

**Mona**

**Assistant Professor**

**Maharaja Ram Ranvijay Prasad Singh College (Maharaja College)**

**Veer Kunwar Singh University, Ara**

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**Topic - Arithmetic Sequence**

### **Arithmetic Sequence**

An arithmetic sequence is a list of numbers that can be generated by repeatedly adding a fixed value, which determines the difference between consecutive values. An example is: 1, 3, 5, 7, ... defined by repeatedly adding 2, starting from 1. Another example is: 10, 9, ... 2, 1, defined by subtracting 1, starting from 10 and finishing at 1.

A sequence is a list of numbers, either finite or infinite in length. A sequence is arithmetic if all consecutive pairs of numbers in the sequence have a common difference. Any term can be calculated from the previous term by adding the value of the difference.

### **Arithmetic Sequence Definition**

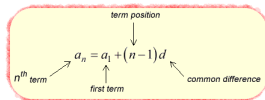
In mathematics, a list of numbers is known as a sequence. Sequences are often defined according to some rule that determines which numbers will appear in the list. A simple example of such a rule is an arithmetic progression, where the next number in the list is found by adding a fixed value to the previous number. The result is known as an arithmetic sequence.

Arithmetic sequences can be used to describe quantities which grow at a fixed rate. For example, if a car is driving at a constant speed of 50 km/hr, the total distance travelled will grow arithmetically, increasing by 50 km hour by hour. Many examples can be given in the realm of finance, since payments for rent, mortgages, bills, or other costs are often made in

regular amounts. Here again, the total amount paid over a span of months or years can be described as an arithmetic sequence.

### Arithmetic Sequence Formula

The formula for the  $n$ th term in an arithmetic sequence is :



The diagram shows the formula  $a_n = a_1 + (n-1)d$  enclosed in a yellow rounded rectangle with a red border. Arrows point from labels to parts of the formula: 'term position' points to  $n$ , ' $n^{\text{th}}$  term' points to  $a_n$ , 'first term' points to  $a_1$ , and 'common difference' points to  $d$ .

The more efficient way solve for the  $n$ th term in an arithmetic sequence is to use the formula  **$a_n = a_1 + (n-1)d$** , where  $a_n$  represents the value of  $n$ th term,  **$a_1$**  represents the first term in the sequence,  **$n$**  represents the number of the term, and  **$d$**  represents the common difference. This formula allows us to quickly identify the value of any  $n$ th term in an arithmetic sequence.