

TYBA COACHING CENTRE | टी वाई बी ए कोचिंग सेंटर

Contact / WhatsApp: 6367029449 • NCERT Class 10 Mathematics Complete Comprehensive Notes & Solutions

Chapter 5: Arithmetic Progressions

अध्याय 5: समांतर श्रेढ़ियाँ

Section 1: Detailed Concepts, Definitions & Formulas

खंड 1: विस्तृत अवधारणाएँ, परिभाषाएँ एवं सूत्र

5.1 Arithmetic Progressions (AP) — Fundamentals / 5.1 समांतर श्रेढ़ी (A.P.) — मूल अवधारणाएँ

[English Theory]: An **Arithmetic Progression (AP)** is a list of numbers in which each term is obtained by adding a fixed number to the preceding term, except the first term.

- **First Term:** Usually denoted by **a** (or a_1).
- **Common Difference:** The fixed number, denoted by **d**. It can be positive, negative, or zero: $d = a_{k+1} - a_k$.
- **General Form of an AP:** $a, a + d, a + 2d, a + 3d, \dots$
- **Finite vs Infinite AP:** An AP containing a finite number of terms has a last term (denoted by l). An AP containing an endless number of terms is called an infinite AP (does not have a last term).

[हिंदी सिद्धांत]: एक **समांतर श्रेढ़ी (A.P.)** संख्याओं की ऐसी सूची है जिसमें प्रत्येक पद (प्रथम पद के अतिरिक्त) अपने से ठीक पहले पद में एक निश्चित संख्या जोड़कर प्राप्त होता है।

- **प्रथम पद:** सामान्यतः इसे **a** (या a_1) से व्यक्त करते हैं।
- **सार्व अंतर (Common Difference):** यह निश्चित संख्या, जिसे **d** कहते हैं। यह धनात्मक, ऋणात्मक या शून्य हो सकता है: $d = a_{k+1} - a_k$ ।
- **AP का व्यापक रूप:** $a, a + d, a + 2d, a + 3d, \dots$
- **परिमित एवं अपरिमित AP:** जिस AP में पदों की संख्या सीमित होती है, उसे परिमित AP कहते हैं (अंतिम पद l होता है)। अनंत पदों वाली AP को अपरिमित AP कहते हैं।

5.2 n^{th} Term of an AP (General Term) / 5.2 AP का $n^{\text{वाँ}}$ पद (व्यापक पद)

[English Theory]: Let $a_1, a_2, a_3, \dots$ be an AP with first term a and common difference d .

$$\text{Then } a_1 = a = a + (1 - 1)d$$

$$a_2 = a + d = a + (2 - 1)d$$

$$a_3 = a + 2d = a + (3 - 1)d$$

In general, the n^{th} term is given by: $a_n = a + (n - 1)d$.

- a_n is also called the **general term** of the AP.
- If there are m terms in the AP, a_m represents the last term l .
- **n^{th} term from the end:** If an AP has last term l and common difference d , the n^{th} term from the end is $l - (n - 1)d$.

[हिंदी सिद्धांत]: माना AP का प्रथम पद a तथा सार्व अंतर d है।

$$\text{तब दूसरा पद: } a_2 = a + d = a + (2 - 1)d$$

$$\text{तीसरा पद: } a_3 = a + 2d = a + (3 - 1)d$$

व्यापक रूप में, AP का $n^{\text{वाँ}}$ पद: $a_n = a + (n - 1)d$ ।

- a_n को AP का **व्यापक पद** भी कहते हैं।
- **अंत से $n^{\text{वाँ}}$ पद:** यदि अंतिम पद l हो, तो अंत से $n^{\text{वाँ}}$ पद $= l - (n - 1)d$ होता है।

5.3 Sum of First n Terms of an AP / 5.3 AP के प्रथम n पदों का योग

[English Theory]: The sum S_n of the first n terms of an AP is given by:

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

Alternatively, if the first term is a and the last term is l (where $l = a_n$):

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

Crucial Relation Between n^{th} Term and Sum:

The n^{th} term is the difference between the sum to n terms and the sum to $(n-1)$ terms:

$$a_n = S_n - S_{n-1}$$

• **Sum of first n positive integers:** $S_n = 1 + 2 + 3 + \dots + n = n(n+1)/2$.

