



Arithmetic Progressions Ex 9.2 Q2

Answer :

In the given problem, we are given its first term (a) and common difference (d).

We need to find the A.P

(i) $a = 4$, $d = -3$

Now, as $a = 4$

A.P would be represented by $a, a_1, a_2, a_3, a_4, \dots$

So,

$$a_1 = a + d$$

$$a_1 = 4 + (-3)$$

$$a_1 = 1$$

Similarly,

$$a_2 = a_1 + d$$

$$a_2 = 1 + (-3)$$

$$a_2 = -2$$

Also,

$$a_3 = a_2 + d$$

$$a_3 = -2 + (-3)$$

$$a_3 = -5$$

Further,

$$a_4 = a_3 + d$$

$$a_4 = -5 + (-3)$$

$$a_4 = -8$$

Therefore, A.P with $a = 4$ and $d = -3$ is $\boxed{4, 1, -2, -5, -8, \dots}$

(ii) $a = -1$, $d = \frac{1}{2}$

Now, as $a = -1$

A.P would be represented by $a, a_1, a_2, a_3, a_4, \dots$

So,

$$a_1 = a + d$$

$$a_1 = -1 + \left(\frac{1}{2}\right)$$

$$a_1 = \frac{-2+1}{2}$$

$$a_1 = \frac{-1}{2}$$

Similarly,

$$a_2 = a_1 + d$$

$$a_2 = \frac{-1}{2} + \left(\frac{1}{2}\right)$$

$$a_2 = 0$$

Also,

$$a_3 = a_2 + d$$

$$a_3 = 0 + \left(\frac{1}{2}\right)$$

$$a_3 = \frac{1}{2}$$

Further,

$$a_4 = a_3 + d$$

$$a_4 = \left(\frac{1}{2}\right) + \left(\frac{1}{2}\right)$$

$$a_4 = \frac{2}{2}$$

$$a_4 = 1$$

Therefore, A.P with $a = 4$ and $d = -3$ is $\boxed{-1, \frac{-1}{2}, 0, \frac{1}{2}, 1, \dots}$

(iii) $a = -1.5$, $d = -0.5$

Now, as $a = -1.5$

A.P would be represented by $a, a_1, a_2, a_3, a_4, \dots$

So,

$$a_1 = a + d$$

$$a_1 = -1.5 + (-0.5)$$

$$a_1 = -2$$

Similarly,

$$a_2 = a_1 + d$$

$$a_2 = -2 + (-0.5)$$

$$a_2 = -2.5$$

Also,

$$a_3 = a_2 + d$$

$$a_3 = -2.5 + (-0.5)$$

$$a_3 = -3$$

Further,

$$a_4 = a_3 + d$$

$$a_4 = -3 + (-0.5)$$

$$a_4 = -3.5$$

Therefore, A.P with $a = 4$ and $d = -3$ is $\boxed{-1.5, -2, -2.5, -3, -3.5, \dots}$

Arithmetic Progressions Ex 9.2 Q3

Answer :

(i) In the given problem,

Cost of digging a well for the first meter = Rs 150

Cost of digging a well for subsequent meter is increased by Rs 20

So,

Cost of digging a well of depth one meter= Rs. 150

Cost of digging a well of depth two meters= Rs $150 + 20$ = Rs. 170

Cost of digging a well of depth three meters= Rs $150 + 20 + 20$ = Rs. 190

Cost of digging a well of depth four meters = Rs $150 + 20 + 20 + 20$ = Rs. 210

Thus, the costs of digging a well of different depths are 150, 170, 190, 210, ..

Now, for a sequence to be an A.P., the difference between adjacent terms should be equal.

Here,

$$\begin{aligned}a_1 - a &= 170 - 150 \\ &= 20\end{aligned}$$

Also,

$$\begin{aligned}a_2 - a_1 &= 190 - 170 \\ &= 20\end{aligned}$$

Therefore, $a_1 - a = a_2 - a_1$

Since the terms of the sequence are at a common difference of 20, the above sequence is an A.P.

with the first term as $[a = 150]$ and common difference $[d = 20]$.

(ii) Here, let us take the initial amount of air present in the cylinder as 100 units.

So,

$$\begin{aligned}\text{Amount left after vacuum pump removes air for 1}^{\text{st}} \text{ time} &= 100 - \left(\frac{1}{4}\right)100 \\ &= 100 - 25 \\ &= 75\end{aligned}$$

$$\begin{aligned}\text{Amount left after vacuum pump removes air for 2}^{\text{nd}} \text{ time} &= 75 - \left(\frac{1}{4}\right)75 \\ &= 75 - 18.75 \\ &= 56.25\end{aligned}$$

$$\begin{aligned}\text{Amount left after vacuum pump removes air for 3}^{\text{rd}} \text{ time} &= 56.25 - \left(\frac{1}{4}\right)56.25 \\ &= 56.25 - 14.06 \\ &= 42.19\end{aligned}$$

Thus, the amount left in the cylinder at various stages is 100, 75, 56.25, 42.19, ..

Now, for a sequence to be an A.P., the difference between adjacent terms should be equal.

Here,

$$\begin{aligned}a_1 - a &= 75 - 100 \\ &= -25\end{aligned}$$

Also,

$$\begin{aligned}a_2 - a_1 &= 56.25 - 75 \\ &= -18.75\end{aligned}$$

Since, $a_1 - a \neq a_2 - a_1$

The sequence is not an A.P.

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