Arithmetic Progressions Ex 9.3 Q2

Answer :

In the given problem, we are given an A.P and the value of one of its term.

We need to find which term it is (n)

So here we will find the value of n using the formula, $a_n = a + (n-1)d$

(i) Here, A.P is $3, 8, 13, ...$

$a_n = 248$

$a = 3$

Now,

Common difference (d) = $a_1 - a$

$= 8 - 3$

= 5

Thus, using the above mentioned formula

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

$248 = 3 + (n-1)5$

$248 - 3 = 5n - 5$

$245 + 5 = 5n$

$n = \frac{250}{5}$

$n = 50$

Thus, $n = 50$

Therefore 248 is the $\boxed{50^{th} \text{ term}}$ of the given A.P

(ii) Here, A.P is $84,80,76,....$

$a_n = 0$

$a = 84$

Now,

Common difference (d) = $a_1 - a$

=80-84

= -4

Thus, using the above mentioned formula

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

$0 = 84 + (n-1)(-4)$

$0 = 84 - 4n + 4$

$0 = 88 - 4n$

$4n = 88$

On further simplifying, we get,

$n = \frac{88}{4}$

$n = 22$

Thus, $n = 22$

Therefore 84 is the $\boxed{22^{nd} \text{ term}}$ of the given A.P

(iii) Here, A.P is $4,9,14,....$

$a_n = 254$

$a = 4$

Now,

Common difference (d) = $a_1 - a$

= 9-4

= 5

Thus, using the above mentioned formula

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

$254 = 4 + (n-1)5$

$254 - 4 = 5n - 5$

$250 + 5 = 5n$

$n = \frac{255}{5}$

$n = 51$

Thus, $n = 51$

Therefore 254 is the $\boxed{51^{st} \text{ term}}$ of the given A.P

(iv) Here, A.P is $21, 42, 63, 84, ...$

$a_n = 420$

$a = 21$

Now,

Common difference (d) = $a_1 - a$

= 42-21

= 21

Thus, using the above mentioned formula

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

$$420 = 21 + (n-1)21$$

$$420 - 21 = 21n - 21$$

$$399 + 21 = 21n$$

$$n = \frac{420}{21}$$

$$n = 20$$

Thus, $n = 20$

Therefore 420 is the $\boxed{20^{th} \text{ term}}$ of the given A.P

(v) Here, A.P is $121, 117, 113, ...$

We need to find first negative term of the A.P

$a = 121$

Now,

Common difference (d) = $a_1 - a$

$= 117 - 121$

$= -4$

Now, we need to find the first negative term,

$a_n < 0$

$$121 + (n-1)(-4) < 0$$

$$121 - 4n + 4 < 0$$

$$125 - 4n < 0$$

$$4n > 125$$

Further simplifying, we get,

$$n > \frac{125}{4}$$

$$n > 31\frac{1}{4}$$

$n \geq 32$ $(\text{as } n \text{ is a natural number})$

Thus, $n = 32$

Therefore, the first negative term is the $\boxed{32^{nd} \text{ term}}$ of the given A.P.

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