DAY 6

1. Find the sum of 24 terms of the list of numbers whose n^{th} term is $3 + 2n$

[Example 15]

Sol :- Given $a_n = 3 + 2n$

For $n = 1, a_1 = 3 + 2 \times \mathbf{1} = 3 + 2 = 5$

$n = \mathbf{2},\ a_2 = 3 + 2 \times \mathbf{2} = 3 + 4 = 7$

$n = \mathbf{3}, a_3 = 3 + 2 \times \mathbf{3} = 3 + 6 = 9$

$\therefore$ AP is 5,7,9, ...with $a = 5, d = 7 - 5 = 2$ and $n = 24$

we know $S_n = \frac{n}{2}\{2a + (n-1)d\}$

$$S_{24} = \frac{24}{2}\{2 \times 5 + (24-1)2\} = 12 \times \{10 + 23 \times 2\}$$

$$= 12 \times \{10 + 46\} = 12 \times 56 = 672$$

2. Find the sum of 35 terms of the list of numbers whose n^{th} term is $5n - 4$

Sol :- Given $a_n = 5n - 4$

For $n = 1, a_1 = 5 \times \mathbf{1} - 4 = 5 - 4 = 1$

$n = \mathbf{2},\ a_2 = 5 \times \mathbf{2} - 4 = 10 - 4 = 6$

$n = \mathbf{3}, a_3 = 5 \times \mathbf{3} - 4 = 15 - 4 = 11$

$\therefore$ AP is 1,6,11, ...with $a = 1, d = 6 - 1 = 5$ and $n = 35$

we know $S_n = \frac{n}{2}\{2a + (n-1)d\}$

$$S_{35} = \frac{35}{2}\{2 \times 1 + (35-1)5\} = \frac{35}{2}\{2 + 34 \times 5\}$$

$$= \frac{35}{2}\{2 + 170\} = \frac{35}{2} \times 172 = 35 \times 86 = 3010$$

3. Find the sum of first 51 terms of an AP whose second term and third terms are 14 and 18 respectively. **[Ex 5.3, Q 8]**

Sol:- Given: 2nd term = 14 $\Rightarrow a + d = 14$ ... ... i)

3rd term = 18 $\Rightarrow a + 2d = 18$ ... ... ii)

Subtracting i) from ii), we get

$(a + 2d) - (a + d) = 18 - 14$

$\Rightarrow a + 2d - a - d = 4 \quad \Rightarrow d = 4$

Put value of d in i), we get

i) $\Rightarrow a + \mathbf{d} = 14 \quad \Rightarrow a + \mathbf{4} = 14 \quad \Rightarrow a = 14 - 4 = 10$

Now $S_n = \frac{n}{2}\{2a + (n-1)d\}$

$$S_{51} = \frac{51}{2}\{2 \times 10 + (51-1)4\} = \frac{51}{2}\{20 + 50 \times 4\}$$

$$= \frac{51}{2}\{20 + 200\} = \frac{51}{2} \times 220 = 51 \times 110 = 5610$$

4. In an AP: given $a = 5, d = 3, a_n = 50$, find n and S_n. [Ex. 5.3 Q3 i)]

Sol :- Here $a = 5, d = 3$ and $l = a_n = 50$

$\Rightarrow a + (n-1)d = 50 \qquad \Rightarrow 5 + (n-1)3 = 50$

$\Rightarrow (n-1)3 = 50 - 5 = 45 \qquad \Rightarrow n - 1 = \frac{45}{3} = 15$

$\Rightarrow n = 15 + 1 = 16$

So in given AP, there are **16** terms.

Now $S_n = \frac{n}{2}\{a + l\}$

$S_{16} = \frac{16}{2}\{5 + 50\} = 8 \times 55 = 440$

5. In an AP: given $a_3 = 15$, $S_{10} = 125$, Find their common difference and 10th term. [Ex. 5.3Q3 iv)]

Sol :- Given $a_3 = 15 \qquad \Rightarrow a + 2d = 15$.....i)

and $S_{10} = 120 \qquad \Rightarrow \frac{10}{2}(2a + 9d) = 125$

$\Rightarrow \quad 5(2a + 9d) = 125 \quad \Rightarrow \quad (2a + 9d) = \frac{125}{5} = 25$..... ii)

Multiplying i) by 2 and subtract from ii), we get

$(2a + 9d) - (2a + 4d) = 25 - 30 \quad \Rightarrow 5d = -5 \quad \Rightarrow d = \frac{-5}{5} = -1$

Replace this value in i) we get

i) $\Rightarrow \quad a + 2(-1) = 15 \qquad \Rightarrow a = 15 + 2 = 17$

Now $a_{10} = a + 9d = 17 + 9(-1) = 17 - 9 = 8$

Thus $d = -1$ **&** $a_{10} = 8$ are required answers

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EXERCISE

1. Ex 5.2, Q 3,5,6,7,9,10