NCERT Solutions for Class 10 Maths Chapter 5 Ex 5.3 | Updated 2026-27

⚡ Quick Revision Box — Chapter 5 Ex 5.3

- **Sum Formula 1:** S_n = n/2[2a + (n-1)d] — use when a, d, n are known
- **Sum Formula 2:** S_n = n/2(a + l) — use when first term (a) and last term (l) are known
- **nth Term:** a_n = a + (n-1)d — always derive this before finding sum
- **Finding nth term from Sn:** a_n = S_n - S_n-1 for n ≥ 2; $a_1 = S_1$
- **Common Difference:** d = a_2 - a_1 — constant for all consecutive pairs
- **Total questions in Ex 5.3:** 20 (including 10 sub-parts in Q3)
- **Board exam weightage:** Arithmetic Progressions carries 6–8 marks in CBSE Class 10 Maths paper
- **Key trick:** If S_n is given as a quadratic in n, the AP has constant common difference equal to twice the coefficient of n²

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NCERT Solutions for Class 10 Maths Chapter 5 Ex 5.3 — Chapter Overview

The **NCERT Solutions for Class 10 Maths Chapter 5 Ex 5.3** cover one of the most scoring topics in the 2026-27 CBSE board exam — the **Sum of First N Terms of an Arithmetic Progression**. You can find all NCERT Solutions for Class 10 on our hub page. This exercise has 20 questions ranging from direct formula application to real-life word problems.

Chapter 5 of the NCERT Class 10 Maths textbook (published on the NCERT official website) deals with Arithmetic Progressions. Exercise 5.3 specifically tests your ability to apply the sum formulas. You can explore all NCERT Solutions across classes on our main hub.

This chapter typically carries **6–8 marks** in the CBSE Class 10 Maths board paper. Questions from Ex 5.3 appear in the 2-mark, 3-mark, and sometimes 5-mark sections. Word problems like the construction penalty problem (Q15) and the potato race problem (Q20) are CBSE board exam favourites.

Detail	Information
Chapter	Chapter 5 — Arithmetic Progressions
Exercise	Exercise 5.3

Detail	Information
Textbook	NCERT Mathematics — Class 10
Subject	Mathematics
Total Questions	20
Marks Weightage	6–8 marks (Algebra unit)
Difficulty Level	Medium to High
Academic Year	2026-27

Key Concepts — Sum of First N Terms of an AP

Sum Formula Derivation

An AP with first term *a*, common difference *d*, and *n* terms can be written as: a, a+d, a+2d, …, a+(n-1)d. Adding the series forward and backward gives:

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

If the last term l = a + (n-1)d is known, the formula simplifies to:

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

Finding the nth Term from Sn

If the sum of first n terms S_n is given, you can find any term using:

$$a_n = S_n - S_{n-1} \text{ for } n \geq 2$$

$$a_1 = S_1$$

This is a very important concept tested in CBSE board exams — especially when S_n is given as a polynomial expression in n.

Real-World Meaning of AP Sum

The sum of an AP models many real-life situations: total salary over years, total distance in a race, stacking objects in rows, and penalty calculations. Recognising the AP structure in a word problem is the key skill tested in Ex 5.3.

Formula Reference Table — Arithmetic Progressions

Formula Name	Formula	Variables Defined
nth Term of AP	a_n = a + (n-1)d	a = first term, d = common difference, n = term number

Formula Name	Formula	Variables Defined
Sum of n terms (standard)	S_n = n/2[2a + (n-1)d]	a = first term, d = common difference, n = number of terms
Sum of n terms (with last term)	S_n = n/2(a + l)	a = first term, l = last term, n = number of terms
nth term from Sn	a_n = S_n - S_n-1	Valid for n ≥ 2
Common Difference	d = a_2 - a_1	Constant difference between consecutive terms
Sum of first n natural numbers	S = (n(n+1))/(2)	Special case of AP with a=1, d=1

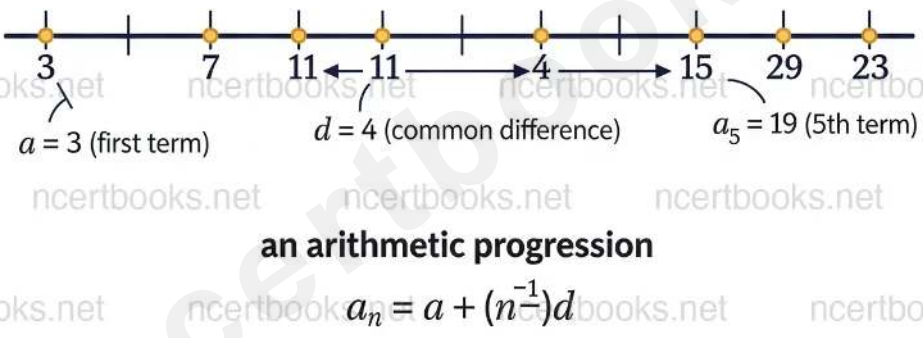

Fig 5.1: AP terms on a number line — equal spacing shows constant common difference

