

### Question Bank (MATHEMATICS) Chapter-5 Arithmetic Progression

**1 marks:**

1. In an AP, if  $d = -4, n = 7, a_n = 4$  then  $a$  is equal to  
a) 6                      b) 7                      c) 20                      d) 28
2. In an AP, if  $a = 3.5, d = 0$  and  $n = 101$  then  $a_n$  will be  
a) 0                      b) 3.5                      c) 103.5                      d) 104.5
3. The  $n^{th}$  term of the AP  $a, 3a, 5a, \dots$  is  
a)  $na$                       b)  $(2n - 1)a$                       c)  $(2n + 1)a$                       d)  $2na$
4. Which term of an AP 21, 42, 63, 84, ... is 210? **[BOARD 2024]**  
a)  $9^{th}$                       b)  $10^{th}$                       c)  $11^{th}$                       d)  $12^{th}$
5. If the common difference of an AP is 5, then what is  $a_{18} - a_{13}$ ?  
a) 5                      b) 20                      c) 25                      d) 30
6. What is the common difference of an AP in which  $a_{18} - a_{14} = 32$ ? **[BOARD 2024]**  
a) 8                      b) -8                      c) -4                      d) 4
7. The common difference of the AP  $\frac{1}{p}, \frac{1-p}{p}, \frac{1-2p}{p}, \dots$  is **[BOARD 2024]**  
a) 1                      b)  $\frac{1}{p}$                       c)  $-\frac{1}{p}$                       d) -1
8. The common difference of the A.P whose  $n^{th}$  term is given by  $a_n = 3n + 7$  is **[BOARD 2023 & BOARD 2024]**  
a) 7                      b) 3                      c)  $3n$                       d) 1
9. The common difference of the A.P whose  $n^{th}$  term is given by  $a_n = 5n - 7$  is **[BOARD 2023]**  
a) -7                      b) 7                      c) 5                      d) -2
10. The first term of AP is  $p$  and the common difference is  $q$ , then its  $10^{th}$  term is  
a)  $q + 9p$                       b)  $p - 9q$                       c)  $p + 9q$                       d)  $2p + 9q$
11. The  $4^{th}$  term from the end of an AP  $-11, -8, -5, \dots, 49$  is  
a) 37                      b) 40                      c) 43                      d) 58
12. The  $11^{th}$  term from the end of the A.P 10, 7, 4, ..., -62 is **[BOARD 2023]**  
a) 25                      b) 16                      c) -32                      d) 0
13. The  $13^{th}$  term from the end of the A.P 20, 13, 6, -1, ..., -148 is **[BOARD 2023]**  
a) 57                      b) -57                      c) 64                      d) -64

14. The 11<sup>th</sup> term of an AP  $-5, \frac{-5}{2}, 0, \frac{5}{2}, \dots$  is  
 a) -20                      b) 20                      c) -30                      d) 30
15. There are 60 terms in an AP of which the first term is 8 and the last term is 185. The 31<sup>st</sup> term is  
 a) 56                      b) 94                      c) 85                      d) 98
16. The 11<sup>th</sup> and 13<sup>th</sup> terms of an AP are 35 and 41 respectively, its common difference is  
 a) 38                      b) 32                      c) 6                      d) 3
17. The next term of the A.P  $\sqrt{6}, \sqrt{24}, \sqrt{54}, \dots$  is **[BOARD 2023]**  
 a)  $\sqrt{60}$                       b)  $\sqrt{96}$                       c)  $\sqrt{72}$                       d)  $\sqrt{216}$
18. The next term of the A.P  $\sqrt{7}, \sqrt{28}, \sqrt{63}, \dots$  is **[BOARD 2023]**  
 a)  $\sqrt{70}$                       b)  $\sqrt{80}$                       c)  $\sqrt{97}$                       d)  $\sqrt{112}$
19. The two APs have the common difference. The first term of one of these is -1 and that of the other is -8. Then the difference between their 4<sup>th</sup> terms is  
 a) -1                      b) -8                      c) 7                      d) -9
20. The first four terms of an AP whose first term is -2 and the common difference is -2 are  
 a) -2, 0, 2, 4                      b) -2, 4, -8, 16                      c) -2, -4, -6, -8                      d) -2, -4, -8, -16
21. If the first term of an AP is -5 and the common difference is 2, then the sum of the first 6 terms is **[BOARD 2024]**  
 a) 0                      b) 5                      c) 6                      d) 15
22. The sum of first 16 terms of the AP 10, 6, 2, ... is  
 a) -320                      b) 320                      c) -352                      d) -400
23. Sum of first 200 natural numbers **[BOARD 2024]**  
 a) 2010                      b) 2000                      c) 20100                      d) 21000
24. In an AP, if  $a = 1, a_n = 20, S_n = 399$  then n is equal to **[BOARD 2024]**  
 a) 19                      b) 21                      c) 38                      d) 42
25. If the  $n^{\text{th}}$  term of an AP is given by  $a_n = 5n - 3$  then the sum of first 10 terms is  
 a) 225                      b) 245                      c) 255                      d) 270
26. An AP starts with a positive fraction and every alternate term is an integer. If the sum of the first 11 terms is 33, then the fourth term is  
 a) 2                      b) 3                      c) 5                      d) 6

