

1. Arithmetic Sequences

In this section we are going to introduce Arithmetic Sequences. The simplest way to generate an arithmetic sequence is to start with a number a and add to it a fixed constant d , over and over again.

DEFINITION OF AN ARITHMETIC SEQUENCE

An **arithmetic sequence** is a sequence of the form

$$a, a + d, a + 2d, a + 3d, a + 4d, \dots$$

The number a is the **first term**, and d is the **common difference** of the sequence. The **n th term** of an arithmetic sequence is given by

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

Example 1: Is this sequence an arithmetic sequence? $13, 7, 1, -5, \dots$

If yes, find the common difference, the next three terms, the n th term, and the 300th term of the arithmetic sequence

Example 2: The 11th term of an arithmetic sequence is 52, and the 19th term is 92. Find the 1000th term.

2. Partial Sums of Arithmetic Sequences

PARTIAL SUMS OF AN ARITHMETIC SEQUENCE

For the arithmetic sequence given by $a_n = a + (n - 1)d$, the **n th partial sum**

$$S_n = a + (a + d) + (a + 2d) + (a + 3d) + \cdots + [a + (n - 1)d]$$

is given by either of the following formulas.

$$1. S_n = \frac{n}{2}[2a + (n - 1)d] \quad 2. S_n = n\left(\frac{a + a_n}{2}\right)$$

Example 3: a) Find the sum of the first 100 numbers.

b) Find the sum of the first 50 odd numbers.