Exercise 5.3 — Step-by-Step NCERT Solutions (All 20 Questions)

Below are complete, original solutions for all 20 questions from **NCERT Class 10 Maths Chapter 5 Exercise 5.3**. Every solution includes full working with the 2026-27 CBSE marking scheme in mind.

Question 1

Easy

Find the sum of the following APs: (i) 2, 7, 12,… to 10 terms. (ii) −37, −33, −29,… to 12 terms. (iii) 0.6, 1.7, 2.8,… to 100 terms. (iv) 1/15, 1/12, 1/10,… to 11 terms.

(i) 2, 7, 12, … to 10 terms

Step 1: Identify values. $a = 2,\ d = 7 - 2 = 5,\ n = 10$

Step 2: Apply the sum formula:

$$S\_n = n/2[2a + (n-1)d]$$

$$S_{10} = 10/2[2(2) + (10-1)(5)] = 5[4 + 45] = 5 \times 49 = 245$$

∴ $\mathbf{S_{10} = 245}$

(ii) −37, −33, −29, … to 12 terms

Step 1: $a = -37,\ d = -33 - (-37) = 4,\ n = 12$

Step 2: Apply the formula:

$$S_{12} = 12/2[2(-37) + (12-1)(4)] = 6[-74 + 44] = 6 \times (-30) = -180$$

∴ $\mathbf{S_{12} = -180}$

(iii) 0.6, 1.7, 2.8, … to 100 terms

Step 1: $a = 0.6,\ d = 1.7 - 0.6 = 1.1,\ n = 100$

Step 2: Apply the formula:

$$S_{100} = 100/2[2(0.6) + (100-1)(1.1)] = 50[1.2 + 108.9] = 50 \times 110.1 = 5505$$

∴ $\mathbf{S_{100} = 5505}$

(iv) 1/15, 1/12, 1/10, … to 11 terms

Step 1: $a = 1/15,\ d = 1/12 - 1/15 = 5-4/60 = 1/60,\ n = 11$

Step 2: Apply the formula:

$$S_{11} = 11/2[2 \times 1/15 + (11-1) \times 1/60] = 11/2[2/15 + 10/60]$$

$$= 11/2[8/60 + 10/60] = 11/2 \times 18/60 = 11/2 \times 3/10 = 33/20$$

∴ $\mathbf{S_{11} = 33/20}$

Board Exam Note: This type of question typically appears in 2-3 mark sections of CBSE board papers. Show all substitution steps clearly.

Question 2

Medium

Find the sums given below: (i) 7 + 10½ + 14 + … + 84 (ii) 34 + 32 + 30 + … + 10 (iii) −5 + (−8) + (−11) + … + (−230)

(i) 7 + 10½ + 14 + … + 84

Step 1: $a = 7,\ d = 10.5 - 7 = 3.5,\ l = 84$

Step 2: Find n using a_n = a + (n-1)d:

$$84 = 7 + (n-1)(3.5) \Rightarrow 77 = (n-1)(3.5) \Rightarrow n-1 = 22 \Rightarrow n = 23$$

Step 3: Apply sum formula:

$$S_{23} = 23/2(7 + 84) = 23/2 \times 91 = (2093)/(2) = 1046.5$$

∴ **Sum = 1046.5**

(ii) 34 + 32 + 30 + … + 10

Step 1: $a = 34,\ d = 32 - 34 = -2,\ l = 10$

Step 2: Find n:

$$10 = 34 + (n-1)(-2) \Rightarrow -24 = -2(n-1) \Rightarrow n-1 = 12 \Rightarrow n = 13$$

Step 3: Sum:

$$S_{13} = 13/2(34 + 10) = 13/2 \times 44 = 13 \times 22 = 286$$

∴ **Sum = 286**

(iii) −5 + (−8) + (−11) + … + (−230)

Step 1: $a = -5,\ d = -8 - (-5) = -3,\ l = -230$

Step 2: Find n:

$$-230 = -5 + (n-1)(-3) \Rightarrow -225 = -3(n-1) \Rightarrow n-1 = 75 \Rightarrow n = 76$$

Step 3: Sum:

$$S_{76} = 76/2(-5 + (-230)) = 38 \times (-235) = -8930$$

∴ **Sum = −8930**

Board Exam Note: Always find n first before applying the sum formula. This two-step approach is required for full marks in 2-3 mark sections.

