NCERT - GRADE 10 CHEAT SHEET

ARITHMETIC PROGRESSIONS
(SUM OF n TERMS)



1 CHAPTER SNAPSHOT

This chapter covers:
- Definition of Arithmetic Series
- Formula for S_n (General)
- Formula for S_n (Last Term)
- Finding a_n from S_n

An **Arithmetic Series** is the sum of terms of an A.P.

Example:
- $S_n = a + (a+d) + \dots + [a+(n-1)d]$

2 KEY CONCEPTS

- **Sum of n terms (S_n):** The total value of all terms from a_1 to a_n.
- **First term (a):** The value of the first term.
- **Common difference (d):** The constant difference between terms.
- **Last term (l):** The value of the nth term.

3 FORMULA BOX

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

$$S_n = \frac{n}{2}(a + l)$$ Last Term Formula

4 VISUAL MEMORY AID

Derivation of Sum Formula

Forward: $S_n = a + (a+d) + \dots + (a+(n-1)d)$

Reverse: $S_n = [a+(n-1)d] + (a+(n-2)d) + \dots + a$

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

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

5 BOARD EXAM FOCUS & HOTSPOTS

Common Question Types
- ✅ Finding the sum of first n terms.
- ✅ Finding n when S_n and d are given.
- ✅ Finding a_n from a given S_n formula ($a_n = S_n - S_{n-1}$).

Example:
Find n given S_n=525, a=10, and d=5.

☑ Check for fractional n.

Example:
- Finding the sequence is AP. Finding n b = a.
- Finding term number / (questions, n = 1.

6 APPLICATIONS OF A.P.

- Savings per month total.
- Auditorium seating sum.
- Ladder rung lengths total.

8 COMMON MISTAKES

- ⚠ Confusing S_n (Sum) and a_n (Term).
- ⚠ Fractional n (which is impossible).
- ⚠ Wrong sign of d.

7 QUICK FORMULA MAP

Given	Formula/Method
a, d, n	$S_n = (n/2)[2a+(n-1)d]$
a, l, n	$S_n = (n/2)(a+l)$
S_n	$a_n = S_n - S_{n-1}$

9 30-SECOND RAPID REVISION

- ▶ Sum of A.P.: constant difference is key.
- ▶ Check which n, a, d values you have.
- ▶ Fractional n -> no solution.
- ▶ $a_n = S_n - S_{n-1}$ is a super tip.

10 KEY TAKEAWAY

The two S_n formulas and the a_n relation are the single keys to solving all progression sum problems efficiently and accurately.

★ **Remember:** Always identify a, d, and n before finding the sum S_n.