Class 10 Maths Chapter 5: Arithmetic Progressions - Notes, Important Questions and MCQs (2026-27)

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These Arithmetic Progressions Class 10 notes cover NCERT Class 10 Maths Chapter 5: what an AP is, the common difference, the nth term, the sum of the first n terms and word problems – with formula tables, solved examples, 10 MCQs and a free PDF.

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Chapter Overview

An arithmetic progression (AP) is a list of numbers in which each term (except the first) is obtained by adding a fixed number d, called the common difference, to the previous term. The general form is a, a + d, a + 2d, a + 3d, ...

The chapter gives two main formulas – the nth term $a_n = a + (n - 1)d$ and the sum $S_n = n/2 [2a + (n - 1)d]$ – and applies them to savings, instalments, seating rows, logs and many other real-life patterns.

Important Topics and Concepts

Identifying an AP

- Check whether $a_2 - a_1 = a_3 - a_2 = a_4 - a_3 = \ldots$

- d can be positive, negative or zero.
- Example: 3, 7, 11, 15 … is an AP with d = 4; 1, 4, 9, 16 … is not an AP.
- A finite AP has a last term; an infinite AP does not.

nth Term of an AP

- $a_n = a + (n - 1)d$.
- To check whether a number is a term, solve for n and see if n is a positive integer.
- nth term from the end of an AP with last term l: $l - (n - 1)d$.
- Three terms in AP can be taken as $a - d$, a, $a + d$ (sum = 3a).

Sum of First n Terms

- $S_n = n/2\ [2a + (n - 1)d]$.
- If the last term l is known: $S_n = n/2\ (a + l)$.
- $a_n = S_n - S_{n-1}$.
- Sum of first n natural numbers = $n(n + 1)/2$.

Applications

- Savings that increase by a fixed amount each month.
- Logs stacked in rows decreasing by one each row.
- Prizes that decrease by a fixed amount.
- Distance covered in a potato race or by a ball in successive bounces (only if differences are equal).

Solved Examples

Board-pattern questions with full working.

- Find the 10th term of 2, 7, 12, … a = 2, d = 5; $a_{10} = 2 + 9 \times 5 = 47$.
- Which term of 21, 18, 15, … is −81? $-81 = 21 + (n - 1)(-3) \rightarrow n - 1 = 34 \rightarrow n = 35$.
- Find the sum of the first 22 terms of 8, 3, −2, … $S_{22} = 11[16 + 21(-5)] = 11(-89) = -979$.
- How many three-digit numbers are divisible by 7? 105, 112, …, 994 → $994 = 105 + (n - 1)7 \rightarrow n = 128$.

Which Formula to Use

Pick quickly in the exam.

Given	Find	Formula
a, d, n	nth term	$a_n = a + (n - 1)d$
a, d, n	Sum	$S_n = n/2\ [2a + (n - 1)d]$
a, l, n	Sum	$S_n = n/2\ (a + l)$
S_n for all n	nth term	$a_n = S_n - S_{n-1}$
l, d	nth from end	$l - (n - 1)d$

Key AP Formulas at a Glance

Quantity	Formula
Common difference	$d = a_{n+1} - a_n$
nth term	$a_n = a + (n - 1)d$
Sum of n terms	$S_n = n/2\ [2a + (n - 1)d]$
Sum using last term	$S_n = n/2\ (a + l)$
nth term from sum	$a_n = S_n - S_{n-1}$
1 + 2 + ... + n	n(n + 1)/2

Important Formulas and Definitions

Formula / Term	Meaning / Use
Arithmetic progression	Sequence with a constant difference between consecutive terms
First term (a)	The starting term
Common difference (d)	Fixed amount added to get the next term
nth term (a_n)	General term of the AP
S_n	Sum of the first n terms
Finite AP	AP with a last term
Infinite AP	AP that never ends

Short Answer Questions

Q1. Find the common difference of 3/2, 1/2, −1/2, ...

d = 1/2 − 3/2 = −1.

Q2. Find the 30th term of 10, 7, 4, ...

a_{30} = 10 + 29(−3) = −77.

Q3. Which term of 3, 8, 13, 18, ... is 78?

78 = 3 + (n − 1)5 → n = 16. The 16th term.

Q4. Is 301 a term of 5, 11, 17, 23, ...?

301 = 5 + (n − 1)6 → n − 1 = 296/6, not an integer. So 301 is not a term.

Q5. Find the sum of the first 15 multiples of 8.

S_{15} = 15/2 (8 + 120) = 960.

Q6. Find the sum of the odd numbers between 0 and 50.

1 + 3 + ... + 49: n = 25, S = 25/2 (1 + 49) = 625.

Q7. If $S_n = 4n - n^2$, find the first term and the 10th term.

a = S_1 = 3. $a_{10} = S_{10} - S_9$ = (40 − 100) − (36 − 81) = −60 + 45 = −15.

Q8. Find the 11th term from the last term of the AP 10, 7, 4, ..., −62.

l = −62, d = −3: 11th from end = −62 − 10(−3) = −32.

Long Answer Questions

Q1. The sum of the 4th and 8th terms of an AP is 24 and the sum of the 6th and 10th terms is 44. Find the first three terms.

