Arithmetic Progressions Ex 9.3 Q23

Answer :

In the given problem, we have an A.P. which consists of n terms.

Here,

The first term $(a) = a$

The last term $(a_n) = l$

Now, as we know,

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

So, for the m^{th} term from the beginning, we take $(n = m)$,

$$a_m = a + (m-1)d$$
$$= a + md - d \qquad ......(1)$$

Similarly, for the m^{th} term from the end, we can take l as the first term.

So, we get,

$$a_{m'} = l - (m-1)d$$
$$= l - md + d \qquad ......(2)$$

Now, we need to prove $a_m + a_{m'} = a + l$

So, adding (1) and (2), we get,

$$a_m + a_{m'} = (a + md - d) + (l - md + d)$$
$$= a + md - d + l - md + d$$
$$= a + l$$

Therefore, $\boxed{a_m + a_{m'} = a + l}$

Hence proved

Arithmetic Progressions Ex 9.3 Q24

Answer :

Here, let us take the first term of the A.P as a and the common difference of the A.P as d

Now, as we know,

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

So, for 3^{rd} term $(n = 3)$,

$$a_3 = a + (3-1)d$$
$$16 = a + 2d$$
$$a = 16 - 2d \qquad ......(1)$$

Also, for 5^{th} term $(n = 5)$,

$$a_5 = a + (5-1)d$$
$$= a + 4d$$

For 7^{th} term $(n = 7)$,

$$a_7 = a + (7-1)d$$
$$= a + 6d$$

Now, we are given,

$$a_7 = 12 + a_5$$
$$a + 6d = 12 + a + 4d$$
$$6d - 4d = 12$$
$$2d = 12$$
$$d = 6$$

Substituting the value of d in (1), we get,

$$a = 16 - 2(6)$$
$$= 16 - 12$$
$$= 4$$

So, the first term is 4 and the common difference is 6.

Therefore, the A.P. is $\boxed{4, 10, 16, 22, \ldots}$

Arithmetic Progressions Ex 9.3 Q25

Answer :

Here, let us take the first term of the A.P. as a and the common difference of the A.P as d

Now, as we know,

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

So, for 7th term (n = 7),

$$a_7 = a + (7-1)d$$
$$32 = a + 6d \qquad \ldots\ldots(1)$$

Also, for 13th term (n = 13),

$$a_{13} = a + (13-1)d$$
$$62 = a + 12d \qquad \ldots\ldots(2)$$

Now, on subtracting (2) from (1), we get,

$$62 - 32 = (a + 12d) - (a + 6d)$$
$$30 = a + 12d - a - 6d$$
$$30 = 6d$$
$$d = \frac{30}{6}$$
$$d = 5$$

Substituting the value of d in (1), we get,

$$32 = a + 6(5)$$
$$32 = a + 30$$
$$a = 32 - 30$$
$$a = 2$$

So, the first term is 2 and the common difference is 5.

Therefore, the A.P. is $\boxed{2, 7, 12, 27, \ldots}$

*********** END **********