27. If the sum of the first  $2n$  terms of  $2, 5, 8, \dots$  is equal to the sum of the first  $n$  terms of  $57, 59, 61, \dots$  then  $n$  is equal to  
 a) 10                      b) 11                      c) 12                      d) 13
28. If the sum of the first  $n$  terms of an AP is  $3n^2 + n$  and its common difference is 6, then its first term is **[BOARD 2023]**  
 a) 1                      b) 2                      c) 3                      d) 4
29. If  $p - 1, p + 1$  and  $2p + 3$  are in A.P then the value of  $p$  is **[BOARD 2023]**  
 a) -2                      b) 4                      c) 0                      d) 2
30. If  $k + 2, 4k - 6$  and  $3k - 2$  are three consecutive terms of an A.P then the value of  $k$  **[BOARD 2023 & BOARD 2024]**  
 a) 3                      b) -3                      c) 4                      d) -4
31. If  $a, b, c$  form an A.P with common difference  $d$ , then the value of  $a - 2b - c$  is **[BOARD 2023]**  
 a)  $2a + 4d$                       b) 0                      c)  $-2a - 4d$                       d)  $-2a - 3d$
32. Three numbers in A.P have the sum 30. What is its middle term? **[BOARD 2024]**  
 a) 4                      b) 10                      c) 16                      d) 8
33. The number of terms of an A.P  $3, 6, 9, \dots, 111$  is **[BOARD 2024]**  
 a) 36                      b) 40                      c) 37                      d) 30

#### Options for Assertion and Reasoning Questions:

- a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)
- b) Both assertion(A) and reason(R) are true but reason(R) is not the correct explanation of assertion(A)
- c) Assertion (A) is true but reason (R) is false
- d) Assertion (A) is false but reason (R) is true
34. **Assertion (A):** Common difference of the AP  $-5, -1, 3, 7, \dots$  is 4.  
**Reason (R):** Common difference of the AP  $a, a + d, a + 2d, \dots$  is given by  $d = a_2 - a_1$ .
35. **Assertion (A):** Sum of first 10 terms of the AP  $-0.5, -1.0, -1.5, \dots$  is 31.  
**Reason (R):** Sum of  $n$  terms of the AP is  $S_n = \frac{n}{2}[2a + (n - 1)d]$ .
36. **Assertion (A):**  $a_n - a_{n-1}$  is not independent of  $n$  then the given sequences is an AP.  
**Reason (R):** Common difference  $d = a_n - a_{n-1}$  is constant or independent of  $n$ .

37. **Assertion (A):** If  $n^{\text{th}}$  term of an AP is  $7 - 4n$  then its common difference is  $-4$ .

