Arithmetic Progression.

Exercise - 5.1

Q1) (i) Let t_n be the taxi fare for first n km.

Then $t_1 = a = 15$, $t_2 = 15 + 8$, $t_3 = 15 + 2(8) = 15 + 16 = 31$.

So, the list will be: 15, 23, 31, ...

Here $= t_2 - t_1 = t_3 - t_2 \ldots = 8$

Thus, this situation forms an AP.

(ii) Let the first term be x units.

Then, $t_1 = a = x$

$$t_2 = x - \frac{1}{4}x = \frac{3}{4}x \text{ units.}$$

$$t_3 = \frac{3}{4} - \frac{1}{4}\left(\frac{3}{4}x\right) = \frac{9}{16}x \text{ units.}$$

$$t_4 = \frac{9}{16}x - \frac{1}{4}\left(\frac{9}{16}x\right) = \frac{27}{64}x \text{ units} \ldots\ldots$$

The list of no.s is $x, \frac{3}{4}x, \frac{9}{16}x, \frac{27}{64}x, \ldots\ldots$

Since $t_2 - t_1 \neq t_3 - t_2$, therefore, it is not an AP.

(iii) First term $a = ₹150$.

Common difference for every subsequent metre is ₹50.

$t_1 = a = 150$

$t_2 = a + d = 150 + 50 = 200$

$t_3 = a + 2d = 150 + 2(50) = 150 + 100 = ₹250$.

$t_4 = a + 3d = 150 + 150 = 300$.

Since $t_2 - t_1 = t_3 - t_2 = 50$, therefore, it is an AP.

(iv) $t_1 = a = 10,000$.

$t_2 = 10,000 + 10000 \times \frac{8}{100}$

$= 10,000 + 800 = 10,800$

$t_3 = 10,800 + 10,800 \times \frac{8}{100} = 10,800 + 864 = 11,664.$

$t_4 = 11,664 + 4,664 \times \frac{8}{100} = 11,664 + 933.12 = 12597.12...$

The list is 10000, 10800, 11664, 12597.12, ...

Here, $t_2 - t_1 \neq t_3 - t_2$, therefore it is not an AP.

Q2) (i) $a = 10, d = 10$

$a_1 = 10$

$a_2 = 10 + 10 = 20$

$a_3 = 10 + 2(10) = 10 + 20 = 30$

$a_4 = 10 + 3(10) = 10 + 30 = 40$

Thus, the first four terms of the AP are 10, 20, 30, 40

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

The first four terms of the AP are $-2, -2, -2, -2$.

(iii) $a_1 = 4, d = -3$.

$a_2 = 4 - 3 = 1$

$a_3 = 4 - 2(3) = 4 - 6 = -2$

$a_4 = 4 - 3(3) = 4 - 9 = -5$.

Thus, the first four terms of the AP are $4, 1, -2, -5$

Q3) (i) $a = 3$ and $d = t_2 - t_1 = 1 - 3 = -2$.

(ii) $a = -5$ and $d = t_2 - t_1 = -1 - (-5) = 4$

(iii) $a = \frac{1}{3}$ and $d = t_2 - t_1 = \frac{5}{3} - \frac{1}{3} = \frac{4}{3}$.

(iv) $a = 0.6$ and $d = t_2 - t_1 = 1.7 - 0.6 = 1.1$.

Q4) (i) 2, 4, 8, 16 . . . .

$a_2 - a_1 = 4 - 2 = 2$.

$a_3 - a_2 = 8 - 4 = 4$

$a_2 - a_1 \neq a_3 - a_2$.

Thus, the given sequence is not an AP.

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

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

$$a_3 - a_2 = \frac{3}{1} - \frac{5}{2} = \frac{1}{2}.$$

$a_2 - a_1 = a_3 - a_2$.

Thus, the given sequence is an AP.

$a_1 = 2, d = \frac{1}{2}$.

Next three terms are, $a_5 = a_4 + d = \frac{7}{2} + \frac{1}{2} = 4$.

$a_6 = a_5 + d = 4 + \frac{1}{2} = \frac{9}{2}$, $a_7 = a_6 + d = \frac{9}{2} + \frac{1}{2} = 5$.

—x x x—