Arithmetic Progressions

An arithmetic progression has a constant difference between consecutive terms. Decide whether the question asks for one term or a total before choosing a formula.

Formulas and methods

Common difference $d = a_2 - a_1$. The nth term is $a_n = a + (n - 1)d$, where n is a positive integer.

$S_n = n[2a + (n - 1)d]/2 = n(a + l)/2$, where l is the nth term.

Why the sum works: write the sum forwards and backwards. Each paired column is a + l; n such columns give $2S_n = n(a + l)$.

Worked examples

Find the 18th term of 7, 11, 15, ...

Here a = 7, d = 4. $a_{18} = 7 + 17 \times 4 = 75$. There are 17 jumps from the first term to the eighteenth.

Find the sum of the first 20 positive multiples of 3.

The AP is 3,6,...,60. $S_{20} = 20(3 + 60)/2 = 630$. This is a sum of 20 terms, not the 20th term, which is 60.

Common mistake

Use n − 1 jumps, not n. If solving for n produces a non-integer or non-positive value, that position is not a valid term number.

Arithmetic Progressions — practice

Try these without looking at the answers. Show substitutions and units. Difficulty labels describe these questions, not official CBSE classifications.

1. [Foundation] Find the common difference of 12, 8, 4, 0, ...

2. [Core] Find the 15th term when a = 2 and d = 5.

3. [Core] Find the sum 4 + 8 + ... + 80.

4. [Challenge] Is 100 a term of 7, 13, 19, ...?

Arithmetic Progressions — answers

1. Find the common difference of 12, 8, 4, 0, ...

d = 8 − 12 = −4.

2. Find the 15th term when a = 2 and d = 5.

a_{15} = 2 + 14 × 5 = 72.

3. Find the sum 4 + 8 + ... + 80.

n = 20. S_{20} = 20(4 + 80)/2 = 840.

4. Is 100 a term of 7, 13, 19, ...?

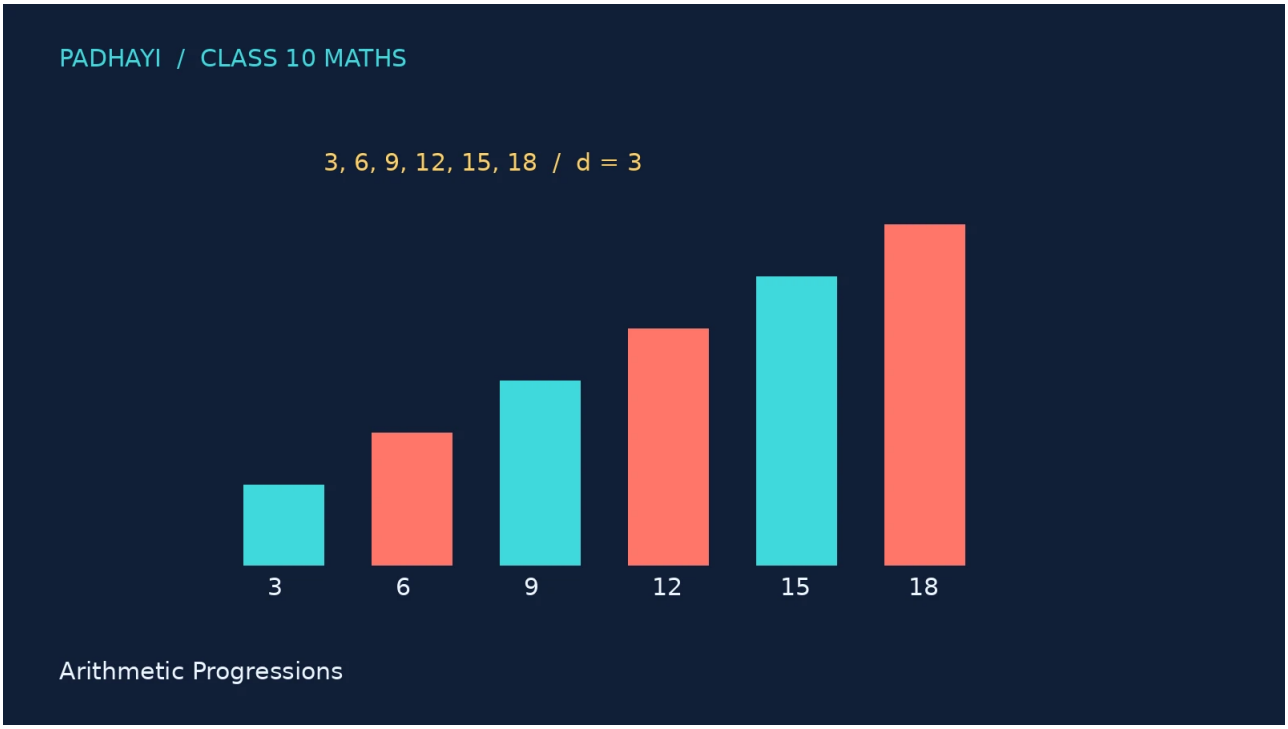
100 = 7 + 6(n − 1) gives n = 16.5. Since n is not an integer, 100 is not a term.

Next step: explain one method aloud, then solve a question from your NCERT textbook without using this sheet.

Original Padhayi revision material. Independent study aid; not an official CBSE or NCERT publication. Syllabus reference: CBSE Mathematics, Class X, 2026–27.

Official CBSE syllabus | NCERT textbooks

Visual reminder



Schematic illustration; diagrams are not necessarily drawn to scale.