1 Hello!

2 Sequences

Sequences are a collection of objects in some particular order.

2.0.1 Notation

A sequence is written in the form $t_1, t_2, \ldots, t_n$ where t_1, t_2, and t_n represent the first, second and nth terms of the sequence respectively.

Example

Let us consider the sequence of odd numbers $1, 3, 5, \ldots$. We can then identify the terms as follows:

t_1	t_2	t_3	t_4	$\ldots$	t_n
1	3	5	7	$\ldots$	$2n-1$

2.1 Arithmetic Sequences

Arithmetic sequences are sequences where each term differs by the same amount (referred to as the common difference). Examples of arithmetic sequences include:

- $1, 3, 5, 7, 9, 11, \ldots$ (odd numbers)
- $2, 4, 6, 8, 10, 12, \ldots$ (even numbers)
- $5, 10, 15, 20, 25, 30, 35, \ldots$ (multiples of 5)
- $-4, -1, 2, 5, 8, 11, \ldots$

An arithmetic sequence has two key components that allow us to determine all of its terms:

- a starting term, denoted t_1 (a in other resources), and
- a common difference, denoted d.

Example

Using the same examples as listed at the beginning of the chapter:

Arithmetic Sequence	t_1	d
$1, 3, 5, 7, 9, 11, \ldots$	1	2
$2, 4, 6, 8, 10, 12, \ldots$	2	2
$5, 10, 15, 20, 25, 30, 35, \ldots$	5	-4
$-4, -1, 2, 5, 8, 11, \ldots$	-4	3

2.1.1 Recursive Formula of an Arithmetic Sequence

2.1.2 General Formula of an Arithmetic Sequence

The general formula of an arithmetic sequence can be represented as

$$t_n = t_1 + (n-1)d$$

where

- n is the term number, and
- d is the common difference.

2.2 Geometric Sequences

Geometric sequences are sequences where each term differs by the same ratio (referred to as the common ratio). Examples of geometric sequences include:

- $1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \ldots$
- $3, 9, 27, 81, \ldots$ (powers of 3)

A geometric sequence has two key components that allow us to determine all of its terms:

- a starting term, denoted t_1 (a in other resources), and
- a common ratio, denoted r.

Example

Using the same examples as listed at the beginning of the chapter:

Geometric Sequence	t_1	r
$1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \ldots$	1	$\frac{1}{2}$
$3, 9, 27, 81, \ldots$	3	3