HW 29/6/21

ch-5

ARITHMETIC PROGRESSION

EXERCISE - 5.1

(1)(i) The taxi fare for first km = ₹15.
The fare for each addition km =
$a, a+d, a+2d, a+3d \quad (n+8)$
$15, 15+8, 15+2\times8, 15+3d$
$15, 23, 31, 39$

Yes, 15, 23, 31, 39... forms an AP as each succeeding term is obtained by adding 8 in its preceding term.

(ii) Let the air remaining in the cylinder at the time be '1'

The amount of air present in a cylinder when a vacuum pump removes $= \frac{1}{4}$ of air.

First term $= \frac{1}{4}$

2nd term $= \left(1-\frac{1}{4}\right) = \frac{4-1}{4} = \frac{3}{4}$

The 3rd term $= \frac{3}{4} - \frac{3}{4}\times\frac{1}{4}$

$= \frac{4\times3}{4\times4} - \frac{3}{16} = \frac{12}{16} - \frac{3}{16}$

The 4th term $= \frac{9}{16} - \frac{9}{16}\times\frac{1}{4} = \frac{9\times4}{16\times4} - \frac{9}{64}$

$= \frac{36-9}{64} = \frac{27}{64}$

No, volumes are, $V, \frac{3V}{4}, \left(\frac{3}{4}\right)^2 V \ldots$

(iii) The cost for the first metre = ₹ 150.

The subsequent rise in the cost per metre = ₹50.

The cost of digging after each metre =

$a, a+2d, a+2d, a+3d \ldots$
$150, 150+50, 150+2\times50, a+3\times50 \ldots$
$150, 200, 250, 300 \ldots$

So, the cost of digging after each metre are in form of A.P. —
150, 200, 250, 300 ....

(iv) The amount of money deposited = ₹10,000

The rise in C.I. every year = 8% year per annum.

$$CI = P\left(1+\frac{r}{100}\right)^n$$

Here, CI for the 1st year

$$CI = \left(1+\frac{8}{100}\right)^1$$

CI for 2nd year.

$$CI = \left(1+\frac{8}{100}\right)^2$$

CI for the 3rd year

$$CI = \left(1 + \frac{8}{100}\right)^3$$

$$10000\left(1+\frac{8}{100}\right)^1, 10000\left(1+\frac{8}{100}\right)^2, 10000\left(1+\frac{8}{100}\right)\ldots$$

As, $a_2 - a_1 \neq a_3 - a_2$

So, the list of number involved doesn't make an A.P

(2) (i) $a = 10, d = 10$

first 4 terms are-

$a, a+d, a+2d, a+3d \ldots$

$10, 20, 30, 40 \ldots$

(ii) $a = (-2), d = 0$

The first 4 terms are-

$a, a+d, a+2d, a+3d \ldots$

$-2, -2, -2, -2, \ldots$

So, the first four terms are-

$(-2), (-2), (-2), (-2)$

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

$a, a+d, a+2d, a+3d \ldots$

$4, 1, -2, -5 \ldots$

So, the AP of first four are-

4, 1, -2 and -5

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

$a, a+d, a+2d, a+3d \ldots\ldots$

$-1, -1+\frac{1}{2}, -1+2\times\frac{1}{2}, -1+3\times\frac{1}{2}$

$-1, -\frac{1}{2}, 0, \frac{-2+3}{2} \ldots\ldots$

So, the AP is $-1, -\frac{1}{2}, 0, \frac{1}{2} \ldots\ldots$

(v) $a = -1.25, d = 0.25$

$a, a+d, a+2d, a+3d \ldots\ldots$

$= -1.25, -1.25+(-0.25), -1.25+2\times(-0.25), -1.25+3(-0.25)$

$= -1.25, -1.5, -1.75, -2 \ldots\ldots$ is the AP.

(3) (i) $3, 1, -1, -3 \ldots$

The first term $a = 3$

And the common difference $= a_2 - a_1 = 1-3 = (-2)$

$a_3 - a_2 = -1-1 = (-2)$

So, the first term $(a) = 3$ and the common difference $= (-2)$.

(ii) $-5, -1, 3, 7 \ldots\ldots$

The first term $(a) = -5$

The common difference $(d) = a_2 - a_1 = -1+5 = 4$

$a_3 - a_2 = 3+1 = 4$

So, $a = (-5)$ and $d = 4$.

