

MATHEMATICS Chapter-5

Arithmetic Progression

EXERCISE 5.3

12. Find the sum of the first 40 positive integers divisible by 6.

Soln:- The first 40 positive integers divisible by 6 are 6, 12, 18, 24

Here

$$\Rightarrow a_2 - a_1 = 12 - 6 = 6$$

$$\Rightarrow a_3 - a_2 = 18 - 12 = 6$$

$$\Rightarrow a_4 - a_3 = 24 - 18 = 6$$

i.e. $a_{k+1} - a_k$ is the same every time

So, the above list of numbers from an AP

$$a = 6 \quad d = 6 \quad n = 40$$

$\therefore$ Sum of the first 40 positive integers

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

$$S_{40} =$$

$$S_n = \frac{40}{2} [2 \times a + (40-1)d]$$

$$= 20 (2a + 39d)$$

$$= (20) (2 \times 6 + 39 \times 6)$$

$$= (20) (12 + 234)$$

$$= (20) (246)$$

$$= 4920$$

13. Find the sum of the first 15 multiples of 8.

Soln:- The first 15 multiple of 8 are

8, 16, 24, 32.....

Here

$$\Rightarrow a_2 - a_1 = 16 - 8 = 8$$

$$\Rightarrow a_3 - a_2 = 24 - 16 = 8$$

$$\Rightarrow a_4 - a_3 = 32 - 24 = 8$$

i.e. $a_{k+1} - a_k$ is the same every time

So, the above list of numbers from an AP

Here

$$a = 8 \quad d = 8 \quad n = 15$$

$\therefore$ Sum of the first 15 multiples of 8

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

$$S_{15} =$$

$$S_n = \frac{15}{2} [2 \times a + (15-1)d]$$

$$= \frac{15}{2} [2a + 14d]$$

$$= 15(a + 7d)$$

$$= 15 (8 + 7 \times 8)$$

$$= (15) (8 + 56)$$

$$= (15) (64)$$

$$= 960$$

14. Find the sum of the odd numbers between 0 and 50.

Soln:- The odd numbers between 0 and 50 are 1, 3, 5, 7.....49

Here

$$\Rightarrow a_2 - a_1 = 3 - 1 = 2$$

$$\Rightarrow a_3 - a_2 = 5 - 3 = 2$$

$$\Rightarrow a_4 - a_3 = 7 - 5 = 2$$

i.e. $a_{k+1} - a_k$ is the same every time

So, the above list of numbers from an AP

Here

$$a = 1 \quad d = 2 \quad l = 49$$

Let the number of term of the AP be n

Then, $l = a + (n-1)d$

$$49 = 1 + (n-1)2$$

$$49 - 1 = (n-1)2$$

$$(n-1)2 = 48$$

$$n-1 = 48/2$$

$$n-1 = 24$$

$$n = 24 + 1$$

$$n = 25$$

Hence the number of term of the AP be 25

$\therefore$ Sum of the odd numbers between 0 and 50

S_{25}

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

$$= \frac{25}{2} (1 + 49)$$

$$= \frac{25}{2} (50)$$

$$= 25(25)$$

$$= 625$$

15. A contract on construction job specifies a penalty for delay of completion beyond a certain date as follows: Rs 200 for the first day, Rs 250 for the second day, Rs 300 for the third day, etc., the penalty for each succeeding day being Rs 50 more than for the preceding day. How much money the contractor has to pay as penalty, if he has delayed the work by 30 days?

Soln:- Since the penalty for each Succeeding day is Rs. 50 more than the preceding day, therefore, the penalties for the first day, the 3rd day etc, will from an AP

Let us denote the penalty for the nth day by an then

$$a_1 = \text{Rs } 200$$

$$a_2 = \text{Rs } 250$$

$$a_3 = \text{Rs } 300$$

Here

$$a = \text{Rs } 200$$

$$d = a_2 - a_1$$

$$= \text{Rs } 250 - \text{Rs } 200 = \text{Rs } 50$$

$$n = 30$$

The money the contractor has to pay penalty. If he has delayed the work by 30 days

(Contd....)