**Reason (R):** Common difference of an AP is  $d = a_{n+1} - a_n$ .

38. **Assertion (A):** If sum of the first  $n$  terms of an AP is  $S_n = 3n^2 - 4n$ . Then its  $n^{\text{th}}$  term is  $a_n = 6n - 7$ .

**Reason (R):**  $n^{\text{th}}$  term of an AP, whose sum to  $n$  terms is  $S_n$  is given by,  $a_n = S_n - S_{n-1}$ .

39. **Assertion (A):**  $a, b, c$  are in A.P if and only if  $2b = a + c$ .

**Reason (R):** The sum of first  $n$  odd natural numbers is  $n^2$ . [BOARD 2023]

40. **Assertion (A):**  $-5, -\frac{5}{2}, 0, \frac{5}{2}, \dots$  is an AP.

**Reason (R):** The terms of an AP cannot have both positive and negative rational numbers.

**2 marks:**

1. If the number  $x + 3, 2x + 1$  and  $x - 7$  are in AP find the value of  $x$ .
2. Find the values of  $a, b$  and  $c$  such that the numbers  $a, 10, b, c, 31$  are in AP.
3. Find the 21<sup>st</sup> term of the AP  $-4\frac{1}{2}, -3, -1\frac{1}{2}, \dots$
4. Find the 7<sup>th</sup> term from the end of AP  $7, 10, 13, \dots, 184$ .
5. Find the middle term of the AP  $213, 205, 197, \dots, 37$ .
6. Find, 100 is a term of the AP  $25, 28, 31, \dots$  or not.
7. Is 184 a term of the sequence  $3, 7, 11, \dots$  ?
8. How many two digits numbers are divisible by 3?
9. If the  $n^{\text{th}}$  term of an AP  $-1, 4, 9, 14, \dots$  is 129. Find the value of  $n$ ?
10. Write the  $n^{\text{th}}$  term of an AP  $\frac{1}{m}, \frac{1+m}{m}, \frac{1+2m}{m}, \dots$
11. Which term of the AP  $3, 15, 27, 39, \dots$  will be 120 more than its 21<sup>st</sup> term?
12. The 8<sup>th</sup> term of an AP is zero. Prove that its 38<sup>th</sup> term is triple of its 18<sup>th</sup> term.
13. For AP show that  $a_p + a_{p+2q} = 2a_{p+q}$ .
14. In an AP, 32<sup>nd</sup> term is twice the 12<sup>th</sup> term. Prove that 70<sup>th</sup> term is twice the 31<sup>st</sup> term.
15. The seventeenth term of an AP exceeds its 10<sup>th</sup> term by 7. Find the common difference.
16. If five times the fifth term of an AP is equal to eight times its eighth term, show that its 13<sup>th</sup> term is zero.

17. The ninth term of an AP is -32 and the sum of its eleventh and thirteenth term is -94. Find the common difference of the AP.
18. How many terms of AP 3, 5, 7, 9, ... must be taken to get the sum 120?
19. Find the sum of first ten multiple of 5.
20. Find the sum of first 15 multiples of 8.
21. What is the sum of five positive integer divisible by 6?
22. Find the sum of first 16 terms of the AP 10, 6, 2...
23. If  $S_n$  the sum of first  $n$  terms of an AP is given by  $S_n = 3n^2 - 4n$ . Find the  $n^{th}$  term.
24. If the sum of  $n$  terms of an AP is  $2n^2 + 5n$  then find the 4<sup>th</sup> term.
25. If the sum of first  $n$  terms of an AP is  $n^2$ , then find its 10<sup>th</sup> term.
26. If the sum of first  $k$  terms of an AP is  $3k^2 - k$  and its common difference is 6. What is the first term?
27. The fifth term of an AP is 20 and the sum of its seventh and eleventh terms is 64. Find the common difference.
28. The fourth term of an AP is 11. The sum of the fifth and seventh terms of the AP is 34. Find the common difference.
29. If the sum of first  $m$  terms of an AP is the same as the sum of its first  $n$  terms, show that the sum of its first  $(m + n)$  terms is zero.
30. If  $S_n$  denotes the sum of  $n$  terms of an AP whose common difference is  $d$  and first term is  $a$ , find  $S_n = 2S_{n-1} + S_{n-2}$ .

