with the following functions:Linear models: $f(x) = mx + c$, Quadratic models: $f(x) = ax^2 + bx + c$; $a \neq 0$. , Axis of symmetry, vertex, zeros and roots, intercepts on the x-axis and y-axis , Exponential growth and decay models: $f(x) = ka^x + c$ $f(x) = ka^{-x} + c$ (for $a > 0$) $f(x) = ke^{rx} + c$ Equation of a horizontal asymptote. , Direct/inverse variation: $f(x) = ax^n$, $n \in \mathbb{Z}$ The y-axis as a vertical asymptote when $n < 0$, Cubic models: $f(x) = ax^3 + bx^2 + cx + d$, Sinusoidal models: $f(x) = a\sin(bx) + d$, $f(x) = a\cos(bx) + d$ Use technology to solve: Systems of linear equations in up to 3 variables Polynomial equations Modelling skills: Use the modelling process described in the "mathematical modelling" section to create, fit and use the theoretical models in section 2.5, and their graphs , Develop and fit the model: Given a context recognize and choose an appropriate model and possible parameters. , Determine a reasonable domain for a model , Find the parameters of a model. , Test and reflect upon the model: Comment on the appropriateness and reasonableness of a model. , Justify the choice of a particular model, based on the shape of the data, properties of the curve and/or on the context of the situation , Use the model: Reading, interpreting and making predictions based on the model
Basic Differentiation	SL5.1* SL5.2* SL5.3* SL5.4* SL5.6 SL5.7	Introduction to the concept of a limit , Derivative interpreted as gradient function and as rate of change Increasing and decreasing functions , Graphical interpretation of $f'(x)>0$, $f'(x) = 0$, $f'(x)< 0$ Derivative of $f(x) = ax^n$ $f'(x) = anx^{n-1}$, $n \in \mathbb{Z}$, The derivative of functions of the form $f(x) = ax^n \_ bx^{n-1}$ . . . where all exponents are integers Tangents and normals at a given point, and their equations Values of x where the gradient of a curve is zero , Solution of $f'(x) = 0$, Local maximum and minimum points Optimisation problems in context
Probability	SL4.2* SL4.5* SL4.6* SL4.7* SL4.8* SL4.9*	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.

		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 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). Formal definition and use of the formulae: P($A \mid B$) = P($A \cap B$) P(B) for conditional probabilities, and P($A \mid B$) = P(A) = P($A \mid B'$) for independent events Concept of discrete random variables and their probability distributions , Expected value (mean), for discrete data , Applications Binomial distribution , Mean and variance of the binomial distribution The normal distribution and curve , Properties of the normal distribution , Diagrammatic representation , Normal probability calculations , Inverse normal calculations
Trigonometry	SL2.1* SL2.3* SL2.4* SL3.1* SL3.5 SL3.6	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 $m_1 \times m_2 = -1$ 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 Determine key features of graphs , Finding the point of intersection of two curves or lines using technology 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 Equations of perpendicular bisectors. Voronoi diagrams; sites, vertices, edges, cells , Addition of a site to an existing Voronoi diagram , Nearest neighbour interpolation , Applications of 'the toxic waste dump' problem