[हिंदी सिद्धांत]: AP के प्रथम n पदों का योग S_n निम्न सूत्र से दिया जाता है:

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

यदि प्रथम पद a और अंतिम पद l ज्ञात हों, तो:

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

$n^{\text{वें}}$ पद और योग में संबंध:

$$a_n = S_n - S_{n-1} \text{ (तथा प्रथम पद } a_1 = S_1)$$

• **प्रथम n धन पूर्णांकों का योग:** $S_n = n(n+1)/2$

Ex 5.3 Q18: Spiral of 13 Successive Semicircles

Ex 5.4 Q3: tapering Ladder with 11 Rungs (25 cm to 45 cm)

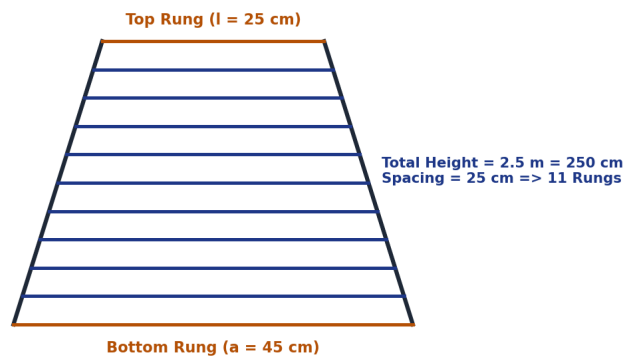
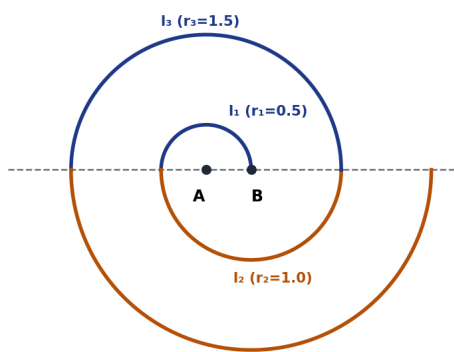


Fig 5.1: Semicircular Spiral with Centres at A and B (Ex 5.3 Q18) and Uniformly Tapering Ladder Rungs (Ex 5.4 Q3) — TYBA Coaching Centre

Section 2: Textbook Solved Examples with Step-by-Step Bilingual Solutions

खंड 2: पाठ्यपुस्तक के सभी हल किए गए उदाहरण (विस्तृत चरणबद्ध हल)

Textbook Example 3: 10th Term of AP: 2, 7, 12... / **उदाहरण 3: AP: 2, 7, 12... का 10वाँ पद**

[Problem - EN]: Find the 10th term of the AP: 2, 7, 12, ...

[प्रश्न - HI]: AP: 2, 7, 12, ... का 10वाँ पद ज्ञात कीजिए।

Step-by-Step Solution (English):

Here, first term $a = 2$, common difference $d = 7 - 2 = 5$, and $n = 10$.

We have $a_n = a + (n-1)d$.

So, $a_{10} = 2 + (10-1) \times 5 = 2 + 45 = 47$.

चरणबद्ध हल (हिंदी):

यहाँ $a = 2$, $d = 7 - 2 = 5$ तथा $n = 10$ है।

सूत्र $a_n = a + (n-1)d$ से: $a_{10} = 2 + 9 \times 5 = 2 + 45 = 47$ ।

Textbook Example 4: Which Term of AP: 21, 18, 15... is -81? / **उदाहरण 4: AP: 21, 18, 15... का कौन-सा पद -81 है?**

[Problem - EN]: Which term of the AP: 21, 18, 15, ... is -81? Also, is any term 0? Give reason.

[प्रश्न - HI]: AP: 21, 18, 15, ... का कौन-सा पद -81 है? साथ ही क्या इस AP का कोई पद 0 है?