**3 marks:**

1. The sum of four consecutive number in AP is 32 and the ratio of the product of the first and last term to the product of two middle terms is 7: 15. Find the numbers.
2. The sum of the first 7 terms of an AP is 63 and that of its next 7 terms is 161. Find the AP.
3. The sum of the 5<sup>th</sup> and the 9<sup>th</sup> terms of an AP is 30. If its 25<sup>th</sup> term is three times its 8<sup>th</sup> term find the AP.
4. If the ratio of the sum of first  $n$  terms of two AP's is  $(7n + 1): (4n + 27)$  find the ratio of their  $m^{th}$  terms.
5. Which term of the AP  $20, 19\frac{1}{4}, 18\frac{1}{2}, 17\frac{3}{4}, \dots$  is the first negative term.
6. Which term of the AP 65, 61, 57, 53, ... is the first negative term. **[BOARD 2023]**
7. Find the middle term of the AP 7, 13, 19, ..., 247.

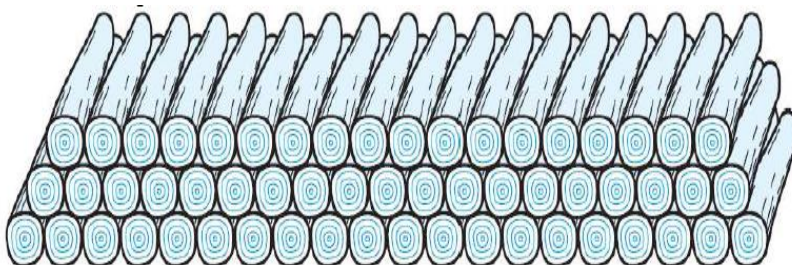
8. Show that the sum of all terms of an AP whose first term is  $a$ , the second term is  $b$  and the last term is  $c$ , is equal to  $\frac{(a+c)(b+c-2a)}{2(b-a)}$ .
9. If in an AP, the sum of first  $m$  terms is  $n$  and the sum of its first  $n$  terms is  $m$ , then prove that the sum of its first  $(m + n)$  terms is  $-(m + n)$ .
10. If the sum of first  $m$  terms of an A.P is same as sum of its first  $n$  terms ( $m \neq n$ ) then show that the sum of its first  $(m + n)$  terms is zero. **[BOARD 2024]**
11. The 17<sup>th</sup> term of an AP is 5 more than twice its 8<sup>th</sup> term. If 11<sup>th</sup> term of AP is 43, then find its  $n^{th}$  term.
12. How many terms are there in an A.P whose first and fifth terms are -14 and 2 respectively and the last term is 62. **[BOARD 2023]**
13. The sum of first 15 terms of an A.P is 750 and its first term is 15. Find its 20<sup>th</sup> term and  $n^{th}$  term. **[BOARD 2023 & BOARD 2024]**
14. Rohan repays his total loan of Rs 1,18,000 by paying every month starting with the first installment of Rs 1,000. If he increases the installment by Rs 100 every month, what amount will be paid by him in the 30<sup>th</sup> installment? What amount of loan has he paid after 30<sup>th</sup> installment? **[BOARD 2023]**
15. If  $p^{th}$  term of an A.P is  $q$  and  $q^{th}$  term is  $p$ , then prove that its  $n^{th}$  term is  $(p + q - n)$  **[BOARD 2023]**
16. In an A.P the sum of the first  $n$  terms is given by  $S_n = 6n - n^2$ . Find its 30<sup>th</sup> term. **[BOARD 2023]**
17. Find the common difference of an A.P whose first term is 8, the last term is 65 and the sum of all its terms is 730. **[BOARD 2023]**
18. Find the sum of all integers between 50 and 500, which are divisible by 7. **[BOARD 2023]**
19. How many numbers lie between 10 and 300, which when divided by 4 leave a remainder 3? Also find their sum. **[BOARD 2023]**
20. In an A.P, the sum of three consecutive terms is 24 and the sum of their squares is 194. Find the numbers. **[BOARD 2024]**
21. If the sum of first 7 terms of an A.P is 49 and that of first 17 terms is 289, find the sum of its first 20 terms. **[BOARD 2024]**
22. The first term of an A.P is 5, the last term is 45 and the sum of all the terms is 400. Find the number of terms and the common difference. **[BOARD 2024]**



