

**Example 70** Find the sum of first 22 terms of an AP in which  $d = 7$  and 22nd term is 149.

**Solution.** Given :  $a_{22} = 149$

$$\Rightarrow a + 21d = 149 \quad \Rightarrow a + 21 \times 7 = 149 \quad \Rightarrow a = 149 - 147 = 2$$

$$\Rightarrow S_{22} = \frac{22}{2} [a + a_{22}] = 11 [2 + 149] = 11 \times 151 = 1661.$$

**Example 71** If the 10th term of an AP is 47 and its first term is 2, find the sum of its first 15 terms. [CBSE Sample Paper 2008]

**Solution.** Here,  $a_{10} = a + 9d = 47$  and  $a = 2$

$$\Rightarrow 2 + 9d = 47 \quad \Rightarrow 9d = 45 \quad \Rightarrow d = 5$$

$$\therefore S_{15} = \frac{15}{2} [2a + (15-1)d] = \frac{15}{2} [2 \times 2 + 14 \times 5] = \frac{15}{2} \times 74 = 15 \times 37 = 555.$$

**Example 72** Find the sum of first 51 terms of an AP whose second and third terms are 14 and 18 respectively.

**Solution.** Given :  $a_2 = 14 \quad \Rightarrow a + d = 14$

$$a_3 = 18 \quad \Rightarrow a + 2d = 18 \quad \Rightarrow d = 4 \quad \text{[By subtraction]}$$

Putting  $d = 4$ ,  $a + 4 = 14 \quad \Rightarrow a = 10$

$$\therefore S_{51} = \frac{51}{2} [2a + (51-1)d] = \frac{51}{2} [2 \times 10 + 50 \times 4] = \frac{51}{2} [20 + 200] = \frac{51}{2} \times 220 = 51 \times 110 = 5610.$$

**Example 73** If the sum of 7 terms of an AP is 49 and that of 17 terms is 289, find the sum of  $n$  terms. [CBSE D 13]

**Solution.** Let  $a$  be the first term and  $d$  the common difference of the given AP. Then,

$$S_7 = \frac{7}{2} [2a + (7-1)d] = 49 \quad \dots(1)$$

or  $7a + 21d = 49$  or  $a + 3d = 7$

Also,  $S_{17} = \frac{17}{2} [2a + (17-1)d] = 289 \quad \dots(2)$

$$17a + 136d = 289 \quad \text{or} \quad a + 8d = 17$$

Subtracting (1) from (2), we get,  $-5d = -10$  or  $d = 2$

Putting  $d = 2$  in (1), we get,  $a = 7 - 3 \times 2 = 1$

$$\therefore S_n = \frac{n}{2} [2a + (n-1)d] = \frac{n}{2} [2 \times 1 + (n-1)2] = n + n(n-1) = n + n^2 - n = n^2.$$

95 **Example 59** The first term of an AP is 5, the last term is 45 and the sum is 400. Find the number of terms and the common difference. 2814  
[NCERT]

**Solution.** Here,  $a = 5$ ,  $l = a_n = 45$ ,  $S_n = 400$

$$\therefore S_n = \frac{n}{2}[a+l] \Rightarrow 400 = \frac{n}{2}[5+45] = 25n \Rightarrow n = \frac{400}{25} = 16$$

Also,  $a_n = 45$

$$\Rightarrow a + (n-1)d = 45 \Rightarrow 5 + (16-1)d = 45$$

$[\because a = 5, n = 16]$

$$15d = 45 - 5 = 40$$

$$\Rightarrow d = \frac{40}{15} = \frac{8}{3} = 2\frac{2}{3}$$

Hence, number of terms  $n = 16$  and the common difference,  $d = 2\frac{2}{3}$ .

96 **Example 60** The first and the last terms of an AP are 17 and 350 respectively. If the common difference is 9, how many terms are there and what is their sum? [CBSE OD 11]

**Solution.** Here,  $a = 17$ ,  $a_n = l = 350$ ,  $d = 9$

$$a_n = 350 \Rightarrow a + (n-1)d = 350 \Rightarrow 17 + (n-1) \times 9 = 350$$

$$\Rightarrow 9n - 9 = 350 - 17 = 333 \quad \text{or} \quad 9n = 333 + 9 = 342$$

$$\therefore n = 38$$

$$\therefore S_{38} = \frac{n}{2}[a+l] = \frac{38}{2}[17+350] = 19 \times 367 = 6973.$$