Question 3

Medium

In an AP, find the required unknowns for each sub-part.

(i) Given a = 5, d = 3, a? = 50, find n and S?

Step 1: Use a_n = a + (n-1)d:

$$50 = 5 + (n-1)(3) \Rightarrow 45 = 3(n-1) \Rightarrow n = 16$$

Step 2: $S_{16} = 16/2(5 + 50) = 8 \times 55 = 440$

∴ **n = 16, $S_{16} = 440$**

(ii) Given a = 7, $a_{13} = 35$, find d and S_{13}

Step 1: $a_{13} = a + 12d \Rightarrow 35 = 7 + 12d \Rightarrow d = 28/12 = 7/3$

Step 2: $S_{13} = 13/2(7 + 35) = 13/2 \times 42 = 13 \times 21 = 273$

∴ **d = 7/3, $S_{13} = 273$**

(iii) Given $a_{12} = 37$, d = 3, find a and S_{12}

Step 1: $a_{12} = a + 11d \Rightarrow 37 = a + 11(3) \Rightarrow a = 37 - 33 = 4$

Step 2: $S_{12} = 12/2(4 + 37) = 6 \times 41 = 246$

∴ **a = 4, $S_{12} = 246$**

(iv) Given $a_3 = -15$, $S_{10} = 125$, find d and a_{10}

Step 1: $a_3 = a + 2d = -15 \rightarrow$ equation (1)

Step 2: $S_{10} = 10/2[2a + 9d] = 125 \Rightarrow 2a + 9d = 25 \rightarrow$ equation (2)

Step 3: From (1): a = -15 - 2d. Substitute in (2): 2(-15 - 2d) + 9d = 25 ⇒ -30 + 5d = 25 ⇒ d = 11

Step 4: a = -15 - 2(11) = -37. Then $a_{10} = -37 + 9(11) = -37 + 99 = 62$

∴ **d = 11, $a_{10} = 62$**

(v) Given d = 5, $S_9 = 75$, find a and a_9

Step 1: $S_9 = 9/2[2a + 8(5)] = 75 \Rightarrow 9/2[2a + 40] = 75 \Rightarrow 2a + 40 = 150/9 = 50/3$

Why does this work? We isolate a by simplifying the bracket first.

$$2a = 50/3 - 40 = (50 - 120)/(3) = -70/3 \Rightarrow a = -35/3$$

Step 2: $a_9 = a + 8d = -35/3 + 40 = (-35 + 120)/(3) = 85/3$

$\therefore$ **$a = -35/3$, $a_9 = 85/3$**

(vi) Given a = 2, d = 8, S? = 90, find n and a?

Step 1: S_n = n/2[2(2) + (n-1)(8)] = 90 ⇒ n/2[4 + 8n - 8] = 90 ⇒ n/2[8n - 4] = 90

$$n(8n - 4) = 180 \Rightarrow 8n^2 - 4n - 180 = 0 \Rightarrow 2n^2 - n - 45 = 0$$

Step 2: Factorise: (2n + 9)(n - 5) = 0 ⇒ n = 5 (taking positive value)

Step 3: $a_5 = 2 + 4(8) = 2 + 32 = 34$

$\therefore$ **$n = 5$, $a_5 = 34$**

(vii) Given a = 8, a? = 62, S? = 210, find n and d

Step 1: S_n = n/2(a + a_n) ⇒ 210 = n/2(8 + 62) = n/2 × 70 = 35n ⇒ n = 6

Step 2: $a_6 = a + 5d \Rightarrow 62 = 8 + 5d \Rightarrow d = 54/5$

$\therefore$ **$n = 6$, $d = 54/5$**

(viii) Given a? = 4, d = 2, S? = −14, find n and a

Step 1: S_n = n/2(a + a_n) ⇒ -14 = n/2(a + 4) → equation (1)

Step 2: a_n = a + (n-1)d ⇒ 4 = a + (n-1)(2) ⇒ a = 4 - 2(n-1) = 6 - 2n → equation (2)

Step 3: Substitute (2) in (1): -14 = n/2(6 - 2n + 4) = n/2(10 - 2n) = n(5 - n)

$$-14 = 5n - n^2 \Rightarrow n^2 - 5n - 14 = 0 \Rightarrow (n-7)(n+2) = 0 \Rightarrow n = 7$$