Step-by-Step Solution (English):

Here, $a = 21$, $d = 18 - 21 = -3$, and $a_n = -81$.

$$-81 = 21 + (n - 1)(-3) \Rightarrow -102 = -3(n - 1) \Rightarrow n - 1 = 34 \Rightarrow n = 35.$$

Therefore, the **35th term** is -81.

For $a_n = 0$: $21 + (n - 1)(-3) = 0 \Rightarrow 3(n - 1) = 21 \Rightarrow n = 8$. So, the **8th term is 0**.

चरणबद्ध हल (हिंदी):

यहाँ $a = 21$, $d = -3$ तथा $a_n = -81$ है।

$$-81 = 21 + (n - 1)(-3) \Rightarrow -3(n - 1) = -102 \Rightarrow n - 1 = 34 \Rightarrow n = 35 \text{ (35वाँ पद)}।$$

शून्य के लिए: $21 - 3(n - 1) = 0 \Rightarrow n = 8$ । अतः **8वाँ पद शून्य है।**

Textbook Example 7: Two-Digit Numbers Divisible by 3 / उदाहरण 7: 3 से विभाज्य दो अंकों वाली संख्याएँ

[Problem - EN]: How many two-digit numbers are divisible by 3?

[प्रश्न - HI]: दो अंकों वाली कितनी संख्याएँ 3 से विभाज्य हैं?

Step-by-Step Solution (English):

The list of two-digit numbers divisible by 3 is: 12, 15, 18, ..., 99.

This forms an AP with $a = 12$, $d = 3$, and last term $a_n = 99$.

$$99 = 12 + (n - 1) \times 3 \Rightarrow 87 = 3(n - 1) \Rightarrow n - 1 = 29 \Rightarrow n = 30.$$

So, there are **30 two-digit numbers** divisible by 3.

चरणबद्ध हल (हिंदी):

3 से विभाज्य दो अंकों वाली संख्याएँ: 12, 15, 18, ..., 99।

यहाँ $a = 12$, $d = 3$, $a_n = 99$ ।

$$99 = 12 + 3(n - 1) \Rightarrow 3(n - 1) = 87 \Rightarrow n = 30।$$

अतः 3 से विभाज्य दो अंकों वाली कुल **30 संख्याएँ** हैं।

Textbook Example 8: 11th Term from the Last Term / उदाहरण 8: अंतिम पद से 11वाँ पद

[Problem - EN]: Find the 11th term from the last term (towards the first term) of the AP: 10, 7, 4, ..., -62.

[प्रश्न - HI]: AP: 10, 7, 4, ..., -62 का अंतिम पद से (प्रथम पद की ओर) 11वाँ पद ज्ञात कीजिए।

Step-by-Step Solution (English):

Method: Reversing the AP gives first term $a = -62$ and common difference $d = 3$.

We need the 11th term of this reversed AP:

$$a_{11} = -62 + (11 - 1) \times 3 = -62 + 30 = -32.$$

Therefore, the 11th term from the last term is **-32**.

चरणबद्ध हल (हिंदी):

विधि: AP को विपरीत क्रम में लिखने पर: प्रथम पद $a = -62$ तथा $d = 3$ ।

$$\text{अतः 11वाँ पद: } a_{11} = -62 + 10 \times 3 = -62 + 30 = -32।$$

Textbook Example 11: Sum of First 22 Terms of AP: 8, 3, -2... / उदाहरण 11: AP: 8, 3, -2... के प्रथम 22 पदों का योग

[Problem - EN]: Find the sum of the first 22 terms of the AP: 8, 3, -2, ...

[प्रश्न - HI]: AP: 8, 3, -2, ... के प्रथम 22 पदों का योग ज्ञात कीजिए।

Step-by-Step Solution (English):

Here, $a = 8$, $d = 3 - 8 = -5$, $n = 22$.

