ARITHMETIC PROGRESSION

Important concepts:

Take a look:

Sequence: - A sequence is an arrangement of numbers in a definite order according to some rule.

Progression: A sequence that follow a definite pattern is called progression.

Arithmetic Progression (A.P.): A sequence in which each term differs from its preceding term by a constant is called an arithmetic progression. This constant is called common difference of the A.P. It is denoted by 'd'.

General form of an A.P.: The general form of an A.P. is a, a+d,a+2d,a+3d ....

n^{th} term of an A.P. : If 'a' is the first term and 'd' is the common difference than [$a_n = a + (n-1)d$]

n^{th} term from the last of an A.P. : [$a_n = l + (n-1)d$]

where l = last term.

d= c.d.

Sum of n terms of an A.P. : -

Sn = $\frac{n}{2[2a + (n-1)d]}$

Or Sn = $\frac{n}{2(a + l)}$. Where l = last term.

Common difference: [d = $a_k - a_{k-1}$]

- Common difference may be +ve , - ve or zero.

n^{th} term: If Sn is given then [$a_n = S_n - S_{n-1}$]

Level – I

1. Is the progression 3,9,15,21 .... is in A.P.?

   Ans yes
2. Find the first term and common difference of the A.P.

   1,5,9,13,17. Ans : a=1 , d=4
3. Find the 10^{th} term of the A.P. 63,58,53,48 ....

   Ans : 18
4. Find the 8^{th} term from the end of the A.P. 7,10,13.................184.

   Ans : 163
5. In the given A.P. find the missing term :
   $\sqrt{2}$, [ ] , 5$\sqrt{2}$ Ans : 3 $\sqrt{2}$
6. Find the sum of first 24^{th} terms of the A.P.:
   5,8,11,14,.................................... Ans : 948

Level – 2

1. Which term of the A.P. 84,80,76,…………………… is zero. Ans : n=22

2. Find the sum of odd numbers between 0 and 50. Ans : 625

3. Which term of the sequence 48,43,38,33……………………..is the first –ve term. Ans : 11th

4. if the no. 4p+1,26,10p-5 are in A.P. .Find the value of p. Ans : p=4

5. If 9th term of an A.P. is zero, prove that its 29th term is double the 19th term.

Level – 3

1. The 7th term of an A.P. is 32 and its 13th term is 62. Find the A.P.

   Ans : 2, 7,12,…………

2. Find the sum of first 25th term of an A.P. whose nth term is given by Tn =2-3n.

   Ans : -925
3. If m times the mth term of an A.P. is equal to n times its nth term; find (m+n)th term. Ans: 0
4. Which term of the A.P. 3,10,17,…………………..will be 84 more than its 13th term.

   Ans : 25th
5. If the sum of first n, 2n and 3n terms of an A.P. be S_1 , S_2 and S_3 respectively then prove that

   $S_3 = 3(S_2 - S_1)$.

Level – 4

1. How many multiple of 4 lie between 10 and 250? Also find their sum.

   Ans : n=60 S_{60} =7800

2. The first and last term of an A.P. is 8 and 350 respectively. If its common difference is 9, how many terms are there and what is their sum?

   Ans : n=39, S_{39} =6981
3. The sum of first 15 terms of an A.P. is 105 and the sum of the next 15 terms is780. Find the first 3 terms of the A.P. :

   Ans : -14,-11,-8.
4. If the sum of first nth terms of an A.P. is given by $S_n = 4n^2 - 3n$, find the nth term of the A.P.

   Ans : $8n - 7$

Self Evaluation

1. Find the common difference and write the next two terms of the A.P. 8,3,-2,-7.

2. Which term of the A.P. 4,9,14 ………………….. is 89?

   Also find the sum.

3. Find the sum of all two digits positive numbers divisible by 3.

4. The sum of n terms of an A.P. is $3n^2+5n$.find the A.P. .Also find 16th term.

5. The ratio of the sum of n and m terms of an A.P. is $m^2:n^2$. Show that the ratio of the mth term and nth term is

   (2m-1):(2n-1).