

MATHEMATICS Chapter-5

Arithmetic Progression

(6) Which term of the AP : 21, 18, 15, ... is - 81?
Also, is any term 0? Give reason for your answer.

Soln:- Here, $a = 21$, $d = 18 - 21 = -3$ and

$$a_n = -81, \text{ and we have to find } n.$$

$$\text{As } a_n = a + (n-1)d,$$

$$\text{we have } -81 = 21 + (n-1)(-3)$$

$$-81 = 24 - 3n$$

$$-105 = -3n$$

$$\text{So, } n = 35$$

Therefore, the 35th term of the given AP is - 81.

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

$$21 + (n-1)(-3) = 0,$$

$$\text{i.e., } 3(n-1) = 21$$

$$\text{i.e., } n = 8$$

So, the eighth term is 0.

(7) Determine the AP whose 3rd term is 5 and the 7th term is 9.

Soln : We have

$$a_3 = a + (3-1)d = a + 2d = 5 \dots\dots\dots(1)$$

$$\text{and } a_7 = a + (7-1)d = a + 6d = 9 \dots\dots\dots(2)$$

Solving the pair of linear equations (1) and (2), we get $a = 3$, $d = 1$

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

(8) How many two-digit numbers are divisible by 3?

Soln : The list of two-digit numbers divisible by 3 is : 12, 15, 18, ..., 99. Is this an AP? Yes it is.

Here, $a = 12$, $d = 3$, $a_n = 99$.

$$\text{As } a_n = a + (n-1)d,$$

$$\text{we have } 99 = 12 + (n-1) \times 3$$

$$\text{i.e., } 87 = (n-1) \times 3$$

$$\text{i.e., } n-1 = 87/3 = 29$$

$$\text{i.e., } n = 29 + 1 = 30$$

So, there are 30 two-digit numbers divisible by 3.

(9) Find the 11th term from the last term (towards the first term) of the AP: 10, 7, 4, ..., - 62.

Soln : Here, $a = 10$, $d = 7 - 10 = -3$, $l = -62$,

$$\text{where } l = a + (n-1)d$$

To find the 11th term from the last term, we will find the total number of terms in the AP.

$$\text{So, } -62 = 10 + (n-1)(-3)$$

$$\text{i.e., } -72 = (n-1)(-3)$$

$$\text{i.e., } n-1 = 24$$

$$\text{or } n = 25$$

So, there are 25 terms in the given AP.

The 11th term from the last term will be the 15th term

$$\text{So, } a_{15} = 10 + (15-1)(-3)$$

$$= 10 - 42$$

$$= -32$$

i.e., the 11th term from the last term is - 32.

10) A sum of Rs 1000 is invested at 8% simple interest per year. Calculate the interest at the end of each year. Do these interests form an AP? If so, find the interest at the end of 30 years

making use of this fact.

Soln : We know that the formula to calculate simple interest is given by

$$\text{Simple I Interest} = \frac{PRT}{100}$$

So, the interest at the end of the 1st year =

$$\text{Rs } \frac{1000 \times 8 \times 1}{100} = \text{Rs. } 80$$

the interest at the end of the 2nd year =

$$\text{Rs } \frac{1000 \times 8 \times 2}{100} = \text{Rs. } 160$$

the interest at the end of the 3rd year =

$$\text{Rs } \frac{1000 \times 8 \times 3}{100} = \text{Rs. } 240$$

Similarly, we can obtain the interest at the end of the 4th year, 5th year, and so on.

So, the interest (in `) at the end of the 1st, 2nd, 3rd, ... years, respectively are 80, 160, 240, ...

It is an AP as the difference between the consecutive terms in the list is 80, i.e.,

$$d = 80. \text{ Also, } a = 80.$$

So, to find the interest at the end of 30 years, we shall find a_{30} .

Now,

$$a_{30} = a + (30-1)d$$

$$= 80 + 29 \times 80$$

$$= 2400$$

So, the interest at the end of 30 years will be

$$\text{Rs. } 2400.$$

11) In a flower bed, there are 23 rose plants in the first row, 21 in the second, 19 in the third, and so on. There are 5 rose plants in the last row. How many rows are there in the flower bed?

Soln : The number of rose plants in the 1st, 2nd, 3rd, ... rows are : 23, 21, 19, ..., 5

It forms an AP. Let the number of rows in the flower bed be n .

$$\text{Then } a = 23, d = 21 - 23 = -2, a_n = 5$$

$$\text{As, } a_n = a + (n-1)d$$

$$\text{We have, } 5 = 23 + (n-1)(-2)$$

$$\text{i.e., } -18 = (n-1)(-2)$$

$$\text{i.e., } n = 10$$

So, there are 10 rows in the flower bed.

Exercise- 5.2

1. Fill in the blanks in the following table, given that a is the first term, d the common difference and a_n the n th term of the AP:

	a	d	n	a_n
(i)	7	3	8	.....
(ii)	- 18	.....	10	0
(iii)	.....	- 3	18	- 5
(iv)	- 18.9	2.5	.....	3.6
(v)	3.5	0	105	.....

(Contd.....)