Series and Sequences

Arithmetic Sequences – a sequence of numbers such that the difference between the consecutive terms is constant

$a_{n+1} = a_n + d \qquad \{a, a+d, a+2d, a+3d, \dots\}$

To find any term: $a_n = a_1 + (n-1)d$

where a_1 is the first term of the sequence, n is the number of the term to find

Geometric Series – a sequence of numbers where each term is found by multiplying the previous one by a fixed ratio

To find any term: $a_n = a_1 r^{n-1}$

where a_1 is the first term of the sequence, n is the number of the term to find

Arithmetic Series

$S_n = \frac{n}{2}(a_1 + a_n) \qquad S_n = \frac{n}{2}(2a_1 + (n-1)d)$

Geometric Series

$S_n = \frac{a_{n+1} - a_1}{r-1} \qquad S_n = \frac{a(r^n - 1)}{r-1} \qquad S = \frac{a}{1-r} \quad where\ r < 1$

Sigma

$\sum_{i=}^{n} a_i$ a_i the general term
n is the last term
$i =$ is the first term

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

$$\sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6}$$

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