(iii) $\frac{1}{3}, \frac{5}{3}, \frac{9}{3}, \frac{13}{3}$ ....

Here, the first term is $= \frac{1}{3}$, $a_2 - a_1$

The common difference $= \frac{5}{3} - \frac{1}{3} = \frac{4}{3}$

$\rightarrow a_3 - a_2$

$\frac{9}{3} - \frac{5}{3} = \frac{4}{3}$

$\rightarrow a_4 - a_3$

$\frac{13}{3} - \frac{9}{3} = \frac{4}{3}$

So, the first term is $\frac{1}{3}$, & the common difference is $\frac{4}{3}$.

(iv) $0.6, 1.7, 2.8, 3.9$ .....

Here, the first term $(a) = 0.6$, and the the common difference $= \rightarrow a_2 - a_1$

$= 1.7 - 0.6$

$= 1.1$

$\rightarrow a_3 - a_3$

$= 2.8 - 1.7$

$= 1.1$

So, the first term is 0.6 and the common difference is 1.1.

(4) (i) 2, 4, 8, 16, we have

$d = a_2 - a_1$, $a_3 - a_2$

$4 - 2 = 2$, $8 - 4 = 4$

So, $a_2 - a_1 \neq a_3 - a_2$

So, the given list of numbers donot form an AP.

(ii) $2, \frac{5}{2}, 3, \frac{7}{2}, \ldots$

we have,

$a_2 - a_1 = \frac{5}{2} - \frac{2\times2}{2} = \frac{5-4}{2} = \frac{1}{2}$

$a_3 - a_2 = \frac{2\times3}{2} - \frac{5}{2} = \frac{6-5}{2} = \frac{1}{2}$

$a_4 - a_3 = \frac{7}{2} - \frac{3\times2}{2} = \frac{7-6}{2} = \frac{1}{2}$

So, $a_2 - a_1 = a_3 - a_2 = a_4 - a_3$

So, the given list of nos forms an AP with the common difference 'd' is $\frac{1}{2}$.

And the three more terms are-

$4, \frac{9}{2}, 5, \frac{11}{2}$

(iii) $-1.2, -3.2, -5.2, -7.2 \ldots$

we have,

$a_2 - a_1 = -3.2 + 1.2 = (-2)$

$a_3 - a_2 = -5.2 + 3.2 = (-2)$

$a_4 - a_3 = -7.2 + 5.2 = (-2)$

So, $a_2 - a_1 = a_3 - a_2 = a_4 - a_3$

So, the given list of nos forms an AP with the 'd' is (-2)

And the three terms are-

$-9.2, -11.2, -13.2, -15.2$.

(iv) $-10, -6, -2, 2 \cdots$

we have,

$a_2 - a_1 = -6 - (-10) = 4$

$a_3 - a_2 = -2 - (-6) = -2 + 6 = 4$

$a_4 - a_3 = 2 - (-2) = 2 + 2 = 4$

So, the given list of nos forms an AP with the common difference 'd' is 4.

And the 3 more terms are -

6, 10, 14, 18

(v) $3, 3+\sqrt{2}, 3+2\sqrt{2}, 3+3\sqrt{2} \cdots$

we have,

$a_2 - a_1 = 3 + \sqrt{2} - 3 = \sqrt{2}$

$a_3 - a_2 = 3 + 2\sqrt{2} - 3 - \sqrt{2}$

$= \sqrt{2} + \sqrt{2} - \sqrt{2}$

$= \sqrt{2}$

$a_4 - a_3 = 3 + 3\sqrt{2} - 3 - 2\sqrt{2}$

$= \sqrt{2} + \sqrt{2} + \sqrt{2} - \sqrt{2} - \sqrt{2}$

$= \sqrt{2}$

So, $a_2 - a_1 = a_3 - a_2 = a_4 - a_3$

So, the given list ~~three more terms are~~ of nos forms 'd' is an AP with the common difference 'd' is $\sqrt{2}$.

