Class 11 Mathematics – Chapter: Sequences and Series

1. Introduction

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    A sequence is an ordered list of numbers.

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    A series is the sum of terms of a sequence.

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    Important in algebra and calculus.

2. Types of Sequences

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Arithmetic Progression (AP): Difference between consecutive terms is constant.

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

where a = first term, d = common difference.

- Geometric Progression (GP): Ratio between consecutive terms is constant.

$a_n = a \times r^{n-1}$

where a = first term, r = common ratio.

- Harmonic Progression (HP): Reciprocal of terms form an AP.

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3. Sum of Terms

- Sum of first n terms of AP:

$$S_n = \frac{n}{2}[2a + (n-1)d]$$

- Sum of first n terms of GP (if $r \neq 1$):

$S_n = a \frac{r^n - 1}{r - 1}$

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4. Special Series

- Sum of first n natural numbers:

  $$1 + 2 + \cdots + n = \frac{n(n+1)}{2}$$

- Sum of squares:

  $$1^2 + 2^2 + \cdots + n^2 = \frac{n(n+1)(2n+1)}{6}$$

- Sum of cubes:

  $$1^3 + 2^3 + \cdots + n^3 = \left[\frac{n(n+1)}{2}\right]^2$$

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5. Important Concepts

- nth term of sequence

- Common difference (AP)

- Common ratio (GP)

- Infinite series and convergence (basic introduction)

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6. Applications

- Finance (compound interest)

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Physics (motion problems)

- Computer science (algorithms)

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7. Exam Tips

- Practice formulas for nth term and sum.

- Solve problems for all three types of progressions.

- Understand differences between AP, GP, and HP.

- Work on word problems.