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

$$S_{22} = (22/2) [2(8) + (22-1)(-5)] = 11 [16 + 21(-5)] = 11 [16 - 105] = 11 \times (-89) = -979.$$

चरणबद्ध हल (हिंदी):

यहाँ $a = 8$, $d = -5$, $n = 22$

$$S_{22} = 11 [16 + 21(-5)] = 11 \times (-89) = -979$$

Section 3: Exercise 5.1 & 5.2 Complete Step-by-Step Solutions

खंड 3: प्रश्नावली 5.1 एवं 5.2 के संपूर्ण चरणबद्ध हल

Exercise 5.1 — Complete Solutions (Q1 to Q4) / प्रश्नावली 5.1 — संपूर्ण हल

[EN] Detailed solutions for Ex 5.1 Q1 to Q4 (AP identification, first term, common difference and three more terms).

[HI] प्रश्नावली 5.1 के प्रश्न 1 से 4 के संपूर्ण चरणबद्ध द्विभाषी हल:

Q1 Solutions:

- (i) Taxi fare: 15, 23, 31, 39... Each term is obtained by adding 8 $\Rightarrow$ **Yes, it is an AP (हाँ, यह AP है).**
- (ii) Air in cylinder: Volumes are V , $(3/4)V$, $(9/16)V$... Differences are $-V/4$, $-3V/16$ $\Rightarrow$ **No, not an AP.**
- (iii) Well digging: 150, 200, 250, 300... Fixed difference $d = 50$ $\Rightarrow$ **Yes, it is an AP.**
- (iv) Compound interest: $10000(1+0.08)^n$: 10800, 11664, 12597.12... Difference increases $\Rightarrow$ **No, not an AP.**

Q2 Solutions (First four terms):

- (i) $a = 10$, $d = 10 \Rightarrow$ **10, 20, 30, 40** • (ii) $a = -2$, $d = 0 \Rightarrow$ **-2, -2, -2, -2** • (iii) $a = 4$, $d = -3 \Rightarrow$ **4, 1, -2, -5** • (iv) $a = -1$, $d = 1/2 \Rightarrow$ **-1, -1/2, 0, 1/2** • (v) $a = -1.25$, $d = -0.25 \Rightarrow$ **-1.25, -1.50, -1.75, -2.00.**

Q3 Solutions (First term a , common difference d):

- (i) 3, 1, -1, -3... $\Rightarrow$ **$a = 3$, $d = -2$** • (ii) -5, -1, 3, 7... $\Rightarrow$ **$a = -5$, $d = 4$** • (iii) $1/3$, $5/3$, $9/3$, $13/3$... $\Rightarrow$ **$a = 1/3$, $d = 4/3$** • (iv) 0.6, 1.7, 2.8, 3.9... $\Rightarrow$ **$a = 0.6$, $d = 1.1$.**

Q4 Solutions (APs, common difference & next 3 terms):

- (i) 2, 4, 8, 16... $\Rightarrow$ **No** • (ii) 2, $5/2$, 3, $7/2$... $\Rightarrow$ **Yes, $d = 1/2$; Next: 4, $9/2$, 5** • (iii) -1.2, -3.2, -5.2... $\Rightarrow$ **Yes, $d = -2$; Next: -9.2, -11.2, -13.2** • (iv) -10, -6, -2, 2... $\Rightarrow$ **Yes, $d = 4$; Next: 6, 10, 14** • (v) 3, $3+\sqrt{2}$, $3+2\sqrt{2}$... $\Rightarrow$ **Yes, $d = \sqrt{2}$; Next: $3+4\sqrt{2}$, $3+5\sqrt{2}$, $3+6\sqrt{2}$** • (vi) 0.2, 0.22... $\Rightarrow$ **No** • (vii) 0, -4, -8, -12... $\Rightarrow$ **Yes, $d = -4$; Next: -16, -20, -24** • (viii) $-1/2$, $-1/2$, $-1/2$... $\Rightarrow$ **Yes, $d = 0$; Next: $-1/2$, $-1/2$, $-1/2$** • (ix) 1, 3, 9, 27... $\Rightarrow$ **No** • (x) a , $2a$, $3a$, $4a$... $\Rightarrow$ **Yes, $d = a$; Next: $5a$, $6a$, $7a$** • (xi) a , a^2 , a^3 ... $\Rightarrow$ **No** • (xii) $\sqrt{2}$, $\sqrt{8}$, $\sqrt{18}$, $\sqrt{32}$... ($= \sqrt{2}$, $2\sqrt{2}$, $3\sqrt{2}$, $4\sqrt{2}$) $\Rightarrow$ **Yes, $d = \sqrt{2}$; Next: $\sqrt{50}$, $\sqrt{72}$, $\sqrt{98}$** • (xiii) $\sqrt{3}$, $\sqrt{6}$, $\sqrt{9}$... $\Rightarrow$ **No** • (xiv) 1^2 , 3^2 , 5^2 ... $\Rightarrow$ **No** • (xv) 1^2 , 5^2 , 7^2 , 73 ... ($= 1, 25, 49, 73$) $\Rightarrow$ **Yes, $d = 24$; Next: 97, 121, 145.**