23. The ratio of the 10<sup>th</sup> term to its 30<sup>th</sup> term of an A.P is 1:3 and the sum of its first six terms is 42. Find the first term and the common difference of A.P. **[BOARD 2024]**
24. A man starts his job with a certain monthly salary and earns a fixed increment every year. If his salary was Rs 15,000 after 4 years of service and Rs 18000 after 10 years of service, what was his starting salary and what was the annual increment? **[BOARD 2024]**

**5 marks:**

1. The ratio of 11<sup>th</sup> term to 17<sup>th</sup> term of an A.P is 3:4. Find the ratio of 5<sup>th</sup> term to 21<sup>st</sup> term of the same A.P. Also find the ratio of the sum of first 5 terms to that of first 21 terms. **[BOARD 2023]**
2. How many terms of an A.P 45, 39, 33, ... must be taken so that their sum is 180? Explain the double answer. **[BOARD 2023]**
3. 200 logs are stacked in the following manner: 20 logs in the bottom row, 19 in the next row, 18 in the row next to it and so on (see below figures). In how many rows are the 200 logs placed and how many logs are in the top row? **[BOARD 2023]**

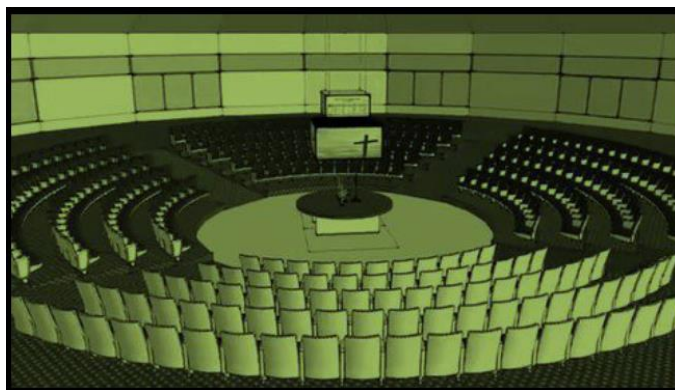


4. The sum of the third and the seventh terms of an AP is 6 and their product is 8. Find the sum of first sixteen terms of an AP. **[BOARD 2023]**
5. The sum of first and eighth terms of an A.P is 32 and their product is 60. Find the first term and common difference of the A.P. Hence, also find the sum of its first 20 terms. **[BOARD 2024]**
6. Solve the equation for x:  $1 + 4 + 7 + 10 + \dots + x = 287$ . **[BOARD 2023]**
7. Solve the equation:  $-4 + (-1) + 2 + 5 + \dots + x = 437$ . **[BOARD 2023]**
8. If the sum of first 6 terms of an AP is 36 and that of the first 16 terms is 256 then find the sum of first 10 terms. **[BOARD 2023]**

9. Poorna saves Rs 32 during the first month, Rs 36 in the second month and Rs 40 in the third month. If she continues to save in this manner, in how many months will she save Rs 2000? **[BOARD 2023]**
10. The sum of first seven terms of an AP is 182. If its 4<sup>th</sup> term and the 17<sup>th</sup> term are in the ratio 1:5, find the A.P. **[BOARD 2023]**
11. The sum of first  $q$  terms of an AP is  $63q - 3q^2$ . If its  $p^{\text{th}}$  term is -60, find the value of  $p$ . Also find the 11<sup>th</sup> term of this AP. **[BOARD 2023]**
12. Find the sum of integers between 100 and 200 which are
- Divisible by 9
  - Not divisible by 9. **[BOARD 2023]**
13. In an A.P of terms, the sum of first 9 terms is 153 and the sum of last 6 terms is 687. Determine the first term and common difference of A.P. Also, find the sum of all the terms of the A.P. **[BOARD 2024]**

**Case Based Questions:**

1. The school auditorium was to be constructed to accommodate at least 1500 people. The chairs are to be placed in concentric circular arrangement in such a way that each succeeding circular row has 10 seats more than the previous one.



