

ARITHMETIC PROGRESSION

KEY CONCEPT

- AN AP is a list of number in which difference of a term and the preceding term is always constant. The constant is called common difference (d) of AP. $d = a_{n+1} - a_n$
- If a is the first term and 'd' is the common difference of an AP, then the AP is a, a+d, a+2d, a+3d.....
- The nth term of an AP is denoted by a_n
 $a_n = a + (n-1)d$ where a=first term and d= common difference
n= number of term
- nth term from the end = $l - (n-1)d$
Where l=last term
- Various terms in an AP can be chosen in following manner.

No. of terms	terms	common difference
3	a-d, a, a+d	d
4	a-3d, a-d, a+d, a+3d	2d
5	a-2d, a-d, a, a+d, a+2d	d

- sum of first n natural number is $n(n+1)/2$
- the sum of n terms of an AP with first term a and common difference d is denoted by
 $S_n = n/2 \{2a + (n-1)d\}$
 $S_n = n/2 (a+l)$
 $a_n = S_n - S_{n-1}$

LEVEL-I

1. Write fourth term of an AP if its nth term is $3n+2$.
2. Find A.P Which fifth term is 5 and common difference is - 3.
3. Determine the 10th term from the end of the A.P 4,9,14.....254
4. Find whether 0 is a term of the A.P 40, 37, 34, 31
5. Write the value of x for which $x+2$, $2x$, $2x+3$ are three consecutive terms of an A.P
6. Find the sum of first 24 term of AP 5,8,11,14.....
7. Which term of the A.P 12,7,2-3..... is -98
8. The nth term of an A.P is $3n+5$ find its common difference.
9. Write the next term of A.P $\sqrt{2}, \sqrt{18}$.
10. If $4/5, a, 2$ three consecutive term of an A.P then find A

LEVEL- II

11. Find the middle term of A.P 6,13,20,.....216
12. The 6th term of an A.P is -10 and its 10th term is -26. Determine the 15th term of an A.P
13. The 8th term of an A.P is 0 prove that its 38th term is triple its 18th term.
14. The sum of three numbers in A.P is 21 and their product is 231 find the numbers.
15. Find the sum of 25th term of an AP which nth term is given by $t_n = (7-3n)$
16. Find the sum of all two digit odd positive numbers
17. Find the sum of three digits numbers which are divisible by 11
18. The sum of first 6 term of A.P is 42. The ratio its 10th term to 38th term is 1:3. Calculate the first and 13th term of the A.P
19. How many term of the A.P 17, 15, 13, 11..... must be added to get the sum 72? Explain the double answer.
20. The sum of n, 2n, 3n term of an A.P are S₁, S₂, and S₃ respectively.

Prove that $S_3 = 3(S_2 - S_1)$

LEVEL - III

21. If in an A.P the sum of first m term = n and the sum of 1^{st} n term = m , then Prove that sum of $(m+n)$ term is – $(m+n)$
22. If $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ is the A.M between a and b find the value of n .
23. If the p^{th} , q^{th} , r^{th} term of an A.P be a, b, c respectively then show that $a(q-r)+b(r-p)+c(p-q) = 0$
24. A man saved Rs 32 during first year Rs. 36 in second year and in this way he increases his saving by Rs. 4 every year find in what time his saving will be Rs 200
25. Find the sum of the following.
 $(1 - \frac{1}{n}) + (1 - \frac{2}{n}) + (1 - \frac{3}{n}) + \dots$ upto n terms

SELF EVALUATION

26. Find the value of x for A.P, $1+6+11+16+\dots+x=148$
27. A man repays a loan for Rs 3250 by paying Rs 20 in the first month and then increases the payments Rs15 every month. How long will it take him to clear the loan?
28. If the sum of m terms of an A.P is the same as the sum of its n terms. Show that the sum of its $(m+n)$ term is zero.
29. Is 51 a term of the A.P, $5, 8, 11, 14, \dots$
30. If the m^{th} term of an A.P is $1/n$ and n^{th} term is $1/m$ then show that sum of mn term is $1/2(mn+1)$.
31. If $2x, x+10, 3x+2$ are in A.P find the value of x .
32. Find the sum of all 3-digits numbers which are multiple of 7.
33. In an A.P the sum of first n terms is $(3n^2/2 + 5n/2)$. Find its 25^{th} term.
34. The first term of an A.P is -7 and common difference is 5 . Find its 18^{th} term and the general term.
35. Determine the 10^{th} term from the end of the A.P. $4, 9, 14, \dots, 254$.

VALUE BASED QUESTIONS

36. A sum of Rs 700 is to be used to give 7 cash prizes to the students of a school for their overall academic performance, punctuality, regularity, cleanliness, confidence and creativity and discipline. If each prize is Rs20 less than its preceding prize. Find the value of each of the prizes.
I) which value according to you should be awarded with maximum amount. Justify your answer.