🟦 Chapter 5: Arithmetic Progressions – Easy Notes

1. What is an Arithmetic Progression (AP)?

An **Arithmetic Progression (AP)** is a list of numbers where **each term is obtained by adding the same fixed number to the previous term**.

This fixed number is called the **common difference (d)**.

✅ The common difference can be positive, negative, or zero.

Examples of APs:

- 2, 4, 6, 8, 10, ... (d = +2)
- 100, 90, 80, 70, ... (d = –10)
- 5, 5, 5, 5, ... (d = 0)

2. General Form of an AP

If:

- First term = a
- Common difference = d

Then the AP is:
a, a + d, a + 2d, a + 3d, ..., a + (n – 1)·d

3. **nth** Term of an AP

Formula to find the nth term (also called general term):
$a_n = a + (n – 1)·d$

Where:

- a_n is the nth term
- a is the first term
- d is the common difference
- n is the position of the term

✅ Use this to:

- Find any term in the AP
- Check whether a number is a term in the AP

4. Sum of First n Terms of an AP

A. If first term is a, common difference is d:

$S_n = (n / 2) \times [2a + (n - 1) \cdot d]$

B. If first term is a and last term is l:

$S_n = (n / 2) \times (a + l)$

Use whichever form suits the question best.

5. How to Identify if a List is an AP

Check if:
$a_2 - a_1 = a_3 - a_2 = a_4 - a_3 = \ldots$ (same value)

If yes → it's an AP.
Otherwise → Not an AP.

6. Solving Problems with APs

Given	Use
First term and difference	Use nth term or sum formula
Any two terms	Use equations to find a and d
From last term	Use nth term backward or reverse AP
Real-life scenarios	Translate into AP → use formulas

7. Common Real-Life Word Problems

Situation Type	What to Do
Savings or salary growth	Fixed increase → use AP formulas
Penalty or cost increasing	Use nth term or sum formulas
Geometry (steps, ladders)	Lengths/positions follow AP
Count divisible numbers	First term = smallest, d = common diff

8. Frequently Asked Exam Questions

Type of Question	Topic Covered
Find nth term	nth term formula
Check if a number is in an AP	Use $a_n = a + (n - 1)d$
Find number of terms	Use a_n and solve for n
Find sum of terms	Use sum formulas
Word problems (money, numbers, penalty, etc.)	Full chapter concepts

✅ Summary for Quick Revision

Concept	Formula
nth term	$a_n = a + (n - 1) \cdot d$
Sum of n terms	$S_n = (n/2) \times [2a + (n - 1) \cdot d]$
Sum using last term	$S_n = (n/2) \times (a + l)$
Common difference	$d = a_2 - a_1$ (or $a_{k+1} - a_k$)