And the three more terms are -

$3 + 4\sqrt{2}$, $3 + 5\sqrt{2}$ and $3 + 6\sqrt{2} \cdots$

(vi) $0.2, 0.22, 0.222, 0.2222 \ldots$

we have,

$a_2 - a_1 = 0.22 - 0.2 = 0.02$

$a_3 - a_2 = 0.222 - 0.22 = 0.002$

As, $a_2 - a_1 \neq a_3 - a_2$

So, the given list of number doesn't form AP with any common difference.

(vii) $a, -4, -8, -12 \ldots$

we have,

$a_2 - a_1 = -8 - (-4) = -8 + 4 = (-4)$

$a_3 - a_2 = (-12) - (-8) = -12 + 8 = (-4)$

As, $a_2 - a_1 = -8 - (-4) = a_3 - a_2$

Here, taking 'a' as (-12) & $d = (-4)$, the will be next 3 terms.

So, the other three terms are -

$= -16, -20, -24 \ldots$

(viii) $\frac{-1}{2}, \frac{-1}{2}, \frac{-1}{2}, \frac{-1}{2} \ldots$

we have,

$a_2 - a_1 = -\frac{1}{2} + \frac{1}{2} = 0$

$a_3 - a_2 = -\frac{1}{2} + \frac{1}{2} = 0$

As, $a_2 - a_1 = a_3 - a_2$

So, As, d is 0 then, the three terms are- $\frac{-1}{2}, \frac{-1}{2}, \frac{-1}{2}$

(x) 1, 3, 9, 27.

We have,

$a_2 - a_1 = 3 - 1 = 2$

$a_3 - a_2 = 9 - 3 = 6$

$a_4 - a_3 = 27 - 9 = 18$

As, $a_2 - a_1 \neq a_3 - a_4$

So, the

(x) $a, 2a, 3a, 4a$ - - -

We have,

$a_2 - a_1 = 2a - a = a$

$a_3 - a_4 = 3a - 2a = a$

As, $a_2 - a_1 = a_3 - a_4$

So, the three terms are $= 5a, 6a, 7a$.

(xi) a, a^2, a^3, a^4 - - -

We have,

$a_2 - a_1 = a^2 - a = a(a-1)$

$a_3 - a_4 = a^3 - a^2 = a^2(a-1)$

As, $a_2 - a_1 \neq a_3 - a_2$

So, the given list of no.s doesnot form AP.

(xii) $\sqrt{2}, \sqrt{8}, \sqrt{18}, \sqrt{32} \ldots$

2×3×3
16×∪

We have,

$a_2 - a_1 = \sqrt{8} - \sqrt{2}$
$= 2\sqrt{2} - 1\sqrt{2} = \sqrt{2}$

$a_3 - a_4 = \sqrt{18} - \sqrt{8}$
$= 3\sqrt{2} - 2\sqrt{2}$
$= \sqrt{2}$

So, the other three terms are -
$4\sqrt{2}, 5\sqrt{2}, 6\sqrt{2}$

(xiii) $\sqrt{3}, \sqrt{6}, \sqrt{9}, \sqrt{12} \ldots$

We have,

$a_2 - a_1 = \sqrt{3\times2} - \sqrt{3} = \sqrt{3}(\sqrt{2}-1)$
$a_3 - a_2 = \sqrt{9} - \sqrt{6} = \sqrt{3\times3} - \sqrt{6}$
$= \sqrt{3}(\sqrt{3} - \sqrt{2} - 1)$

As, $a_2 - a_1 \neq a_3 - a_2 \neq a_4 - a_3$

(xiv) $1^2, 3^2, 5^2, 7^2 \ldots$

We have,

$a_2 - a_1 = 3^2 - 1 = 8$
$a_3 - a_2 = 5^2 - 3^2 = 25 - 9 = 16$

As, $a_2 - a_1 \neq a_3 - a_2$
It has no common diff. and doesnot form an AP.

(xv) $1^2, 5^2, 7^2, 73, \ldots\ldots$

$1, 25, 49, 73$

We have,

$a_2 - a_1 = 25 - 1 = 24$

$a_3 - a_2 = 49 - 25 = 24$

$a_4 - a_3 = 73 - 49 = 24$

As, $a_2 - a_1 = a_3 - a_2 = a_4 - a_3$.

So, the other three A.P's are -

97, 121, 145 . . . . respectively.