IBDP Mathematics
Applications and interpretation (SL)
Formula sheet

Prior learning	
Area of a parallelogram	$A = bh$ b = base, h = height
Area of a triangle	$A = \frac{1}{2}bh$
Area of a trapezoid	$A = \frac{1}{2}$ (a + b)h a, b = parallel sides, h = height
Area of a circle	$A = \pi r^2, r\ is\ radius$
Circumference of a circle	$C = 2\pi r, r\ is\ radius$
Volume of a cuboid	$V = lwh$
Volume a cylinder	$V = \pi r^2 h$
Volume of a prism	$V = Ah$, where A is the area of cross-section, h is the height
Area of the curved surface of a cylinder	$A = 2\pi rh$
Two points distance	$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$
Midpoint	$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Topic 2 Functions	
Straight line gradient	$m = \frac{y_2 - y_1}{x_2 - x_1}$
Straight line equation	$y = mx + c$; $ax + by + d = 0$
Axis of symmetry	$f(x) = ax^2 + bx + c$ $\rightarrow\ x = \frac{-b}{2a}$

Topic 1 Number and Algebra	
The nth term of A.S.	$u_n = u_1 + (n-1)d$
The sum of n terms of A.S.	$S_n = \frac{n}{2}(2u_1 + (n-1)d)$ $= \frac{n}{2}(u_1 + u_n)$
The nth terms of G.S.	$u_n = u_1 r^{n-1}$
The sum of n terms of G.S.	$S_n = \frac{u_1(r^n - 1)}{r-1} = \frac{u_1(1-r^n)}{1-r}, r \neq 1$
Compound interest	$FV = PV$ x $\left(1 + \frac{r}{100k}\right)^{kn}$, where FV= future value, PV = present value, n = number of years, k = number of compounding periods per year, $r\%$ = nominal annual rate interest
Exponents and logarithms	$a^x = b \leftrightarrow x = log_a b$
Percentage error	$\mathcal{E} = \left\|\frac{V_A - V_E}{V_E}\right\|$ x 100%, where V_E is the exact value and V_A is the approximate value of v

Topic 3 Geometry and trigonometry	
Arc length	$l = \frac{\theta}{360}$ x $2\pi r$, where θ is in degree
Sector area	$A = \frac{\theta}{360}$ x πr^2, where θ is in degree
Cosine rule	$c^2 = a^2 + b^2 - 2ab\ cos\ C$ $\cos C = \frac{a^2 + b^2 - c^2}{2ab}$
Sine rule	$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
Area of a triangle	$A = \frac{1}{2}absin\ C$
Surface area of a sphere	$A = 4\pi r^2$
Volume of a sphere	$V = \frac{4}{3}\pi r^3$
Volume of a pyramid or cone	$V = \frac{1}{3}$ x base area x vertical height
Curved surface area of a cone	$A = \pi rl$, where l is the slant height

Topic 4 Statistics and probability		Topic 5 Calculus	
Mean of a set of data	$\bar{x} = \frac{\sum_{i=1}^{k} f_i x_i}{n}$, where $n \sum_{i=1}^{k} f_i$	**Derivative of x^n**	$f(x) = x^n \quad \rightarrow \quad f'(x) = nx^{n-1}$
Interquartile range	$IQR = Q_3 - Q_1$	**Integral of x^n**	$\int x^n dx = \frac{x^{n+1}}{n+1} + C \, , n \neq 1$
Probability of an event *A*	$P(A) = \frac{n(A)}{n(U)}$	**Area under a curve between $x = a$ and $x = b$**	$A = \int_a^b y \, dx$
Complementary events	$P(A) + P(A') = 1$	**The trapezoidal rule**	$\int_a^b y \; dx$ $\approx \frac{1}{2} h((y_0 + y_n) + 2(y_1 + y_2 + \cdots + y_{n-1}))$
Combined events	$P(A \cup B)$ $= P(A) + P(B) - P(A \cap B)$		
Mutually exclusive events	$P(A \cup B) = P(A) + P(B)$		
Conditional probability	$P(A\|B) = \frac{P(A \cap B)}{P(B)}$		
Independent events	$P(A \cup B) = P(A)P(B)$		
Expected value of a discrete random variable *X*	$E(X) = \sum x \mathrm{P}(X = x)$		
Binomial distribution **Mean** **Variance**	$X \sim B(n, p)$ $\rightarrow P(X = r) = \binom{n}{r} p^r (1-p)^{n-r}$ $E(X) = np$ $Var(X) = np(1-p)$		