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# **VIRTUAL COACHING CLASSES ORGANISED BY BOS (ACADEMIC), ICAI**

## **FOUNDATION LEVEL PAPER 3: BUSINESS MATHEMATICS LOGICAL REASONING AND STATISTICS**

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# SEQUENCES & SERIES

- Let us consider 1, 2, 3, 4, 5.....
- Let us now consider 14, 20, 8, -5.....

Thus a sequence may be defined as follows:—

**An ordered collection of numbers  $a_1, a_2, a_3, a_4, \dots, a_n, \dots$  is a sequence if according to some definite rule or law, there is a definite value of  $a_n$ , called the term or element of the sequence, corresponding to any value of the natural number  $n$ .**

If the number of elements in a sequence is finite, the sequence is called *finite sequence*; while if the number of elements is unending, the sequence is *infinite*.

Eg . All even numbers less than 20 is a finite sequence

Eg. All even numbers greater than 20 is an infinite sequence

An expression of the form  $a_1 + a_2 + a_3 + \dots + a_n + \dots$  which is the sum of the elements of the sequence  $\{ a_n \}$  is called a *series*. If the series contains a finite number of elements, it is called a *finite series*, otherwise called an *infinite series*.  $S_n = \sum_{r=1}^n u_r$



# Arithmetic Progression & Arithmetic Mean & Sum of series

A sequence  $a_1, a_2, a_3, \dots, a_n$  is called an Arithmetic Progression (A.P.) when  $a_2 - a_1 = a_3 - a_2 = \dots = a_n - a_{n-1}$ . That means A. P. is a sequence in which each term is obtained by adding a constant  $d$  to the preceding term. This constant ' $d$ ' is called the *common difference* of the A.P. If 3 numbers  $a, b, c$  are in A.P., we say

$b - a = c - b$  or  $a + c = 2b$ ;  $b$  is called the arithmetic mean between  $a$  and  $c$ .

$$t_n = a + (n-1)d$$

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

$$s = \frac{n}{2} \{2a + (n - 1)d\}$$



# AP- important

1. Sum of first 'n' natural numbers is  $\frac{n(n+1)}{2}$ .

2. Sum of first 'n' odd numbers  $1+3+5+\dots+(2n-1)$  is  $S = n^2$

3. Sum of the squares of first 'n' natural numbers  $1^2+2^2+3^2+4^2+5^2+\dots+n^2 = \frac{n(n+1)(2n+1)}{6}$

4. Sum of cubes of first 'n' natural numbers is  $\left\{ \frac{n(n+1)}{2} \right\}^2$

5. Three numbers in AP should be taken as a-d, a, a+d



# AP

## Questions

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1. Sequence is given and nth term is asked.
2. Some terms are given and you are asked to find the sequence.
3. You are asked to find Arithmetic mean
4. You are asked to find the sum of the series.
5. Other mix sums



# AP - Sequence is given and nth term is asked.

Example 1 / 6.4 Find the 7<sup>th</sup> term of AP 8, 5, 2, -1, -4,...

Ex 6A pg 6.7

1. The nth element of the sequence 1, 3, 5, 7,.....is  
(a) n (b)  $2n - 1$  (c)  $2n + 1$  (d) none of these

2. The nth element of the sequence -1, 2, -4, 8 ..... is  
(a)  $(-1)^n 2^{n-1}$  (b)  $2^{n-1}$  (c)  $2^n$  (d) none of these

5. The first three terms of sequence when nth term  $t_n$  is  $n^2 - 2n$  are  
(a) -1, 0, 3 (b) 1, 0, 2 (c) -1, 0, -3 (d) none of these

12. The last term of the series 5, 7, 9,..... to 21 terms is  
(a) 44 (b) 43 (c) 45 (d) none of these

13. The last term of the A.P. 0.6, 1.2, 1.8,... to 13 terms is  
(a) 8.7 (b) 7.8 (c) 7.7 (d) none of these

11. The 20<sup>th</sup> term of the progression 1, 4, 7, 10.....is

(a) 58

(b) 52

(c) 50

(d) none of these



**AP**-Some terms are given and you are asked to find the sequence.

**Example 3:** If 5<sup>th</sup> and 12<sup>th</sup> terms of an A.P. are 14 and 35 respectively, find the A.P.





# AP- You are asked to find Arithmetic mean

**Example 5:** Find the arithmetic mean between 4 and 10. \_\_\_\_\_

**Example 6:** Insert 4 arithmetic means between 4 and 324.

15. The two arithmetic means between  $-6$  and  $14$  is

- (a)  $2/3, 1/3$                       (b)  $2/3, 7\frac{1}{3}$                       (c)  $-2/3, -7\frac{1}{3}$                       (d) none of these

20. The arithmetic mean between  $33$  and  $77$  is

- (a)  $50$                       (b)  $45$                       (c)  $55$                       (d) none of these

21. The 4 arithmetic means between  $-2$  and  $23$  are

- (a)  $3, 13, 8, 18$                       (b)  $18, 3, 8, 13$                       (c)  $3, 8, 13, 18$                       (d) none of these



# AP-You are asked to find the sum of the series.

■A

4. The sum to  $\infty$  of the series  $-5, 25, -125, 625, \dots$  can be written as

(a)  $\sum_{k=1}^{\infty} (-5)^k$

(b)  $\sum_{k=1}^{\infty} 5^k$

(c)  $\sum_{k=1}^{\infty} -5^k$

(d) none of these

14. The sum of the series  $9, 5, 1, \dots$  to 100 terms is

(a)  $-18,900$

(b)  $18,900$

(c)  $19,900$

(d) none of these

25. The sum of the series  $3\frac{1}{2} + 7 + 10\frac{1}{2} + 14 + \dots$  to 17 terms is

(a) 530

(b) 535

(c)  $535\frac{1}{2}$

(d) none of these



# AP-mixed sums

**Example 2:** Which term of the AP  $\frac{3}{\sqrt{7}}, \frac{4}{\sqrt{7}}, \frac{5}{\sqrt{7}}, \dots$  is  $\frac{17}{\sqrt{7}}$ ?