Final Answer / उत्तर: All parts of Ex 5.1 solved and verified.

Exercise 5.2 — Complete Solutions (Q1 to Q20) / प्रश्नावली 5.2 — संपूर्ण हल

[EN] Detailed solutions for Ex 5.2 Q1 to Q20 using general term $a_n = a + (n-1)d$.

[HI] प्रश्नावली 5.2 के प्रश्न 1 से 20 तक के संपूर्ण हल:

- **Q1:** (i) $a_8 = 7 + 7(3) = 28$ • (ii) $0 = -18 + 9d \Rightarrow d = 2$ • (iii) $-5 = a + 17(-3) \Rightarrow a = 46$ • (iv) $3.6 = -18.9 + (n-1)(2.5) \Rightarrow n = 10$ • (v) $a_{105} = 3.5 + 0 = 3.5$.
- **Q2:** (i) 30th term of 10, 7, 4... = $10 + 29(-3) = -77$ (Option C) • (ii) 11th term of -3, $-1/2$, 2... = $-3 + 10(5/2) = 22$ (Option B).

- **Q3:** (i) 2, [14], 26 • (ii) [18], 13, [8], 3 • (iii) 5, [6½], [8], 9½ • (iv) -4, [-2], [0], [2], [4], 6 • (v) [53], 38, [23], [8], [-7], -22.
- **Q4:** $3 + 5(n - 1) = 78 \Rightarrow 5(n - 1) = 75 \Rightarrow$ **16th term (16वाँ पद).**
- **Q5:** (i) $7 + 6(n-1) = 205 \Rightarrow n = 34$ • (ii) $18 - (5/2)(n-1) = -47 \Rightarrow n = 27$.
- **Q6:** $11 - 3(n - 1) = -150 \Rightarrow n = 164/3$ (not an integer) $\Rightarrow$ **No, -150 is not a term.**
- **Q7:** $a_{11} = 38, a_{16} = 73 \Rightarrow 5d = 35 \Rightarrow d = 7, a = -32 \Rightarrow a_{31} = -32 + 30(7) = 178$.
- **Q8:** $a_3 = 12, a_{50} = 106 \Rightarrow 47d = 94 \Rightarrow d = 2, a = 8 \Rightarrow a_{29} = 8 + 28(2) = 64$.
- **Q9:** $a_3 = 4, a_9 = -8 \Rightarrow 6d = -12 \Rightarrow d = -2, a = 8 \Rightarrow 8 - 2(n - 1) = 0 \Rightarrow$ **5th term (5वाँ पद).**
- **Q10:** $a_{17} - a_{10} = 7 \Rightarrow (a + 16d) - (a + 9d) = 7 \Rightarrow 7d = 7 \Rightarrow d = 1$.
- **Q11:** $a_n = a_{54} + 132 \Rightarrow a + (n-1)(12) = a + 53(12) + 11(12) = a + 64(12) \Rightarrow$ **65th term (65वाँ पद).**
- **Q12:** Difference between 1000th terms = $A - B$ = Difference between 100th terms = **100.**
- **Q13:** 3-digit numbers divisible by 7: 105, 112, ..., 994 $\Rightarrow 105 + 7(n-1) = 994 \Rightarrow n = 128$.
- **Q14:** Multiples of 4 between 10 and 250: 12, 16, ..., 248 $\Rightarrow 12 + 4(n-1) = 248 \Rightarrow n = 60$.
- **Q15:** $63 + 2(n-1) = 3 + 7(n-1) \Rightarrow 5(n-1) = 60 \Rightarrow n = 13$.
- **Q16:** $a_7 - a_5 = 2d = 12 \Rightarrow d = 6; a + 2(6) = 16 \Rightarrow a = 4 \Rightarrow$ AP: **4, 10, 16, 22, ...**
- **Q17:** 20th term from last term of 3, 8, 13..., 253: $l - 19d = 253 - 19(5) = 158$.
- **Q18:** $2a + 10d = 24$ & $2a + 14d = 44 \Rightarrow 4d = 20 \Rightarrow d = 5, a = -13 \Rightarrow$ Terms: **-13, -8, -3.**
- **Q19:** $5000 + 200(n - 1) = 7000 \Rightarrow 200(n - 1) = 2000 \Rightarrow$ **11th year (11वाँ वर्ष).**
- **Q20:** $5 + 1.75(n - 1) = 20.75 \Rightarrow 1.75(n - 1) = 15.75 \Rightarrow n - 1 = 9 \Rightarrow n = 10$.

