Arithmetic Progressions

Standard difficulty · 20 questions · 40 marks · Time: 36 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer — 8 × 1 = 8 marks

1. The common difference of the AP −13, −12, −11, −10, … is:
(a) −13 **(b)** −1 **(c)** 2 **(d)** 1

2. The 36th term of the AP 21, 30, 39, … is:
(a) 336 **(b)** 345 **(c)** 324 **(d)** 327

3. Which term of the AP −3, −1, 1, … is 89?
(a) 48th **(b)** 46th **(c)** 45th **(d)** 47th

4. The sum of the first 22 terms of 16, 12, 8, … is:
(a) −1144 **(b)** −644 **(c)** 264 **(d)** −572

5. In an AP, the difference between consecutive terms is:
(a) always zero **(b)** always increasing
(c) constant **(d)** always 1

6. Which of these lists is an AP?
(a) 16, 25, 36, 49, … **(b)** 5, 12, 20, 26, …
(c) 4, 8, 16, 32, … **(d)** 5, 12, 19, 26, …

7. The sum of the first 27 multiples of 3 is:
(a) 1,134 **(b)** 81 **(c)** 2,187 **(d)** 378

8. Assertion (A): −1, 7, 15, 23 is an arithmetic progression.
Reason (R): A list of numbers is an AP when each term is a fixed multiple of the one before it.
(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

Section B — Short answer — 8 × 2 = 16 marks

9. The 7th term of an AP is 32 and the 15th term is 88. Find the first term and the common difference.

10. Find the 4th term from the end of the AP 12, 21, 30, …, 426.

11. How many terms are there in the AP 2, 11, 20, …, 146?

12. An AP has 39 terms. Its first term is 17 and its last term is 131. Find the sum of all its terms.

13. Find the sum: 13 + 19 + 25 + … + 115

14. How many terms of the AP 14, 18, 22, … must be taken to give a sum of 1,440?

15. Three numbers in AP have a sum of 30 and a product of 190. Find them.

16. Find k if k + 6, 4k + 16 and 2k − 4 are consecutive terms of an AP.

Section C — Word problems — 4 × 4 = 16 marks

17. Vikram saves Rs 150 in the first month and Rs 50 more each month than the month before. How much will Vikram have saved in 19 months?

18. A job starts with a monthly salary of Rs 16,000 and a yearly increment of Rs 2,000. What is the monthly salary in the 12th year?

19. A hall has 13 seats in the first row, and each row has 4 more seats than the row in front. How many seats are there in 25 rows?

20. Logs are stacked with 37 logs in the bottom row, 36 in the next, 35 in the next, and so on, with 17 in the top row. How many rows are there, and how many logs in all?

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Answer key

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Q	Answer	Working
1	**(d) 1**	−12 − (−13) = 1
2	**(a) 336**	a + (n − 1)d = 21 + 35 × 9 = 336
3	**(d) 47th**	−3 + (n − 1) × 2 = 89, so n − 1 = 46
4	**(d) −572**	22/2 × (2 × 16 + 21 × (−4)) = −572
5	**(c) constant**	—
6	**(d) 5, 12, 19, 26, …**	the difference is 7 each time
7	**(a) 1,134**	3(1 + 2 + … + 27) = 3 × 378
8	**(c) A is true, but R is false.**	A is true: the difference is 8 every time. R is false.
9	**a = −10, d = 7**	8d = 56, so d = 7; a = 32 − 6 × 7
10	**399**	l − (n − 1)d = 426 − 3 × 9 = 399
11	**17 terms**	2 + (n − 1) × 9 = 146; n − 1 = 16
12	**2886**	39/2 × (17 + 131) = 2886
13	**1,152**	n = (115 − 13) ÷ 6 + 1 = 18; 18/2 × (13 + 115)
14	**24 terms**	n/2 × (28 + (n − 1) × 4) = 1440; the positive solution is n = 24
15	**1, 10, 19**	take a − d, a, a + d: 3a = 30, a = 10; 10(100 − d^2) = 190, d = 9
16	**k = −6**	2(4k + 16) = (k + 6) + (2k − 4); 5k = −30
17	**Rs 11,400**	19/2 × (2 × 150 + 18 × 50) = 11,400
18	**Rs 38,000**	16,000 + 11 × 2,000 = 38,000
19	**1,525 seats**	25/2 × (2 × 13 + 24 × 4) = 1525
20	**21 rows; 567 logs**	rows = 37 − 17 + 1 = 21; sum = 21/2 × (37 + 17)