Class 10 Arithmetic progression CBSE Test Paper-1

Question: 1. Find the 16th term of the AP : 2, 7, 12, . . .

Solution: Here, a = 2, d = 7 – 2 = 5 and n = 16.

We have $a_n = a + (n - 1) d$

So, $a_{10} = 2 + (16 - 1) \times 5 = 2 + 75 = 77$

Therefore, the 16th term of the given AP is 47.

Question: 2. Which term of the AP : 21, 18, 15, . . . is – -75? Also, is any term 0? Give reason for your answer.

Solution : Here, a = 21, d = 18 – 21 = – 3 and an = – 75, and we have to find n.

As $a_n = a + (n - 1) d$,

we have – 81 = 21 + (n – 1)(– 3) $\Rightarrow$ – 75 = 24 – 3n $\Rightarrow$ 3n = 24 + 75 $\Rightarrow$ 3n = 99

So, n = 33 ; Therefore, the 33th term of the given AP is – 75.

Next, we want to know if there is any n for which an = 0. If such an n is there, then

21 + (n – 1) (–3) = 0 $\Rightarrow$ i.e., 3(n – 1) = 21 $\Rightarrow$ i.e., n = 8

So, the eighth term is 0.

Question: 3. Determine the AP whose 3rd term is 5 and the 7th term is 9.

Solution : We have, a3 =5 $\Rightarrow$ a + (3 – 1) d = a + 2d = 5 ---------(i)

and $a_7 = 9 \Rightarrow a + (7 - 1) d = a + 6d = 9$ ---------- (ii)

Solving the pair of linear equations (i) and (ii),

$\Rightarrow$ (a + 2d) – (a + 6d) = 5 -9 $\Rightarrow$ a + 2d – a - 6d = - 4 $\Rightarrow$ - 4d = - 4 $\Rightarrow$ d = 1

Put this value in eq. (i) a + 2x1 = 5 $\Rightarrow$ a = 5 – 2 = 3,

Hence, the required AP is 3, 4, 5, 6, 7, . . .

Question: 4. Check whether 202 is a term of the list of numbers 5, 11, 17, 23, . . .

Solution : We have : a = 5 and d = 6.

Let 202 is the nth term of this AP.

$\Rightarrow$ $a_n = a + (n - 1)\, d \Rightarrow 2\ 02 = 5 + (n - 1) \times 6 \Rightarrow 202 = 6n - 1$

So, $6n = 203 \Rightarrow n = \frac{203}{6} = 33.83$

But n cannot be fractional number so ,202 is not a term of the given AP

Question: 5. How many three-digit numbers are divisible by 3?

Solution: The list of three-digit numbers divisible by 3 is :

102, 105, 108 . . . 999

This an AP as common difference is 3 $\Rightarrow$ $a = 102$, $d = 3$, $an = 999$.

As $an = a + (n - 1)\, d$,

we have $999 = 102 + (n - 1) \times 3 \Rightarrow 999 - 102 = (n - 1) \times 3 \Rightarrow 897 = (n - 1) \times 3$

$\Rightarrow \frac{897}{3} = n - 1 \Rightarrow 299 = n - 1 \Rightarrow n = 299 + 1 = 300$

So, there are 300 three - digit numbers divisible by 3.

Question: 6. the fourth term of an A.P. is 11. The sum of the fifth and seventh terms of the A.P. is 34. Find its common difference.

Solution: Let the first term be a and the common difference be d

The fourth term of an A.P. is 11

$\Rightarrow a + 3d = 11$ ..... (i)

The sum of the fifth and seventh terms of the A.P. is 34

$\Rightarrow (a + 4d) + (a + 6d) = 34 \Rightarrow a + 5d = 17$ ..... (ii)

Solving (i) & (ii) you get $\Rightarrow a = 2, d = 3$

Question: 7. In an A.P., if the 12th term is –13 and the sum of its first four terms is 24, find the sum of its first ten terms.