Final Answer / उत्तर: All 20 questions of Ex 5.2 solved and verified.

Section 4: Exercise 5.3 & 5.4 Complete Step-by-Step Solutions

खंड 4: प्रश्नावली 5.3 एवं 5.4 (ऐच्छिक) के संपूर्ण चरणबद्ध हल

Exercise 5.3 & 5.4 — Complete Solutions / प्रश्नावली 5.3 एवं 5.4 के संपूर्ण हल

[EN] Comprehensive step-by-step solutions for Exercise 5.3 (Q1 to Q20) and Exercise 5.4 Optional (Q1 to Q5).

[HI] प्रश्नावली 5.3 तथा प्रश्नावली 5.4 के सभी प्रश्नों के संपूर्ण चरणबद्ध द्विभाषी हल:

- **Ex 5.3 Q1:** (i) $S_{10} = 5[4+9(5)] = 245$ • (ii) $S_{12} = 6[-74+11(4)] = -180$ • (iii) $S_{100} = 50[1.2+99(1.1)] = 5505$ • (iv) $S_{11} = (11/2)[2/15+10/60] = 33/20$.
- **Ex 5.3 Q2:** (i) $n = 23, S_{23} = (23/2)(7+84) = 1046\frac{1}{2}$ • (ii) $n = 13, S_{13} = (13/2)(34+10) = 286$ • (iii) $n = 76, S_{76} = 38(-235) = -8930$.
- **Ex 5.3 Q3 (All 10 parts):** (i) $n=16, S_n=440$ • (ii) $d=7/3, S_{13}=273$ • (iii) $a=4, S_{12}=246$ • (iv) $d=-1, a_{10}=8$ • (v) $a=-35/3, a_9=85/3$ • (vi) $n=5, a_n=34$ • (vii) $n=6, d=54/5$ • (viii) $n=7, a=-8$ • (ix) $d=6$ • (x) $a=4$.
- **Ex 5.3 Q4:** $(n/2)[18 + 8(n-1)] = 636 \Rightarrow 4n^2 + 5n - 636 = 0 \Rightarrow n = 12$.
- **Ex 5.3 Q5:** $(n/2)(5 + 45) = 400 \Rightarrow n = 16; 5 + 15d = 45 \Rightarrow d = 8/3$.
- **Ex 5.3 Q6:** $17 + 9(n-1) = 350 \Rightarrow n = 38; S_{38} = 19(17 + 350) = 6973$.
- **Ex 5.3 Q7:** $a + 21(7) = 149 \Rightarrow a = 2; S_{22} = 11(2 + 149) = 1661$.
- **Ex 5.3 Q8:** $d = 18 - 14 = 4, a = 10; S_{51} = (51/2)[20 + 50(4)] = 5610$.