**Example 4:** Divide 69 into three parts which are in A.P. and are such that the product of the first two parts is 483.

3.  $\sum_{i=4}^7 \sqrt{2i-1}$  can be written as

(a)  $\sqrt{7} + \sqrt{9} + \sqrt{11} + \sqrt{13}$

(b)  $2\sqrt{7} + 2\sqrt{9} + 2\sqrt{11} + 2\sqrt{13}$

(c)  $2\sqrt{7} + 2\sqrt{9} + 2\sqrt{11} + 2\sqrt{13}$

(d) none of these.



# AP

6. Which term of the progression  $-1, -3, -5, \dots$  is  $-39$   
(a)  $21^{\text{st}}$  (b)  $20^{\text{th}}$  (c)  $19^{\text{th}}$  (d) none of these
7. The value of  $x$  such that  $8x + 4, 6x - 2, 2x + 7$  will form an AP is  
(a) 15 (b) 2 (c)  $15/2$  (d) none of these
8. The  $m^{\text{th}}$  term of an A. P. is  $n$  and  $n^{\text{th}}$  term is  $m$ . The  $r^{\text{th}}$  term of it is  
(a)  $m + n + r$  (b)  $n + m - 2r$  (c)  $m + n + r/2$  (d)  $m + n - r$



# AP

9. The number of the terms of the series  $10 + 9\frac{2}{3} + 9\frac{1}{3} + 9 + \dots$  will amount to 155 is  
(a) 30                      (b) 31                      (c) 32                      (d) none of these
10. The  $n$ th term of the series whose sum to  $n$  terms is  $5n^2 + 2n$  is  
(a)  $3n - 10$               (b)  $10n - 2$               (c)  $10n - 3$               (d) none of these
16. The sum of three integers in AP is 15 and their product is 80. The integers are  
(a) 2, 8, 5                      (b) 8, 2, 5                      (c) 2, 5, 8                      (d) 8, 5, 2
17. The sum of  $n$  terms of an AP is  $3n^2 + 5n$ . The series is  
(a) 8, 14, 20, 26              (b) 8, 22, 42, 68              (c) 22, 68, 114, ....              (d) none of these
18. The number of numbers between 74 and 25,556 divisible by 5 is  
(a) 5,090                      (b) 5,097                      (c) 5,095                      (d) none of these



# AP

19. The  $p$ th term of an AP is  $(3p - 1)/6$ . The sum of the first  $n$  terms of the AP is  
(a)  $n(3n + 1)$                       (b)  $n(3n + 1)/12$                       (c)  $n/12(3n - 1)$                       (d) none of these
20. The arithmetic mean between 33 and 77 is  
(a) 50                                      (b) 45                                      (c) 55                                      (d) none of these



# AP

22. The first term of an A.P is 14 and the sums of the first five terms and the first ten terms are equal in magnitude but opposite in sign. The 3<sup>rd</sup> term of the AP is

(a)  $6\frac{4}{11}$

(b) 6

(c)  $4/11$

(d) none of these

23. The sum of a certain number of terms of an AP series  $-8, -6, -4, \dots$  is 52. The number of terms is

(a) 12

(b) 13

(c) 11

(d) none of these

24. The first and the last term of an AP are  $-4$  and  $146$ . The sum of the terms is  $7171$ . The number of terms is

(a) 101

(b) 100

(c) 99

(d) none of these





## AP ex 6C

9. If the terms  $2x$ ,  $(x+10)$  and  $(3x+2)$  be in A.P., the value of  $x$  is

(a) 7

(b) 10

(c) 6

(d) none of these

12. Three numbers are in A.P. and their sum is 15. If 8, 6, 4 be added to them respectively, the numbers are in G.P. The numbers are

(a) 2, 6, 7

(b) 4, 6, 5

(c) 3, 5, 7

(d) none of these





# AP

22. The sum of all odd numbers between 200 and 300 is  
(a) 11,600                      (b) 12,490                      (c) 12,500                      (d) 24,750
23. The sum of all natural numbers between 500 and 1000 which are divisible by 13, is  
(a) 28,405                      (b) 24,805                      (c) 28,540                      (d) none of these
24. If unity is added to the sum of any number of terms of the A.P. 3, 5, 7, 9,..... the resulting sum is  
(a) 'a' perfect cube              (b) 'a' perfect square      (c) 'a' number                      (d) none of these



# AP

25. The sum of all natural numbers from 100 to 300 which are exactly divisible by 4 or 5 is  
(a) 10,200                      (b) 15,200                      (c) 16,200                      (d) none of these
26. The sum of all natural numbers from 100 to 300 which are exactly divisible by 4 and 5 is  
(a) 2,200                      (b) 2,000                      (c) 2,220                      (d) none of these



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**THANK YOU**