(a + 3d) + (a + 7d) = 24 → a + 5d = 12.

(a + 5d) + (a + 9d) = 44 → a + 7d = 22.

Subtract: 2d = 10 → d = 5; a = −13.

First three terms: −13, −8, −3.

Check: $a_4 + a_8 = 2 + 22 = 24$ ✓.

Q2. A sum of ₹700 is to be used to give seven cash prizes; each prize is ₹20 less than its preceding prize. Find each prize.

Prizes form an AP with d = −20 and n = 7, $S_7 = 700$.

700 = 7/2 [2a + 6(−20)] → 200 = 2a − 120 → a = 160.

Prizes: ₹160, 140, 120, 100, 80, 60, 40.

Check: sum = 700 ✓.

The largest prize is ₹160.

Q3. 200 logs are stacked: 20 in the bottom row, 19 in the next, 18 in the next, and so on. In how many rows are the 200 logs placed, and how many are in the top row?

a = 20, d = −1, $S_n = 200$.

200 = n/2 [40 − (n − 1)] → $n^2 − 41n + 400 = 0$ → (n − 16)(n − 25) = 0.

n = 25 gives $a_{25} = 20 − 24 = −4$ (impossible), so n = 16.

Top row: $a_{16} = 20 − 15 = 5$ logs.

Answer: 16 rows, 5 logs in the top row.

MCQs with Answers

1. The common difference of 5, 1, −3, −7 is(a) 4 (b) −4 (c) 6 (d) −6Answer: (b) −4

2. The 10th term of 2, 7, 12, … is(a) 45 (b) 47 (c) 49 (d) 52Answer: (b) 47

3. Which is an AP?(a) 1, 2, 4, 8 (b) 2, 4, 8, 16 (c) 1, 4, 7, 10 (d) 1, 1, 2, 3Answer: (c) 1, 4, 7, 10

4. Sum of the first 10 natural numbers is(a) 50 (b) 55 (c) 60 (d) 45Answer: (b) 55

5. If $a_n = 3n + 2$, the common difference is(a) 2 (b) 3 (c) 5 (d) 1Answer: (b) 3

6. The number of terms in 7, 13, 19, …, 205 is(a) 32 (b) 33 (c) 34 (d) 35Answer: (c) 34 – 205 = 7 + (n−1)6

7. If a, b, c are in AP, then(a) 2b = a + c (b) $b^2 = ac$ (c) a = b = c (d) 2a = b + cAnswer: (a) 2b = a + c

8. $S_n = n/2$ (a + l) needs(a) a, d, n (b) a, l, n (c) d, l only (d) a onlyAnswer: (b) a, l, n

9. The 11th term of the AP −3, −1/2, 2, … is(a) 22 (b) 25 (c) 28 (d) −28Answer: (a) 22 – d = 5/2; −3 + 10(5/2)

Quick Revision Points

- AP: constant difference $d = a_{n+1} - a_n$.
- $a_n = a + (n - 1)d$; nth from end $= l - (n - 1)d$.
- $S_n = n/2\ [2a + (n - 1)d] = n/2\ (a + l)$.
- $a_n = S_n - S_{n-1}$.
- Three terms in AP: $a - d$, a, $a + d$.
- n must be a positive integer – reject other values.

Chapter Summary

An arithmetic progression is a sequence with a constant common difference d. The nth term is $a + (n - 1)d$ and the sum of the first n terms is $n/2\ [2a + (n - 1)d]$, or $n/2\ (a + l)$ when the last term is known.

These two formulas solve almost every question in the chapter – finding terms, checking whether a number belongs to the AP, counting terms and summing them – and model real situations such as prizes, savings and stacked logs.

Exam Tips and PYQ Pattern

- Expect a 2-mark nth-term question and a 3–5 mark sum-based word problem.
- Write a, d and n clearly before substituting.
- When solving a quadratic for n, reject non-integer or impossible values and say why.
- Learn $a_n = S_n - S_{n-1}$; it appears as a twist question.
- Count terms carefully in “how many multiples” questions.

Frequently Asked Questions

Is this chapter in the 2026-27 CBSE syllabus?

Yes. It is part of the NCERT Class 10 Mathematics textbook and the rationalised CBSE syllabus for 2026-27.

Can I download these notes as a PDF?

Yes. Use the free PDF link at the top of this page – no signup needed.

What is the nth term formula of an AP?

$a_n = a + (n - 1)d$, where a is the first term and d the common difference.

What is the sum of the first n terms of an AP?

$S_n = n/2\ [2a + (n - 1)d]$, or $n/2\ (a + l)$ if the last term l is known.

Conclusion

Arithmetic Progressions is formula-driven and easy to score once a, d and n are identified correctly. Revise the formula tables and solved problems here and keep the free PDF for last-minute practice.

Author Bio: Written and reviewed by the Nextoper Editorial Team, a group of CBSE mathematics educators who build chapter notes directly from the NCERT textbook and past board paper patterns.

Freshness Note: These notes follow the NCERT Class 10 Maths textbook, Mathematics (Reprint 2026-27), and the CBSE syllabus for the 2026-27 session. Last checked on 16 November 2026.