

### 3.Arithmetic Progression

- Question for 1 Mark.

A) Choose the correct alternative answer for each of the following sub questions.

- In an Arithmetic Progression 2,4,6,8,.....the common difference  $d$  is.....  
(A) 8 (B) 6 (C) 2 (D) -2
- What is the common difference of the sequence 0,-4,-8,-12 ?  
(A) 4 (B) -4 (C) 8 (D) -8
- For an A.P. 5,12,19,26,.....  $a=?$   
(A) 12 (B) 26 (C) 19 (D) 5
- A set of numbers where the numbers are arranged in a definite order, like the natural numbers, is called a .....  
(A) index (B) numbers (C) line (D) sequence
- First four terms of an A.P., are.....whose first term is -2 and common difference is -2.  
(A)-2,0,2,4 (B)-2,4,-8,16 (C)-2,-4,-6,-8 (D)-2,-4,-8,-16
- 1,4,7,10,13..... Next two terms of this A.P. are.....  
(A) 16,19 (B) 10,7 (C) 19,22 (D) 16,18
- Find  $d$  of an A.P. whose first two terms are -3 and -4.  
(A) 7 (B) 4 (C) -7 (D) -3
- If third term and fifth term of an A.P. are 13 and 25 respectively, find its 7<sup>th</sup> term.  
(A) 30 (B) 33 (C) 37 (D) 38
- Find  $t_3 = ?$  in an A.P. 9,15,21,27  
(A) 27 (B) 21 (C) 15 (D) 9
- In an A.P., 0,-4,-8,-12.....find  $t_2 = ?$   
(A) -8 (B) -4 (C) -12 (D) 0

B) Solve the following sub questions.

- Decide whether the given sequence 2,4,6,8.....is an A.P.
- Find  $a$  and  $d$  for an A.P., 1,4,7,10.....
- Write the formula of the sum of first  $n$  terms for an A.P.
- Find  $t_n$  if  $a=20$  आणि  $d=3$

5. Find  $t_5$  if  $a=3$  आणि  $d=-3$
6.  $t_n = 2n-5$  in a sequence, find its first two terms.
7. Find first term of the sequence  $t_n=2n+1$
8. Find two terms of the sequence  $t_n=3n-2$
9. Find common difference of an A.P., 0.9, 0.6, 0.3.....
10. Find  $d$  if  $t_9=23$  व  $a=7$ .

• **Question for 2 Marks.**

**A) complete the following activity**

1) Find the sum of first 1000 positive integers.

Activity :- Let  $1+2+3+\dots+1000$

Using formula for the sum of first  $n$  terms of an A.P.,

$$S_n = \boxed{\phantom{000}}$$

$$S_{1000} = \frac{\boxed{\phantom{000}}}{2} (1+1000)$$

$$= 500 \times 1001$$

$$= \boxed{\phantom{000}}$$

Therefore, Sum of the first 1000 positive integer is  $\boxed{\phantom{000}}$

2) Which term of following A.P. is -940.

50, 40, 30, 20.....

Activity:- Here  $a = \boxed{\phantom{00}}$   $d = \boxed{\phantom{00}}$   $t_n = -940$

According to formula,  $t_n = a + (n-1)d$

$$-940 = \boxed{\phantom{000}}$$

$$n = \boxed{\phantom{000}}$$

3) For an A.P., If  $t_1 = 1$  and  $t_n = 149$  then find  $S_n$ .

Activity :- Here  $t_1 = 1$ ,  $t_n = 149$ ,  $S_n = ?$

$$S_n = \frac{n}{2} (\boxed{\phantom{00}} + \boxed{\phantom{00}})$$

$$= \frac{n}{2} \times \boxed{\phantom{000}}$$

$$= \boxed{\phantom{000}} n$$

4)  $t_{19} = ?$  for the given A.P., 9, 4, -1, -6.....

Activity :- Here  $a=9$ ,  $d = \square$

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

$$t_{19} = 9+(19-1)\square$$

$$= 9+ \square$$

$$= \square$$

5) Common difference,  $d = ?$  for the given A.P., 7,14,21,28.....

Activity :- Here  $t_1=7$ ,  $t_2=14$ ,  $t_3=21$ ,  $t_4= \square$

$$t_2 - t_1 = \square$$

$$t_3 - t_2 = 7$$

$$t_4 - t_3 = \square$$

Therefore, common difference  $d = \square$

**B) Solve the following.**

1. Decide whether the following sequence is an A.P. or not.

3, 5, 7, 9, 11, .....

2. Find first four terms of an A.P., whose first term is 3 and common difference is 4.

3. 1, 6, 11, 16.....Find the 18<sup>th</sup> term of this A.P.

4. In an A.P.  $a=2$  and  $d=3$ , then find  $S_{12}$ .

5. Find first four terms of the sequence  $t_n=n+2$ .

6. In an A.P.,  $a=10$  and  $d= -3$  then find its first four terms.

7. 1, 7, 13, 19.....find 18<sup>th</sup> term of this A.P.

8. In an A.P.  $a=4$  and  $d=0$ , then find first five terms.

9. If  $a=6$  and  $d=10$ , then find  $S_{10}$ .

10. Decide whether the given sequence 24,17,10, 3.....is an A.P.? If yes find its common term ( $t_n$ ).

• **Question for 3 Marks**

**A) complete the following activity**

1) how many two-digit numbers are divisible by 5?