- If the first circular row has 30 seats, how many seats will be there in the 10th row? **1**
- For 1500 seats in the auditorium, how many rows need to be there? **2**

**OR**

- If 1500 seats are to be arranged in the auditorium, how many seats are still left to be put after 10th row? **2**
- If there were 17 rows in the auditorium, how many seats will be there in the middle row? **1**



2. Manpreet Kaur is the national record holder for women in the shot-put discipline. Her throw of 18.86m at the Asian Grand Prix in 2017 is the biggest distance for an Indian female athlete. Keeping her as a role model, Sanjitha is determined to earn gold in Olympics one day. Initially her throw reached 7.56m only. Being an athlete in school, she regularly practiced both in the mornings and in the evenings and was able to improve the distance by 9cm every week. During the special camp for 15 days, she started with 40 throws and every day kept increasing the number of throws by 12 to achieve this remarkable progress.



- (i) How many throws Sanjitha practiced on 11th day of the camp? **1**  
(ii) What would be Sanjitha's throw distance at the end of 6 months? **2**

**OR**

- When will she be able to achieve a throw of 11.16 m? **2**  
(iii) How many throws did she do during the entire camp of 15 days? **1**

3. Salary : In investigating different job opportunities, you find that firm A will start you at Rs 25,000 per year and guarantee you a raise of Rs 1,200 each year whereas firm B will start you at Rs 28,000 per year but will guarantee you a raise of only Rs 800 each year.



- (i) Over a period of 15 years, how much would you receive from firm A? **1**  
(ii) Over a period of 15 years, how much would you receive from firm B? **1**  
(iii) What would be your annual salary at firm A for the tenth year? **2**

**OR**

- What would be your annual salary at firm B for the tenth year? **2**

4. Bequests to Charity: At the time our mother left this Earth, she gave Rs 90000 to her children of birth. This we kept and each year added Rs 30000 more, as a lasting memorial from the children she bore. When Rs 4,20,000 is thusly attained, all goes to charity that her memory be maintained.



- (i) What was the balance in the sixth year? **1**  
(ii) In what year was the goal of Rs 420,000 met? **2**

5. It takes 5 toothpicks to build the top trapezoid shown at below. You need 9 toothpicks to build 2 adjoined trapezoids and 13 toothpicks for 3 trapezoids.



- (i) If 1000 toothpicks are available, how many trapezoids will be in the last complete row? **1**  
(ii) How many complete rows will there be? **1**  
(iii) How many toothpicks will you use to construct these rows? **1**

6. A manufacturer of TV sets produced 600 sets in the third year and 700 sets in the seventh year. Assuming that the production increases uniformly by a fixed number every year.



- (i) What is the production in the 1st year? **1**  
(ii) What is the production in the 10th year? **1**  
(iii) What is the total production in first 7 years? **2**

7. Treasure Hunt is an exciting and adventurous game where participants follow a series of clues/numbers/maps to discover hidden treasures. Players engage in a thrilling quest, solving puzzles and riddles to unveil the location of the coveted prize. While playing a treasure hunt game, some clues (numbers) are hidden in

various spots collectively forming an A.P. If the number on the  $n$ th spot is  $20 + 4n$ , then answer the following questions to help the players in spotting the clues :

**[BOARD 2024]**



- |      |                                |          |
|------|--------------------------------|----------|
| (i)  | Which number is on first spot? | <b>1</b> |
| (ii) | Which spot is numbered as 112? | <b>2</b> |

**OR**

- |       |   |          |
|-------|---|----------|
|       | What is the sum of all the numbers on the first 10 spots? | <b>2</b> |
| (iii) | Which number is on the $(n - 2)^{th}$ spot?               | <b>1</b> |