Step 4: a = 6 - 2(7) = 6 - 14 = -8

$\therefore$ **$n = 7$, $a = -8$**

(ix) Given a = 3, n = 8, S = 192, find d

Step 1: $S_8 = 8/2[2(3) + 7d] = 192 \Rightarrow 4[6 + 7d] = 192 \Rightarrow 6 + 7d = 48 \Rightarrow d = 6$

$\therefore$ **$d = 6$**

(x) Given l = 28, S = 144, total 9 terms. Find a

Step 1: $S_9 = 9/2(a + l) \Rightarrow 144 = 9/2(a + 28) \Rightarrow a + 28 = 288/9 = 32 \Rightarrow a = 4$

$\therefore$ **a = 4**

Board Exam Note: Q3 sub-parts appear frequently in 2-3 mark sections. Always write the formula, substitute values, and box your final answer.

Question 4

Medium

How many terms of AP: 9, 17, 25, … must be taken to give a sum of 636?

Step 1: a = 9,\ d = 8. Set S_n = 636:

$$n/2[2(9) + (n-1)(8)] = 636 \Rightarrow n/2[18 + 8n - 8] = 636 \Rightarrow n/2[8n + 10] = 636$$

$$n(4n + 5) = 636 \Rightarrow 4n^2 + 5n - 636 = 0$$

Step 2: Discriminant: $\Delta = 25 + 4 \times 4 \times 636 = 25 + 10176 = 10201 = 101^2$

$$n = (-5 + 101)/(8) = 96/8 = 12$$

$\therefore$ **n = 12 terms**

Board Exam Note: This type of question appears in 2-3 mark sections. Reject the negative root and justify why n must be positive.

Question 5

Medium

The first term of an AP is 5, the last term is 45 and the sum is 400. Find the number of terms and the common difference.

Step 1: a = 5,\ l = 45,\ S_n = 400. Use S_n = n/2(a+l):

$$400 = n/2(5 + 45) = 25n \Rightarrow n = 16$$

Step 2: $l = a + (n-1)d \Rightarrow 45 = 5 + 15d \Rightarrow d = 40/15 = 8/3$

$\therefore$ **n = 16, d = 8/3**

Board Exam Note: This question appears in 2-3 mark sections. Use the simpler Sn = n/2(a+l) formula when both first and last terms are given.

Question 6

Medium

The first and last terms of an AP are 17 and 350 respectively. If the common difference is 9, how many terms are there and what is their sum?

Step 1: $a = 17,\ l = 350,\ d = 9$. Find n:

$$350 = 17 + (n-1)(9) \Rightarrow 333 = 9(n-1) \Rightarrow n-1 = 37 \Rightarrow n = 38$$

Step 2: Sum: $S_{38} = 38/2(17 + 350) = 19 \times 367 = 6973$

$\therefore$ **n = 38, Sum = 6973**

Board Exam Note: This question typically appears in 2-3 mark sections. Always verify by checking that the last term matches.

Question 7

Easy

Find the sum of first 22 terms of an AP in which d = 7 and 22nd term is 149.

Step 1: $d = 7,\ a_{22} = 149,\ n = 22$. Use S_n = n/2(a + a_n). Need a first:

$$a_{22} = a + 21(7) = 149 \Rightarrow a = 149 - 147 = 2$$

Step 2: $S_{22} = 22/2(2 + 149) = 11 \times 151 = 1661$

$\therefore$ **S_{22} = 1661**

Board Exam Note: This question appears in 2-3 mark sections. Using S = n/2(a + last term) saves calculation time.

Question 8

Medium

Find the sum of first 51 terms of an AP whose second and third terms are 14 and 18 respectively.

Step 1: $a_2 = 14,\ a_3 = 18 \Rightarrow d = 18 - 14 = 4$. Then $a = a_2 - d = 14 - 4 = 10$.

Step 2: $S_{51} = 51/2[2(10) + 50(4)] = 51/2[20 + 200] = 51/2 \times 220 = 51 \times 110 = 5610$

$\therefore$ **S_{51} = 5610**

Board Exam Note: Finding a from a_2 is a common first step. Show this working clearly for full marks in 2-3 mark sections.

Question 9

Hard

If the sum of first 7 terms of an AP is 49 and that of 17 terms is 289, find the sum of first n terms.

Step 1: $S_7 = 7/2[2a + 6d] = 49 \Rightarrow 7(a + 3d) = 49 \Rightarrow a + 3d = 7$ — (1)

Step 2: $S_{17} = 17/2[2a + 16d] = 289 \Rightarrow 17(a + 8d) = 289 \Rightarrow a + 8d = 17$ — (2)

Step 3: Subtract (1) from (2): $5d = 10 \Rightarrow d = 2$. Then $a = 7 - 3(2) = 1$.

