Topics

Topic 1—Algebra

1.1	The n^{th} term of an arithmetic sequence	$u_n = u_1 + (n-1)d$
	The sum of n terms of an arithmetic sequence	$S_n = \frac{n}{2}(2u_1 + (n-1)d) = \frac{n}{2}(u_1 + u_n)$
	The n^{th} term of a geometric sequence	$u_n = u_1 r^{n-1}$
	The sum of n terms of a finite geometric sequence	$S_n = \frac{u_1(r^n - 1)}{r-1} = \frac{u_1(1-r^n)}{1-r}, \ r \neq 1$
	The sum of an infinite geometric sequence	$S_\infty = \frac{u_1}{1-r}, \ \lvert r \rvert < 1$
1.2	Exponents and logarithms	$a^x = b \iff x = \log_a b$
	Laws of logarithms	$\log_c a + \log_c b = \log_c ab$
		$\log_c a - \log_c b = \log_c \frac{a}{b}$
		$\log_c a^r = r \log_c a$
	Change of base	$\log_b a = \frac{\log_c a}{\log_c b}$
1.3	Binomial coefficient	$\binom{n}{r} = \frac{n!}{r!(n-r)!}$
	Binomial theorem	$(a+b)^n = a^n + \binom{n}{1}a^{n-1}b + \ldots + \binom{n}{r}a^{n-r}b^r + \ldots + b^n$