Time Complexity 1

**Arithmetic Progression**

An arithmetic progression or arithmetic sequence is a [sequence](https://en.wikipedia.org/wiki/Sequence) of [numbers](https://en.wikipedia.org/wiki/Number) such that the difference between the consecutive terms is constant.

For instance, the sequence 5, 7, 9, 11, 13, 15, . . . is an arithmetic progression with a common difference of 2.

If the initial term of an arithmetic progression is and the common difference of successive members is , then the -th term of the sequence is given by:



Sum of AP series is given by -

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**Derivation of Sum Formula:**

**To derive the above formula, begin by expressing the arithmetic series in two different ways:**

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Adding both sides of the two equations, all terms involving *d* cancel:

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Dividing both sides by 2 produces a common form of the equation:

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An alternate form results from re-inserting the substitution: ****

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Reference: ​​[https://en.wikipedia.org/wiki/Arithmetic\_progression](https://en.wikipedia.org/wiki/Arithmetic_progression#:~:text=An%20arithmetic%20progression%20or%20arithmetic,a%20common%20difference%20of%202)

**Geometric Progression -**

A geometric progression, also known as a geometric sequence, is a [sequence](https://en.wikipedia.org/wiki/Sequence) of non-zero [numbers](https://en.wikipedia.org/wiki/Number) where each term after the first is found by multiplying the previous one by a fixed, non-zero number called the *common ratio*.

For example, the sequence 2, 6, 18, 54, ... is a geometric progression with common ratio 3. Similarly 10, 5, 2.5, 1.25, ... is a geometric sequence with a common ratio 1/2.

The general form of a geometric sequence is  where *r* ≠ 0 is the common ratio and *a* ≠ 0 is a [scale factor](https://en.wikipedia.org/wiki/Scale_factor), equal to the sequence's start value.

The *n*-th term of a geometric sequence with initial value *a* = *a*1 and common ratio *r* is given by



Reference: <https://en.wikipedia.org/wiki/Geometric_progression>