



HIGH SCHOOL MATHEMATICS

SEQUENCES & SERIES

Arithmetic Sequences:

A sequence that has a common difference between its adjacent terms.

$$a, \quad (a + d), \quad (a + 2d), \quad (a + 3d), \quad \dots, \quad (a + (n - 1)d)$$

General term:

$$U_n = a + (n - 1)d$$

Sum of the first n terms:

$$S_n = \frac{1}{2} n (2a + (n - 1)d) \quad \text{Alternative form} \rightarrow S_n = \frac{1}{2} n (a + l)$$

Geometric Sequences:

A sequence that has a common ratio between its adjacent terms.

$$a, \quad (a \times r), \quad (a \times r^2), \quad (a \times r^3), \quad \dots, \quad (a \times r^{n-1})$$

General term:

$$U_n = a \times r^{(n-1)}$$

The sum of the first n terms:

$$S_n = \frac{a(1-r^n)}{1-r}$$

The sum to infinity:

(Applicable for convergent series ; $|r| < 1$)

$$S_\infty = \frac{a}{1-r}$$

Summation formulae:

$$\sum_{i=1}^n a_i = a_1 + a_2 + a_3 + \dots + a_n$$

$$\sum_{i=1}^n a_i \pm b_i = \sum_{i=1}^n a_i \pm \sum_{i=1}^n b_i$$

$$\sum_{i=1}^n i = 1 + 2 + 3 + \dots = \frac{n(n+1)}{2}$$

$$\sum_{i=1}^n c a_i = c \sum_{i=1}^n a_i$$

$$\sum_{i=1}^n c = c + c + c + \dots = nc$$

(c is a constant)

Note that the summation formulae are not provided in the formulae booklet!