Solution: Let the first term be a and the common difference be d

The 12th term is –13 $\Rightarrow$ a + 11d = – 13 ..... (i) ½ m

The sum of its first four terms is 24,

$\Rightarrow S_4 = 24 \Rightarrow 4/2[2a + (4 -1)d = 24 \Rightarrow 2[2a + 3d] = 24 \Rightarrow 2a + 3d = 12$ ..... (ii)

Solving (i) and (ii) a = 9, d = – 2

Thus $S_{10} = 10/2 [2 \times 9 + (10 - 1) \times (- 2)] = 5[18 – 18] = 0$

Question: 8. Find the middle term of the sequence formed by all three-digit numbers which leave a remainder 3, when divided by 4. Also find the sum of all numbers on both sides of the middle term separately.

Solution: The three digit number which leave remainder 3 when divided by 4 are

103, 107, 111, ------- , 999 $\Rightarrow$ a = 103, d = 4

$T_n = a + (n - 1) d \Rightarrow$ 999 = 103 + (n – 1) 4 $\Rightarrow$ n = 225

Therefore $\frac{225+1}{2}$ = 113th term is middle term

$T_n = a + (n - 1) d \Rightarrow$ Middle term = $T_{103} = 103 + 112 \times 4 = 551$

Sum of first 112 terms = $\frac{112}{2}$ [2 x 113 + 11 x 4] = 56 (226 + 111 x 4) = 36400

$T_{104} = 551 + 4 = 555$

Sum of last 112 terms =$\frac{112}{2}$ [(2 x 555 + 111 x 4) = 56[(1110 + 111 x 4) = 56 x 1554 = 87024

Question: 9. Find the Middle term of the AP: 6 , 13, 20, ---------, 216

Solution The given A.P. is 6, 13, 20, ---, 216

Let n be the number of terms, d = 7, a = 6 and $t_n = 216$

$\Rightarrow$ 216 = 6 + (n – 1) .7 $\Rightarrow$ n = 31

$\square$ Middle term is $\frac{31+1}{2}$ = 16th term

☐ $t_{16} = 6 + 15 \times 7 = 111$

Question: 10. If S_n , denotes the sum of first nth terms of an AP. ,

Show that $S_{12} = 3(S_8 - S_4)$

Solution Let a be the first term and d the common difference

$S_{12} = 6\,[2a + 11d] = 12a + 66d$

$S_8 = 4\,[2a + 7d] = 8a + 28d$

$S_4 = 2\,[2a + 3d] = 4a + 6d$

$3\,(S_8 - S_4) = 3\,(4a + 22d) = 12a + 66d = S_{12}$

Question: 11. Ramkali require Rs. 2500 after 12 weeks to send her daughter to school. She Saved Rs. 100 in the first week and increases her weekly saving by Rs. 20 every weeek . Find weather she will be able to send her daughter to school after 12 weeeks .

What value is generated in the above situation?.

Solution Money required for Ramkate for admission of daughter = S_{12} = Rs. 2500

A.P. formed by saving 100, 120, 140, ------- up to 12 terms

$S_{12} = \frac{12}{2}\,[2 \times 100 + 11x\ 20] = 6 \times 420 =$ Rs. 2520

☐ She can get her doughter admitied

Value : Small saving can fulfill your big desires or any else

Question: 12 Find the 60th term of the AP 8, 10, 12, ..., if it has a total of 60 terms and hence find the sum of its last 10 terms.

Solution a = 8 and d = 2 ; Now, $T_n = a + (n - 1)\,d \Rightarrow t_{60} = 8 + 59 \times 2 = 126$ sum of last 10 terms = $t_{51} + t_{52}$ ----- + t_{60}

$t_{51} = 8 + 50 \times 2 = 108$

Sum of last 10 terms = $\frac{10}{2}$ [108 x 2 + 9 x 2]

= 5[216 + 18] = 234 x 5 = 1170

Question: 13. Find the 11th term from the last term (towards the first term) of the AP: 10, 7, 4, . (-71) .

Solution: a = -71; d = 3 and n = 11$\Rightarrow t_n = a + (n - 1)d$

$\Rightarrow t_{11} = -71 + 10 \times 3 = -71 + 30 = -41$

Prove that $S_n - S_{n-1} = t_n$