Activity :- Two-digit numbers divisible by 5 are, 10,15,20.....95.

Here,  $d=5$ , therefore this sequence is an A.P.

Here  $a=10$ ,  $d=5$ ,  $T_n=95$ ,  $n=?$

$$t_n = a + (n-1) \square$$

$$\square = 10 + (n-1) \times 5$$

$$\square = (n-1) \times 5$$

$$\square = (n-1)$$

therefore  $n = \square$

there are  $\square$  two-digit numbers divisible by 5.

2) Kalpana saves some amount every month. In first three months she saves Rs.100, Rs.150 and Rs.200 respectively. In how many months will she save Rs.1200?

Activity :- Kalpana's monthly saving is Rs.100, Rs.150, Rs.200.....Rs.1200

Here  $d=50$ . Therefore this sequence is an A.P.

$$a=100, \quad d=50, \quad t_n = \square \quad n=?$$

$$t_n = a + (n-1) \square$$

$$\square = 100 + (n-1) \times 50$$

$$\frac{\square}{50} = n-1$$

$$n = \square$$

therefore, she saves Rs.1200 in  $\square$  months.

3) Determine the sum of first 100 terms of given A.P. 12,14,16,18,20.....

Activity :- here,  $a=12$ ,  $\square$   $n=100$ ,  $S_{100}=?$

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

$$S_{100} = \frac{\square}{2} [ 24 + (100-1)d ]$$

$$= 50 ( 24 + \square )$$

$$= \square$$

4) Find the sum of natural numbers between 1 to 140, which are divisible by 4.

Activity :- Natural numbers between 1 to 140 divisible by 4 are,

4,8,12,16,.....136

Here  $d=4$ , therefore this sequence is an A.P.

$a=4$ ,  $d=4$ ,  $t_n=136$ ,  $S_n=?$

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

$$\square = 4+(n-1)\times 4$$

$$\square = (n-1)\times 4$$

$$n = \square$$

Now,

$$S_n = \frac{n}{2} [a + t_n]$$

$$S_n = 17 \times \square$$

$$S_n = \square$$

Therefore, the sum of natural numbers between 1 to 140, which are divisible by 4 is  $\square$

5) Decide whether 301 is term of given sequence 5,11,17,23,.....

Activity :- Here,  $d = \square$  therefore this sequence is an A.P.

$$a= 5, d= \square$$

Let  $n$ th term of this A.P. be 301.

$$t_n = a + (n-1)\square$$

$$301 = 5 + (n-1)\times 6$$

$$301 = 6n-1$$

$$n = \frac{302}{6} = \square$$

But  $n$  is not positive integer

Therefore, 301 is  $\square$  the term of sequence 5,11,17,23,.....

**B) Solve the following sub questions.**

1. Find  $S_{10}$  if  $a=6$  and  $d=3$
2. 12,16,20,24.....Find 25<sup>th</sup> term of this A.P.
3. If  $t_n=2n-5$  is the  $n$ th term of an A.P., then find its first five terms.
4. Find the sum of three-digit natural numbers, which are divisible by 4.
5. Merry got a job with salary Rs.15000 per month. If her salary increases by Rs.100 per month, how much would be her salary after 20 months?
6. The  $n^{\text{th}}$  term of an A.P 5,8,11,14..... is 68. Find  $n=?$
7. What is the sum of an odd numbers between 1 to 50.
8. For an A.P.,  $t_4=12$  and its common difference  $d=-10$ , then find  $t_n$ .
9. Find 27th and  $n^{\text{th}}$  term of given A.P. 5,2,-1,-4.....
10. Find the first terms and common difference of an A.P. whose  $t_8=3$  and  $t_{12}=52$ .

• **Question for 4 marks**

**Solve the following sub questions.**

1. Sum of first 55 terms of an A.P. is 3300. Then find its 28<sup>th</sup> term.
2. Find the sum of numbers between 1 to 140, divisible by 4.
3. In a 'Mahila Bachat Gat', Sharvari invested Rs.2 on first day, Rs.4 on second day and Rs.6 on third day. If She saves like this, then what would be her total savings in the month of February 2010?
4. Find the sum of odd natural numbers from 1 to 101.
5. Shubhankar invested in a national savings certificate scheme. In the first year he invested Rs.500, in the second year Rs.700, in the third year Rs.900 and so on. Find the total amount that he invested in 12 years.
6. A merchant borrows Rs.1000 and agrees to repay its interest Rs.140 with principal in 12 monthly instalments. Each instalment being less than the preceding one by Rs.10. Find the amount of the first first instalment.
7. Find  $t_{21}$ , if  $S_{41} = 4510$  in an A.P.
8. In an A.P.  $t_{10}=57$  and  $t_{15}=87$  then find  $t_{21}$ .
9. If Rs.3900 will have to repay In 12 monthly instalments such that each instalment being more than the preceding one by Rs.10, then find the amount of the first and last instalment.
10. Find the next 4 terms of the sequence  $\frac{1}{6}$  ,  $\frac{1}{4}$  ,  $\frac{1}{3}$  also find  $S_n$ .