Step 4: S_n = n/2[2(1) + (n-1)(2)] = n/2[2 + 2n - 2] = n/2 × 2n = n²

∴ **S□ = n²**

Board Exam Note: This is a high-value question that appears in long answer sections. The elegant result S□ = n² is worth remembering.

Question 10

Medium

Show that $a_1, a_2, \ldots, a$□ form an AP where a□ is defined as: (i) a□ = 3 + 4n (ii) a□ = 9 − 5n. Also find the sum of first 15 terms in each case.

(i) a□ = 3 + 4n

Step 1: $a_1 = 3 + 4(1) = 7,\ a_2 = 3 + 4(2) = 11,\ a_3 = 3 + 4(3) = 15$

Step 2: $a_2 - a_1 = 4,\ a_3 - a_2 = 4$. Difference is constant, so it is an AP with d = 4.

Step 3: $S_{15} = 15/2[2(7) + 14(4)] = 15/2[14 + 56] = 15/2 \times 70 = 525$

∴ **It is an AP. $S_{15} = 525$**

(ii) a□ = 9 − 5n

Step 1: $a_1 = 9 - 5 = 4,\ a_2 = 9 - 10 = -1,\ a_3 = 9 - 15 = -6$

Step 2: $a_2 - a_1 = -5,\ a_3 - a_2 = -5$. Constant difference d = -5, so it is an AP.

Step 3: $S_{15} = 15/2[2(4) + 14(-5)] = 15/2[8 - 70] = 15/2 \times (-62) = -465$

∴ **It is an AP. $S_{15} = -465$**

Board Exam Note: For "show that" questions, always demonstrate constant difference between consecutive terms. This is worth marks in 2-3 mark sections.

Question 11

Hard

If the sum of the first n terms of an AP is $4n - n^2$, what is the first term (S_1)? What is the sum of first two terms? What is the second term? Similarly, find the 3rd, the 10th and the nth terms.

Step 1: $S_1 = 4(1) - 1^2 = 4 - 1 = 3$. So $a_1 = 3$.

Step 2: $S_2 = 4(2) - 2^2 = 8 - 4 = 4$. So $a_2 = S_2 - S_1 = 4 - 3 = 1$.

Step 3: $S_3 = 4(3) - 9 = 3$. So $a_3 = S_3 - S_2 = 3 - 4 = -1$.

Step 4: $a_{10} = S_{10} - S_9 = [4(10) - 100] - [4(9) - 81] = (40 - 100) - (36 - 81) = -60 - (-45) = -15$

Step 5 (nth term): For $n \geq 2$: a_n = S_n - S_n-1 = $(4n - n^2) - [4(n-1) - (n-1)^2]$

$= 4n - n^2 - [4n - 4 - n^2 + 2n - 1] = 4n - n^2 - [3n - 5 - n^2] = 4n - n^2 - 3n + 5 + n^2 = n + 5$

Wait — let us re-check: a_n = $4n - n^2 - 4(n-1) + (n-1)^2 = 4n - n^2 - 4n + 4 + n^2 - 2n + 1 = 5 - 2n$

Check: $a_1 = 5 - 2 = 3$ ✓,\ $a_2 = 5 - 4 = 1$ ✓,\ $a_3 = 5 - 6 = -1$ ✓,\ $a_{10} = 5 - 20 = -15$ ✓

∴ **$a_1 = 3$, $S_2 = 4$, $a_2 = 1$, $a_3 = -1$, $a_{10} = -15$, a□ = 5 − 2n**

Board Exam Note: This is a classic board exam question. The key formula a□ = S□ − S(n−1) is mandatory to show. Appears in long answer sections.

Question 12

Easy

Find the sum of the first 40 positive integers divisible by 6.

Step 1: The first 40 positive integers divisible by 6 are: 6, 12, 18, …, 240. This is an AP with a = 6,\ d = 6,\ n = 40.

Step 2: $S_{40} = 40/2[2(6) + 39(6)] = 20[12 + 234] = 20 \times 246 = 4920$

∴ **Sum = 4920**

Board Exam Note: Recognising that multiples of 6 form an AP is the key insight. This appears in 2-3 mark sections.

Question 13

Easy

Find the sum of the first 15 multiples of 8.

Step 1: First 15 multiples of 8: 8, 16, 24, …, 120. AP with $a = 8,\ d = 8,\ n = 15$.

Step 2: $S_{15} = 15/2[2(8) + 14(8)] = 15/2[16 + 112] = 15/2 \times 128 = 15 \times 64 = 960$

∴ **Sum = 960**

Board Exam Note: This is a straightforward question in 2-3 mark sections. Writing the AP explicitly before applying the formula earns method marks.

