Sequences

Arithmetic Sequences

Each term is derived by adding a constant, d, to the previous term; *i.e.*,

$$a_n = a_{n-1} + d$$

← This is the recursive version of the sequence

The n^{th} term of an arithmetic sequence:

$$a_n = a_1 + d(n-1)$$

Note that n in this case is the number of elements you're adding, not necessarily the element number of the last element.

The sum of an arithmetic series with n terms:

$$S = \frac{n}{2}(a_{\text{first}} + a_{\text{final}})$$

Finding *d*

$d = a_2 - a_1$
$d = a_3 - a_2$
etc.

Geometric Sequences

Each term is derived by multiplying the previous term by a constant, r; *i.e.*,

$$a_n = r \cdot a_{n-1}$$

← This is the recursive version of the sequence

Finding *r*

$r = \frac{a_2}{a_1}$
$r = \frac{a_3}{a_2}$
etc.

The n^{th} term of geometric sequence:

$$a_n = a_1 r^{n-1}$$

The sum of a geometric series with n terms:

$$S = a_{\text{first}}\left(\frac{1-r^n}{1-r}\right)$$

Note that n in this case is the number of elements you're adding, not necessarily the element number of the last element.

The sum of an infinite geometric series ($-1 < r < 1$)

$$S = \frac{a_{\text{first}}}{1-r}$$

Sigma Notation

$$\sum_{i=1}^{6} 3n - 6$$

- 6: The element number of the **last element** you are adding.
- $3n - 6$: The equation for calculating a_n.
- $i = 1$: The element number of the first element you are adding.