- **Ex 5.3 Q9:** $S_7 = 49 \Rightarrow a + 3d = 7$; $S_{17} = 289 \Rightarrow a + 8d = 17 \Rightarrow d = 2, a = 1 \Rightarrow S_n = n^2$.
- **Ex 5.3 Q10:** (i) $a_n = 3 + 4n \Rightarrow a_1 = 7, d = 4 \Rightarrow S_{15} = 525$ • (ii) $a_n = 9 - 5n \Rightarrow S_{15} = -465$.
- **Ex 5.3 Q11:** $S_n = 4n - n^2 \Rightarrow S_1 = a_1 = 3; S_2 = 4; a_2 = 1; a_3 = -1; a_{10} = -15; a_n = 5 - 2n$.
- **Ex 5.3 Q12:** S_{40} of 6, 12...240 = $20(6 + 240) = 4920$.
- **Ex 5.3 Q13:** S_{15} of 8, 16...120 = $(15/2)(8 + 120) = 960$.
- **Ex 5.3 Q14:** Odd numbers 1 to 49 ($n = 25$) $\Rightarrow S_{25} = 25^2 = 625$.
- **Ex 5.3 Q15:** 30 days penalty ($a=200, d=50$) $\Rightarrow S_{30} = 15[400 + 29(50)] = ₹ 27,750$.
- **Ex 5.3 Q16:** 7 cash prizes of ₹ 700 with $d = -20 \Rightarrow ₹ 160, ₹ 140, ₹ 120, ₹ 100, ₹ 80, ₹ 60, ₹ 40$.
- **Ex 5.3 Q17:** Tree plantation: $3 \times [12 \times 13 / 2] = 3 \times 78 = 234$ trees.
- **Ex 5.3 Q18 (Spiral of 13 Semicircles — See Fig 5.1 Left):** Length = $\pi(0.5 + 1.0 + \dots + 6.5) = (22/7) \times (13/2)(7) = 143$ cm.
- **Ex 5.3 Q19:** 200 logs (20, 19, 18...) $\Rightarrow n^2 - 41n + 400 = 0 \Rightarrow n = 16$ rows, and top row has 5 logs ($n = 25$ rejected).
- **Ex 5.3 Q20:** Potato race total distance = S_{10} of 10, 16, 22... = $5[20 + 9(6)] = 370$ m.
- **Ex 5.4 (Optional):**
 - **Q1:** $121 - 4(n - 1) < 0 \Rightarrow 32$ nd term.
 - **Q2:** $a_3 + a_7 = 6, a_3 \cdot a_7 = 8 \Rightarrow S_{16} = 76$ or 20.
 - **Q3 (Ladder Rungs — See Fig 5.1 Right):** 11 rungs from 45 cm to 25 cm $\Rightarrow$ Total wood = $(11/2)(45 + 25) = 385$ cm.
 - **Q4:** Houses 1 to 49, $S_{x-1} = S_{49} - S_x \Rightarrow x^2 = 49 \times 25 \Rightarrow x = 35$.
 - **Q5:** Terrace volume = 15 steps of 50 m solid concrete $\Rightarrow$ Total volume = 750 m^3 .

Final Answer / उत्तर: All questions of Ex 5.3 and Ex 5.4 solved and verified.

Section 5: Chapter Summary & Key Formulas

खंड 5: अध्याय सारांश एवं प्रमुख सूत्र

Concept	Mathematical Formula	हिंदी विवरण
General Term	$a_n = a + (n - 1)d$	AP का n वाँ पद
Sum of n Terms	$S_n = (n/2)[2a + (n-1)d] = (n/2)(a + l)$	प्रथम n पदों का योग
Term from Sum	$a_n = S_n - S_{n-1}$	n वाँ पद एवं योग में संबंध

© TYBA Coaching Centre (टी वाई बी ए कोचिंग सेंटर) — All Rights Reserved. For Admissions, Regular Batch Coaching & Doubt Clearing Sessions, Contact: **6367029449**.