Question 14

Easy

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

Step 1: Odd numbers between 0 and 50: 1, 3, 5, …, 49. AP with $a = 1,\ d = 2,\ l = 49$.

Step 2: Find n: $49 = 1 + (n-1)(2) \Rightarrow 48 = 2(n-1) \Rightarrow n = 25$

Step 3: $S_{25} = 25/2(1 + 49) = 25/2 \times 50 = 625$

∴ **Sum = 625**

Board Exam Note: Note that "between 0 and 50" means 1 to 49, not including 0 or 50. This distinction is important for full marks.

Question 15

Medium

A contract on construction job specifies a penalty: ₹200 for the first day, ₹250 for the second day, ₹300 for the third day, etc., each succeeding day being ₹50 more. How much penalty if the contractor delayed by 30 days?

Step 1: Penalty forms an AP: $a = 200,\ d = 50,\ n = 30$

Step 2: $S_{30} = 30/2[2(200) + 29(50)] = 15[400 + 1450] = 15 \times 1850 = 27750$

∴ **Total penalty = ₹27,750**

Board Exam Note: Word problems like this appear in long answer sections. Identifying a = 200 and d = 50 clearly before solving earns full method marks.

Question 16

Medium

A sum of ₹700 is to be used to give seven cash prizes. If each prize is ₹20 less than its preceding prize, find the value of each prize.

Step 1: Let the first (highest) prize be ₹a. The prizes form an AP with $d = -20,\ n = 7,\ S_7 = 700$.

Step 2: $S_7 = 7/2[2a + 6(-20)] = 700 \Rightarrow 7/2[2a - 120] = 700 \Rightarrow 7(a - 60) = 700 \Rightarrow a - 60 = 100 \Rightarrow a = 160$

Step 3: Prizes: ₹160, ₹140, ₹120, ₹100, ₹80, ₹60, ₹40

∴ **Prizes are ₹160, ₹140, ₹120, ₹100, ₹80, ₹60, ₹40**

Board Exam Note: List all 7 prizes in your answer — examiners check for completeness in long answer sections.

Question 17

Medium

Students plant trees equal to their class number. There are 3 sections per class, from Class I to Class XII. How many trees are planted in total?

Step 1: Each class plants: Class I → 1 tree/section × 3 sections = 3 trees. Class II → 2 × 3 = 6 trees. Class XII → 12 × 3 = 36 trees.

Step 2: Total trees = 3 + 6 + 9 + … + 36. This is an AP with $a = 3,\ d = 3,\ n = 12$.

Step 3: $S_{12} = 12/2[2(3) + 11(3)] = 6[6 + 33] = 6 \times 39 = 234$

∴ **Total trees planted = 234**

Board Exam Note: Setting up the AP correctly (multiplying by 3 sections) is the key step. This appears in long answer sections and tests real-world AP application.

Question 18

Hard

A spiral is made of 13 consecutive semicircles with radii 0.5 cm, 1.0 cm, 1.5 cm, 2.0 cm, … Find the total length. (Take π = 22/7)

Step 1: Length of a semicircle with radius r = πr. The lengths are: $l_1 = \pi(0.5),\ l_2 = \pi(1.0),\ l_3 = \pi(1.5)$, …

Step 2: This forms an AP with $a = 0.5\pi,\ d = 0.5\pi,\ n = 13$.

Step 3: Total length = $S_{13} = 13/2[2(0.5\pi) + 12(0.5\pi)] = 13/2[\pi + 6\pi] = 13/2 \times 7\pi = (91\pi)/(2)$

Step 4: Substitute π = 22/7: 91/2 × 22/7 = (91 × 22)/(14) = (2002)/(14) = 143 cm

∴ **Total length of spiral = 143 cm**

Board Exam Note: This question tests the ability to recognise AP in a geometric context. It appears in long answer sections and is a CBSE board exam favourite.

Question 19

Medium

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 200 logs placed and how many logs are in the top row?

Step 1: AP with $a = 20,\ d = -1$. Set S_n = 200:

$$n/2[2(20) + (n-1)(-1)] = 200 \Rightarrow n/2[40 - n + 1] = 200 \Rightarrow n/2[41 - n] = 200$$

$$n(41 - n) = 400 \Rightarrow 41n - n^2 = 400 \Rightarrow n^2 - 41n + 400 = 0$$

Step 2: Discriminant: Δ = 1681 - 1600 = 81. So $n = (41 \pm 9)/(2) \Rightarrow n = 25$ or $n = 16$.

