IB MATH ANALYSIS & APPROACHES SL
Complete Formula Sheet

Topic 1: Number & Algebra

1.2	nth term of an AP	$u_n = u_1 + (n-1)d$
1.2	Sum of n terms (AP)	$S_n = \frac{n}{2}(2u_1 + (n-1)d)$
1.2	Sum of n terms (AP)	$S_n = \frac{n}{2}(u_1 + u_n)$
1.3	nth term of a GP	$u_n = u_1 r^{n-1}$
1.3	Sum of n terms (GP)	$S_n = \frac{u_1(r^n-1)}{r-1}$
1.3	Sum of n terms (GP)	$S_n = \frac{u_1(1-r^n)}{1-r}$
1.4	Compound interest	$FV = PV\left(1 + \frac{r}{100k}\right)^{kn}$
1.5	Exponents & logarithms	$a^x = b \Leftrightarrow x = \log_a b$
1.6	Percentage error	$\varepsilon = \left\lvert \frac{v_A - v_E}{v_E} \right\rvert \times 100\%$

Topic 3: Geometry & Trigonometry

Prior Learning / Core Formulas

-	Area: Parallelogram	$A = bh$
-	Area: Triangle	$A = \frac{1}{2}bh$
-	Area: Trapezoid	$A = \frac{1}{2}(a+b)h$
-	Area: Circle	$A = \pi r^2$
-	Circumference: Circle	$C = 2\pi r$
-	Volume: Cuboid	$V = lwh$
-	Volume: Cylinder	$V = \pi r^2 h$
-	Curved SA: Cylinder	$A = 2\pi rh$
-	Volume of a prism	$V = Ah$
-	Distance (2D)	$d = \sqrt{(x_1-x_2)^2 + (y_1-y_2)^2}$
-	Midpoint (2D)	$M = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

SL Syllabus Formulas

3.1	Volume: Right-pyramid	$V = \frac{1}{3}Ah$
3.1	Volume: Cone	$V = \frac{1}{3}\pi r^2 h$
3.1	Curved SA: Cone	$A = \pi rl$
3.1	Volume: Sphere	$V = \frac{4}{3}\pi r^3$
3.1	Surface Area: Sphere	$A = 4\pi r^2$
3.2	Sine rule	$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
3.2	Cosine rule	$c^2 = a^2 + b^2 - 2ab\cos C$
3.2	Cosine rule	$\cos C = \frac{a^2+b^2-c^2}{2ab}$
3.2	Area of a triangle	$A = \frac{1}{2}ab\sin C$
3.4	Arc length (radians)	$l = r\theta$
3.4	Sector area (radians)	$A = \frac{1}{2}r^2\theta$
3.5	Identity for $\tan\theta$	$\tan\theta = \frac{\sin\theta}{\cos\theta}$
3.5	Pythagorean identity	$\cos^2\theta + \sin^2\theta = 1$
3.6	Double angle (sin)	$\sin 2\theta = 2\sin\theta\cos\theta$
3.6	Double angle (cos)	$\cos 2\theta = \cos^2\theta - \sin^2\theta$
3.6	Double angle (cos)	$\cos 2\theta = 2\cos^2\theta - 1$
3.6	Double angle (cos)	$\cos 2\theta = 1 - 2\sin^2\theta$

Topic 2: Functions

2.1	Straight line	$y = mx + c$
2.1	Straight line	$ax + by + d = 0$
2.1	Straight line	$y - y_1 = m(x - x_1)$
2.1	Gradient formula	$m = \frac{y_2-y_1}{x_2-x_1}$
2.5	Axis of symmetry	$x = -\frac{b}{2a}$

Topic 4: Statistics & Probability

4.2	Interquartile range	$IQR = Q_3 - Q_1$
4.3	Mean of a data set	$\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$
4.5	Probability of event A	$P(A) = \frac{n(A)}{n(U)}$
4.5	Complementary events	$P(A) + P(A') = 1$
4.6	Combined events	$P(A \cup B) = P(A) + P(B) - P(A \cap B)$
4.6	Mutually exclusive	$P(A \cup B) = P(A) + P(B)$
4.6	Conditional probability	$P(A\lvert B) = \frac{P(A \cap B)}{P(B)}$
4.6	Independent events	$P(A \cap B) = P(A)P(B)$
4.7	Expected value	$E(X) = \sum xP(X = x)$
4.8	Binomial mean	$E(X) = np$
4.8	Binomial variance	$\mathrm{Var}(X) = np(1-p)$

Topic 5: Calculus

5.3	Derivative of x^n	$f'(x) = nx^{n-1}$
5.5	Integral of x^n	$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$
5.6	Derivative of $\ln x$	$f'(x) = \frac{1}{x}$
5.6	Derivative of e^x	$f'(x) = e^x$
5.6	Derivative of $\sin x$	$f'(x) = \cos x$
5.6	Derivative of $\cos x$	$f'(x) = -\sin x$
5.9	Chain rule	$\frac{dy}{dx} = \frac{dy}{du}\frac{du}{dx}$
5.9	Product rule	$\frac{dy}{dx} = u\frac{dv}{dx} + v\frac{du}{dx}$
5.9	Quotient rule	$\frac{dy}{dx} = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$
5.10	Integral of $1/x$	$\int \frac{1}{x}\,dx = \ln\lvert x\rvert + C$
5.10	Integral of $\sin x$	$\int \sin x\,dx = -\cos x + C$
5.10	Integral of $\cos x$	$\int \cos x\,dx = \sin x + C$
5.10	Integral of e^x	$\int e^x\,dx = e^x + C$
5.11	Area under a curve	$A = \int_a^b \lvert y\rvert\,dx$
5.11	Kinematics (accel)	$a = \frac{dv}{dt} = \frac{d^2s}{dt^2}$
5.11	Kinematics (dist)	$d = \int_{t_1}^{t_2} \lvert v(t)\rvert\,dt$
5.11	Kinematics (disp)	$s = \int_{t_1}^{t_2} v(t)\,dt$