MATHEMATICS Chapter–1

Arithmetic Progression

EXERCISE 5.2

14) How many multiples of 4 lie between 10 and 250?

Soln:- **(…….contd)**

i.e., $a_{n+1} - a_n$ is the same for n = 1, 2, 3 etc

the above list of numbers froms an an A.P with first term a = 12 and common difference d = 4

Last term (l) = 248

Let there be n terms in this AP.

$$Then \quad nth \ term = l$$

$$a + (n-1)d = 248$$

$$12 + (n-1)(4) = 248$$

$$(n-1)4 = 248 - 12$$

$$(n-1)4 = 236$$

$$(n-1) = \frac{236}{4}$$

$$(n-1) = 59$$

$$n = 59 + 1 = 60$$

Hence, 60 multiples of 4 lie between 10 and 250

(15) For what value of *n*, are the *n*th terms of two APs: 63, 65, 67, . . . and 3, 10, 17, . . . equal?

Soln:-

First APs

63, 65, 67……

Here a = 63

d = 65-63=2

nth term = 63 + (n-1)2

$$(\because a_n = a + (n-1)d)$$

Second APs

3, 10, 17……

Here a = 3

d = 3 – 10 = 7

nth term = 3 + (n-1)7

$$(\because a_n = a + (n-1)d)$$

If the nth term of the two APs are equal, then

63 + (n - 1)2 = 3 + (n - 1) 7

(n-1)2- (n-1)7 = -60

(n-1)(-5) = -60

(n-1) = -60/-5

n-1 = 12

n= 12+1 = 13

Hence, for n= 13, the n^{th} term of the two APs are equal

(16) Determine the AP whose third term is 16 and the 7th term exceeds the 5th term by 12.

Soln: Let the first term and the common difference of AP be a and d respectively.

Then 3rd term = 16

Let the first term and the common difference of AP be *a* and *d* respectively.

Then 3rd term = 16

$a + (3 - 1)d = 16$

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

a + 2d = 16..... (1)

and 7^{th} term = 5^{th} term +12

$a + (7 - 1)d = a + (5-1)d + 12$

$= a + 6d = a + 4d + 12$

$= 6d - 4d = 12$

$= 2d = 12$

d = 12/2 = 6

put d = 6 in (…..1)

We get

$a + 2(6) = 16$

$a + 12 = 16$

$a = 16 - 12 = 4$

Hence the required AP is 4, 4+6, 4+6+6, 4+6+6+6.....

i.e 4, 10, 16, 22.....

17. Find the 20th term from the last term of the AP : 3, 8, 13, . . ., 253.

Soln:-

The given AP is 3, 8, 13.....253

a = 3 and common difference d = 5

Last term (l) = 253

Let the number of terms of the AP be n.

Term nth term =l

$$Then \quad nth \ term = l$$

$$3 + (n-1)5 = 253$$

$$(n-1)(5) = 253 - 3$$

$$(n-1)5 = 250$$

$$(n-1) = \frac{250}{5}$$

$$(n-1) = 50$$

$$n = 50 + 1$$

$$n = 51$$

So, there are 51 term in the given A P

Now 20^{th} term from the last term

= (51-20+1)th term from the beginning

= 32^{nd} term from the beginning

$= 3 + (32 - 1)5 \quad (\because a_n = a + (n-1)d)$

= 3+155= 158

Hence the 20^{th} term from the last term of the given AP is 158

18. The sum of the 4th and 8th terms of an AP is 24 and the sum of the 6th and 10th terms is 44. Find the first three terms of the AP.

Ans:- Let the first term and the common difference of AP be *a* and *d* respectively.

Then 4rd term = $a + (4 - 1)d = a + 3d$

$$(\because a_n = a + (n-1)d)$$

8^{th} term = $a + (8- 1)d = a+7d$

$$(\because a_n = a + (n-1)d)$$

6^{th} term = $a + (6- 1)d = a+5d$

$$(\because a_n = a + (n-1)d)$$

10^{th} term = $a + (10- 1)d = a+9d$

$$(\because a_n = a + (n-1)d)$$

According to the question

4^{th} term + 8^{th} term = 24

$= (a + 3d) + (a + 7d) = 24$

$2a + 10d = 24$

$a + 5d = 12$.....(1)

(Dividing throught by 2)

And 6^{th} term + 10^{th} term = 44

$(a+5d) + (a+9d) = 44$

$2a + 14d = 44$

$a + 7d = 22$.....(2)

(Dividing throught by 2)

(Contd……..)