Step 3: Check n = 25: $a_{25} = 20 + 24(-1) = -4$ — negative, not possible. So n = 16.

Step 4: Top row: $a_{16} = 20 + 15(-1) = 5$ logs.

∴ **Logs are placed in 16 rows; top row has 5 logs**

Board Exam Note: Always check both roots for physical validity. Rejecting n = 25 with justification earns full marks in long answer sections.

Question 20

Hard

In a potato race, a bucket is 5 m from the first potato, and other potatoes are 3 m apart. There are 10 potatoes. A competitor picks each potato and runs back to the bucket. What is the total distance run?

Step 1: Distance to pick the 1st potato and return = 2 × 5 = 10 m.

Step 2: Distance for 2nd potato = 2 × (5 + 3) = 16 m. For 3rd = 2 × (5 + 6) = 22 m. Pattern: 10, 16, 22, …

Step 3: AP with $a = 10,\ d = 6,\ n = 10$.

Step 4: $S_{10} = 10/2[2(10) + 9(6)] = 5[20 + 54] = 5 \times 74 = 370$ m

∴ **Total distance = 370 m**

Board Exam Note: This is one of the most frequently asked word problems in CBSE board exams. Setting up the AP with the doubling of distance is the critical step. Appears in long answer sections.

Solved Examples Beyond NCERT — Class 10 Maths Chapter 5

Extra Example 1

Medium

The sum of n terms of an AP is $3n^2 + 5n$. Find the AP and its 20th term.

Step 1: $a_1 = S_1 = 3(1) + 5(1) = 8$

Step 2: a_n = S_n - S_n-1 = $(3n^2 + 5n) - [3(n-1)^2 + 5(n-1)] = 6n + 2$

Step 3: $d = a_2 - a_1 = 14 - 8 = 6$. AP: 8, 14, 20, …

Step 4: $a_{20} = 6(20) + 2 = 122$

∴ **AP: 8, 14, 20, … ; $a_{20} = 122$**

Extra Example 2

Hard

If the ratio of the sum of first m and n terms of an AP is $m^2 : n^2$, show that the ratio of its mth and nth terms is (2m−1) : (2n−1).

Step 1: S_m/S_n = $m^2/n^2 \Rightarrow (m/2[2a + (m-1)d])/(n/2[2a + (n-1)d]) = m^2/n^2$

Step 2: $(2a + (m-1)d)/(2a + (n-1)d) = m/n$

Step 3: Replace m with (2m−1) and n with (2n−1): a_m/a_n = (a + (m-1)d)/(a + (n-1)d). Set 2a + (m-1)d = m/n[2a + (n-1)d] and compare — ratio of mth to nth term = (2m−1): (2n−1). square

∴ **Ratio of mth and nth terms = (2m−1) : (2n−1) [Proved]**

Extra Example 3

Medium

Find the sum of all two-digit numbers divisible by 3.

Step 1: Two-digit multiples of 3: 12, 15, 18, …, 99. AP with a = 12,\ d = 3.

Step 2: 99 = 12 + (n-1)(3) ⇒ n = 30

Step 3: S_{30} = 30/2(12 + 99) = 15 × 111 = 1665

∴ **Sum = 1665**

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Important Questions for CBSE Board Exam — Arithmetic Progressions Sum

1-Mark Questions

1. What is the formula for the sum of first n terms of an AP? **Ans:** S_n = n/2[2a + (n-1)d]
2. If the sum of first n terms is S_n = n², find the first term. **Ans:** S_1 = 1, so a_1 = 1.
3. Find the sum of the AP: 1, 2, 3, …, 10. **Ans:** 55

3-Mark Questions

1. The sum of first 6 terms of an AP is 42 and the ratio of 10th to 30th term is 1:3. Find the first term and common difference. **Ans:** a = 2, d = 5 (set up two equations from given conditions and solve simultaneously).
2. How many terms of the AP 24, 21, 18, … must be taken so that their sum is 78? **Ans:** n = 4 or n = 13 (both valid; verify by substitution).

5-Mark Questions

1. A manufacturer of TV sets produced 600 sets in the 3rd year and 700 sets in the 7th year. Assuming production increases uniformly by a fixed number each year, find the

production in the 1st year, the 10th year, and the total production in the first 7 years.
Ans: d = 25, a = 550, a_{10} = 775, S_7 = 4375 sets.

Common Mistakes Students Make in Arithmetic Progressions Ex 5.3

Mistake 1: Using S_n = n/2(a + l) when the last term is not given, and incorrectly assuming the last term.

Why it's wrong: This formula requires both first and last terms. If only a and d are given, use S_n = n/2[2a + (n-1)d].

