

## SOLUTIONS.

1. A.T.Q. - 3rd term =  $t_3 = 16 \Rightarrow a + (3-1)d = 16$   
 $\Rightarrow a + 2d = 16$  ——— ① and 7th term =  $t_7 = a + (7-1)d = a + 6d$   
 5th term =  $t_5 = a + (5-1)d = a + 4d$ .

Also, A.T.O. -  $t_7 - t_5 = 12$

$$a + 6d - (a + 4d) = 12$$

$$a + 6d - a - 4d = 12 \Rightarrow 2d = 12 \text{ or } d = 6 \checkmark \text{ ——— ②}$$

put in eq<sup>n</sup> ①  $\Rightarrow a + 2d = 16 \Rightarrow a + 2(6) = 16$

$$\Rightarrow a + 12 = 16 \checkmark$$

$$\Rightarrow a = 16 - 12 \Rightarrow a = 4$$

Now for A.P. when  $a = 4$ ;  $d = 6$

$$\therefore a, a+d, a+2d, a+3d, \dots$$

$$\therefore 4, (4+6), (4+2 \times 6), (4+3 \times 6), \dots$$

$$\therefore 4, 10, 16, 22, \dots$$

2.  $t_{20} = ?$  A.T.Q. -  $t_7 = t_{11} - 24$  ;  $a = 12 \checkmark$

$$\Rightarrow a + (7-1)d = a + (11-1)d - 24$$

$$\Rightarrow a + 6d = a + 10d - 24$$

$$\Rightarrow a - a + 6d - 10d = -24$$

$$\Rightarrow -4d = -24 \Rightarrow d = 6 \checkmark$$

Now,  $\therefore t_n = a + (n-1)d$

$$\therefore t_{20} = 12 + (20-1) \times 6 \Rightarrow 12 + 19 \times 6 \Rightarrow 12 + 114 = 126$$

$$\therefore t_{20} = 126 \checkmark$$

3.  $t_{31} = ?$  ;  $t_{11} = 38$  and  $t_6 = 73$ .

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

$$\therefore t_{11} = a + (11-1)d \Rightarrow t_{11} = a + 10d = 38$$

$$\text{i.e. } a + 10d = 38 \text{ ——— ①}$$

and  $t_6 = 73$

$$\text{i.e. } a + (6-1)d = 73$$

$$a + 5d = 73 \text{ ——— ②}$$

Solving ① and ②  $a + 10d = 38$

$$\begin{array}{r} a + 10d = 38 \\ -) \quad a + 5d = 73 \\ \hline 5d = -35 \end{array}$$

$$\therefore d = -7 \checkmark$$

put in eq<sup>n</sup> ①  $\Rightarrow a + 10d = 38$

$$a + 10(-7) = 38$$

$$a - 70 = 38$$

$$a = 38 + 70 = 108 \quad \therefore a = 108 \checkmark$$

$$\begin{aligned}
 \therefore t_{31} &= a + (n-1)d \\
 \therefore t_{31} &= 108 + (31-1)(-7) \\
 &= 108 + 30(-7) \\
 &= 108 - 210 \\
 \therefore t_{31} &= -102 \quad \checkmark
 \end{aligned}$$

4. Let the three numbers in A.P are -

$$\begin{aligned}
 &a-d, a, a+d \\
 \text{A.T.Q.} - &(a-d) + a + (a+d) = 3 \\
 &a-d+a+a+d = 3 \\
 &3a = 3 \Rightarrow a=1 \quad \checkmark
 \end{aligned}$$

$$\begin{aligned}
 \text{and } &(a-d)a(a+d) = -35 \\
 \Rightarrow &a(a-d)(a+d) = -35 \\
 \Rightarrow &a(a^2-d^2) = -35 \\
 \Rightarrow &1(1^2-d^2) = -35 \\
 &1-d^2 = -35 \\
 &-d^2 = -35-1 \\
 &d^2 = 36 \\
 &d = \sqrt{36} \\
 &d = \pm 6 \quad \checkmark
 \end{aligned}$$

When  $d=6$  and  $a=1$

$$\begin{aligned}
 \text{then numbers are: - } &a-d, a, a+d \\
 \text{i.e., } &1-6, 1, 1+6 \\
 \text{e, } &-5, 1, 7 \quad \checkmark
 \end{aligned}$$

and when  $d=-6$  and  $a=1$  then numbers are:-

$$\begin{aligned}
 &1-(-6), 1, 1+(-6) \\
 \text{i.e., } &1+6, 1, 1-6 \\
 \text{e, } &7, 1, -5 \quad \checkmark
 \end{aligned}$$

5. 2, 7, 12, - - - - - to 10 terms.

$$\therefore S_n = \frac{n}{2} [2a + (n-1)d] \quad ; a=2 ; d=7-2=5$$

$$\begin{aligned}
 \therefore S_{10} &= \frac{10}{2} [2 \times 2 + (10-1)5] \\
 &= 5 [4 + 9 \times 5] \\
 &= 5 [4 + 45] \\
 &= 5 \times 49 \\
 &= 245 \quad \checkmark
 \end{aligned}$$

$$6. \quad 34 + 32 + 30 + \dots + 10$$

$$\text{Here, } a=34, \quad d=32-34=-2; \quad l=10$$

$$\therefore l = a + (n-1)d$$

$$\therefore 10 = 34 + (n-1)(-2)$$

$$10 = 34 - (n-1) \times 2$$

$$10 = 34 - 2n + 2 \Rightarrow 10 = 36 - 2n \quad \checkmark$$

$$\Rightarrow 10 - 36 = -2n \Rightarrow -26 = -2n \text{ or } n = \frac{26}{2} \therefore n=13$$

$$\text{Now, } \therefore S_n = \frac{n}{2} [2a + (n-1)d]$$

$$\therefore S_{13} = \frac{13}{2} [2 \times 34 + (13-1)(-2)]$$

$$= \frac{13}{2} [68 + 12(-2)] \Rightarrow \frac{13}{2} [68 - 24]$$

$$\Rightarrow \frac{13}{2} \times 44 \Rightarrow S_{13} = 13 \times 22 = 286 \quad \checkmark$$

$$7. \quad \text{Given } a=5; \quad d=3, \quad t_n=50; \quad n=?; \quad S_n=?$$

$$\therefore a_n = t_n = a + (n-1)d$$

$$\therefore 50 = 5 + (n-1) \times 3 \Rightarrow 50 = 5 + 3n - 3$$

$$\Rightarrow 50 = 2 + 3n \text{ or } 50 - 2 = 3n \Rightarrow 3n = 48 \Rightarrow n = \frac{48}{3} = 16$$

$$\therefore n=16 \quad \checkmark$$

$$\text{Now, } \therefore S_n = \frac{n}{2} [2a + (n-1)d]$$

$$\therefore S_{16} = \frac{16}{2} [2 \times 5 + (16-1) \times 3]$$

$$= 8 [10 + 15 \times 3]$$

$$= 8 [10 + 45]$$

$$= 8 [55]$$

$$= 440$$

$$\therefore S_{16} = 440 \quad \checkmark$$