Arithmetic Progressions Ex 9.3 Q8

Answer :

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

We are given that 10 times the 10^{th} term is equal to 15 times the 15^{th} term. We need to show that 25^{th} term is zero.

So, let us first find the two terms.

So, as we know,

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

For 10^{th} term (n = 10),

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

For 15^{th} term (n = 15),

$$a_{15} = a + (15-1)d$$
$$= a + 14d$$

Now, we are given,

$$10(a + 9d) = 15(a + 14d)$$

Solving this, we get,

$$10a + 90d = 15a + 210d$$
$$90d - 210d = 15a - 10a$$
$$-120d = 5a$$
$$-24d = a \quad \ldots\ldots(1)$$

Next, we need to prove that the 25^{th} term of the A.P. is zero. For that, let us find the 25^{th} term using n = 25,

$$a_{25} = a + (25-1)d$$
$$= -24d + 24d \quad (\text{Using } 1)$$
$$= 0$$

Thus, the 25^{th} term of the given A.P. is zero.

Hence proved

Arithmetic Progressions Ex 9.3 Q9

Answer :

In the given problem, we are given 10^{th} and 18^{th} term of an A.P.
We need to find the 26^{th} term
Here,

$a_{10} = 41$

$a_{18} = 73$

Now, we will find a_{10} and a_{18} using the formula $a_n = a + (n-1)d$
So,

$a_{10} = a + (10-1)d$

$41 = a + 9d$ ..... (1)

Also,

$a_{18} = a + (18-1)d$

$73 = a + 17d$ .....(2)

So, to solve for *a* and *d*
On subtracting (1) from (2), we get

$8d = 32$

$d = \frac{32}{8}$

$d = 4$

Substituting *d*=4 in (1), we get

$41 = a + 9(4)$

$41 - 36 = a$

$a = 5$

Thus,

$a = 5$

$d = 4$

$n = 26$

Substituting the above values in the formula, $a_n = a + (n-1)d$

$a_{26} = 5 + (26-1)4$

$a_{26} = 5 + 100$

$a_{26} = 105$

Therefore, $\boxed{a_{26} = 105}$

Arithmetic Progressions Ex 9.3 Q10

Answer :

Here, we are given that 24th term is twice the 10th term, for a certain A.P. Here, let us take the first term of the A.P. as *a* and the common difference as *d*

We have to prove that $a_{72} = 2a_{34}$

So, let us first find the two terms.

As we know,

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

For 10th term (n = 10),

$a_{10} = a + (10-1)d$

$= a + 9d$

For 24th term (n = 24),

$a_{24} = a + (24-1)d$

$= a + 23d$

Now, we are given that $a_{24} = 2a_{10}$

So, we get,

$$a + 23d = 2(a + 9d)$$

$$a + 23d = 2a + 18d$$

$$23d - 18d = 2a - a$$

$$5d = a \quad \ldots\ldots (1)$$

Further, we need to prove that the 72nd term is twice of 34th term. So let now find these two terms,

For 34th term (n = 34),

$a_{34} = a + (34-1)d$

$= 5d + 33d$ (Using 1)

$= 38d$

For 72nd term (n = 72),

$a_{72} = a + (72-1)d$

$= 5d + 71d$ (Using 1)

$= 76d$

$= 2(38d)$

Therefore, $\boxed{a_{72} = 2a_{34}}$

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