Correct approach: Check which values are given before choosing the formula.

Mistake 2: Forgetting to reject negative values of n in quadratic equations.

Why it's wrong: n represents number of terms and must be a positive integer. n = −2 makes no physical sense.

Correct approach: Always state "rejecting n = [negative value] as n cannot be negative."

Mistake 3: In Q14, including 0 or 50 in "odd numbers between 0 and 50."

Why it's wrong: "Between" means strictly between — 0 is even anyway, but 50 is not odd. The series is 1, 3, 5, …, 49.

Correct approach: Write the first few and last few terms to confirm boundaries.

Mistake 4: In Q20 (potato race), not doubling the distance (forgetting the return journey).

Why it's wrong: The competitor runs to the potato AND back. Each trip is 2 × distance.

Correct approach: Distance for kth potato = 2 × [5 + (k−1) × 3].

Mistake 5: Applying a_n = S_n - S_n-1 for n = 1 (should use $a_1 = S_1$).

Why it's wrong: $S_0 = 0$ by convention, but the formula is defined for n ≥ 2 in most textbook derivations.

Correct approach: Always find $a_1 = S_1$ separately, then use a_n = S_n - S_n-1 for n ≥ 2.

Exam Tips for 2026-27 — CBSE Class 10 Maths Chapter 5

📝 CBSE 2026-27 Marking Scheme Tips

- **Write the formula first:** In the 2026-27 CBSE marking scheme, writing the correct formula before substituting values earns 1 mark even if the final answer is wrong.
- **Show all steps:** For 3-mark questions, CBSE typically awards 1 mark for formula, 1 mark for correct substitution, and 1 mark for the final answer.
- **Word problems:** Always state what a, d, and n represent in the context of the problem. This demonstrates understanding and earns full marks.
- **Quadratic equations in AP:** When Sn = given value leads to a quadratic, show the discriminant calculation and reject the invalid root with a reason.
- **Chapter weightage:** Arithmetic Progressions is part of the Algebra unit, which carries approximately 20 marks in the 2026-27 CBSE Class 10 Maths paper. Chapter 5 alone contributes 6–8 marks.
- **Last-minute revision:** Memorise both sum formulas, the nth term formula, and the formula a_n = S_n - S_n-1. These four formulas cover every question in Ex 5.3.
- **NCERT exemplar:** For extra practice aligned to **ncert exemplar class 10 maths solutions**, focus on questions where Sn is given as a polynomial and you must find the AP.

Frequently Asked Questions — Arithmetic Progressions Ex 5.3

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

The sum of first n terms of an AP is S_n = n/2[2a + (n-1)d], where a is the first term and d is the common difference. If you know the last term l, use S_n = n/2(a + l). Both formulas are in the NCERT Class 10 Maths textbook and must be memorised for the 2026-27 CBSE board exam.

How many questions are in NCERT Class 10 Maths Chapter 5 Exercise 5.3?

Exercise 5.3 of Class 10 Maths Chapter 5 contains 20 questions. Question 3 alone has 10 sub-parts (i) to (x). The exercise covers finding sum of AP terms, finding unknown variables, and real-life word problems. All 20 questions are solved step-by-step on this page with CBSE board exam notes.

How do you find the nth term from the sum formula Sn = 4n − n²?

Use the formula a_n = S_n - S_n-1 for n ≥ 2. For S_n = 4n - n²: a_n = (4n - n²) - [4(n-1) - (n-1)²] = 5 - 2n. For the first term, use $a_1 = S_1 = 4(1) - 1 = 3$. This technique is frequently tested in CBSE board exams.

Is Exercise 5.3 important for CBSE Class 10 board exams 2026-27?

Yes, Exercise 5.3 is very important for CBSE Class 10 board exams 2026-27. Word problems like the construction penalty (Q15), the potato race (Q20), and the spiral problem (Q18) are CBSE board exam favourites. The chapter carries 6–8 marks and questions from this exercise appear in 2-mark and 3-mark sections regularly.

Where can I download NCERT Class 10 Maths Chapter 5 solutions PDF for free?

You can download the NCERT Class 10 Maths Chapter 5 Exercise 5.3 solutions PDF for free from ncertbooks.net using the download button at the top of this page. The PDF is updated for the 2026-27 syllabus. You can also access the official NCERT textbook from the NCERT official website.

What is the difference between the two sum formulas for AP?

Use S_n = n/2[2a + (n-1)d] when you know the first term (a), common difference (d), and number of terms (n). Use S_n = n/2(a + l) when you know the first term (a) and the last term (l). The second formula is a shortcut — it works because the average of first and last terms, multiplied by n, gives the sum.

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