

ARITHMETIC PROGRESSION**(Key Points)**

- Arithmetic progression (A.P.) :- An A.P. is a list of numbers in which each term is obtained by adding a fixed number to the preceding term except the first term.
- This fixed number is called the common difference of the A.P.
- If a is first term and d is common difference of an A.P. , then the A.P is $a, a+d, a+2d, a+3d, \dots$
- The n^{th} term of an a.p is denoted by a_n and $a_n = a + (n-1)d$, where a = first term and d = common difference.
- n^{th} term from the end = $l - (n-1)d$, where l = last term.
- Three terms $a-d, a, a+d$ are in A.P with common difference d .
- Four terms $a-3d, a-d, a+d, a+3d$ are in A.P with common diff. $2d$.
- The sum of first n natural number is $\frac{n(n+1)}{2}$
- The sum of n terms of an A.P with first term a and common difference d is denoted by $S_n = \frac{n}{2}\{2a + (n-1)d\}$ also , $S_n = \frac{n}{2}(a+l)$ where , l = last term.
- $a_n = S_n - S_{n-1}$. Where $a_n = n^{th}$ term of an A.P
- $D = a_n - a_{n-1}$. Where d = common difference of an A.P.

[LEVEL -1]

1. Find n^{th} term of $-15, -18, -21, \dots$

Ans .-3 (n+4)

2. Find the common diff. of A.P $1, -2, -5, -8, \dots$

Ans . -3

3. Find the A.P whose first term is 4 and common difference is -3

Ans . a.p = $4, 1, -2, -5, -8, \dots$

4. Find 5^{th} term from end of the AP : $17, 14, 11, \dots, -40$.

Ans . -28

5. If $2p, p+10, 3p+2$ are in AP then find p .

Ans . $p = 6$

6. If arithmetic mean between $3a$ and $2a-7$ is $a+4$, then find a .

Ans . $a = 5$

7. Find sum of all odd numbers between 0 & 50.

Ans . 625

8. If $a = 5, d = 3$ and $a_n = 50$, then find n .

Ans . $n = 16$

9. For what value of n are the n^{th} term of two AP , $63, 65, 67, \dots$ and $3, 10, 17, \dots$ equal?

Ans . $n = 13$.

10. If sum of n terms of an AP is $2n^2 + 5n$, then find its n^{th} term.

Ans. $4n+3$.

[LEVEL - 2]

1. Find n^{th} term of an AP is $7-4n$. find its common difference.

Ans. -4.

2. Which term of an AP 5,2,-1,...will be -22 ?

Ans. 10^{th} term .

3. Write the next term of an AP $\sqrt{8}, \sqrt{18}, \sqrt{32}, \dots$

Ans. $5\sqrt{2}$.

4. Determine 27^{th} term of an AP whose 9^{th} term is -10 and common difference is $1\frac{1}{4}$

Ans. $927 = \frac{25}{2}$.

5. Find the sum of series $103=+101+99+\dots+49$.

Ans. 2128.

6. Which term of the AP 3,15,27,39,...will be 132 more than its 54^{th} term ?

Ans. 65^{th} term .

7. How many three digit numbers are divisible by 7 ?

Ans. 128.

8. Given $a = 2$, $d = 8$, $s_n = 90$, find n and a_n .

Ans. $N = 5$ & $a_n = 34$

(LEVEL- 3)

1. Which term of the sequence -1, 3, 7, 11 Is 95?

Ans. 25^{th} term

2. How many terms are there in the sequence 3, 6, 9, 12,111?

Ans. 37 terms

3. The first term of an AP is -7 and the common difference 5, find its 18^{th} term and the general term.

Ans. $a_{18} = 78n$ & $a_n = 5n - 12$

4. How many numbers of two digits are divisible by 3?

Ans. 30

5. If the n^{th} term of an AP is $(2n+1)$, find the sum of first n terms of the AP.

Ans. $S_n = n(n+2)$

6. Find the sum of all natural numbers between 250 and 1000 which are exactly divisible by 3.

Ans. 156375.

Problems for self evaluation.

1. Show that the sequence defined by $t_n = 4n + 7$ is an AP.

2. Find the number of terms for given AP :7,13 ,19,25,.....,205.

3. The 7^{th} term of an AP is 32 and its 13^{th} term is 62. Find AP.

4. Find the sum of all two digit odd positive nos.

5. Find the value of 'x' for AP. $1+6+11+16+\dots+X=148$.

6. Find the 10^{th} term from the end of the AP 8,10,12,...126.

7. The sum of three numbers of AP is 3 and their product is -35. Find the numbers.

8. A man repays a loan of Rs3250 by paying Rs20 in the first month and then increase the payment by Rs15 every month .How long will it take him to clear the loan ?

9. The ratio of the sums of m and n terms of an AP is $m^2 : n^2$. Show that the ratio of the m th and n th terms is $(2m-1) : (2n-1)$.
10. In an AP, the sum of first n terms is $\frac{3n^2}{2} + \frac{5n}{2}$, Find its 25th term.

www.studiestoday.com