Exercise-5.1

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

Then $t_1 = a = 15$,

$t_2 = 15 + 8 = 23$,

$t_3 = 23 + 8 = 31$.

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

here $t_2 - t_1 = t_3 - t_2 = \cdots = 8$.

Thus the situation forms an AP.

(ii) Let the first term be x units.

Then, $t_1 = a = x$.

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

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

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

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

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

(iii) first term a = ₹150.

common different for every subsequent metre is ₹50.

$t_1 = a = 150$.

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

$t_3 = a + 2d = 150 + 2 \times 50 = 250$.

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

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

(iv) Let t_n be the amount of money in the nth year.

then, $t_1 = a = 10000$.

(iv) $t_2 = 1000 + 10000 \times \frac{8}{100}$

$= 10000 + 800 = 10800$.

$t_3 = 10800 + 10800 \times \frac{8}{100}$

$= 10800 + 864 = 11664$

$t_4 = 11664 + 11664 \times \frac{8}{100}$

$= 11664 + 933.12 = 12597.12$.

Here, $t_2 - t_2 \neq t_3 - t_2$, therefore its not an AP.

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

$a_1 = 10$.

$a_2 = 10 + 10 = 20$.

$a_3 = 20 + 10 = 30$.

$a_4 = 30 + 10 = 40$.

Thus, the first 4 terms of AP are 10, 20, 30, 40.

ii) given $a = -2$.

$d = 0$.

The 4 four terms of AP are $-2, -2, -2, -2$.

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

$a_2 = a_1 + d = 4 - 3 = 1$.

$a_3 = a_2 + d = 1 - 3 = -2$.

$a_4 = a_3 + d = -2 - 3 = -5$.

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

(iv) $a_1 = -1, d = \frac{1}{2}$.

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

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

Q2. iv) . $a_4 = a_3 + d = 0 + \frac{1}{2} = \frac{1}{3}$.

Thus, the first 4 terms of AP are $-1, -\frac{1}{2}, 0, \frac{1}{2}$.

(v) $a_1 = -1.25$, $d = -0.25$.

$a_2 = a_1 + d = -1.25 - 0.25 = -1.50$.

$a_3 = a_2 + d = -1.50 - 0.25 = -1.75$.

$a_4 = a_3 + d = -1.75 - 0.25 = -2$.

Thus, the 1st four terms of AP $\cdot -1.25, -1.50, -1.75, 2$.

Q3. (i) $3, 1, -1, -3, \ldots$.

Ans ⇒ $a = 3$ & $d = t_2 - t_1 = 1 - 3 = -2$.

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

Ans ⇒ $a = -5$ & $d = t_2 - t_1 = -1 - (-5) = 4$.

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

Ans ⇒ $a = \frac{1}{3}$ & $d = t_2 - t_1 = \frac{5}{3} - \frac{1}{3} = \frac{4}{3}$.

(iv) $0.6, 1.7, 2.8, 3.9, \ldots$

Ans ⇒ $a = 0.6$ & $d = t_2 - t_1 = 1.7 - 1.6 = 1.1$.

Q4. $2, 4, 8, 16, \ldots$

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

$a_3 - a_2 = 8 - 4 = 4$.

$a_2 - a_1 \neq a_3 - a_2$.

∴ 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 a AP.

$a_1 = 2$.

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

Q4. (ii) next 3 terms are

$a_5 = a_4 + d = \frac{7}{2} + \frac{1}{2} = 4$.

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

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

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

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

$a_3 - a_2 = a_2 - a_1$.

Thus, the given sequence is an AP.

$a_1 = -1.2, d = -2$.

$a_5 = a_4 + d = -7.2 + (-2) = -9.2$.

$a_6 = a_5 + d = (-9.2) + (-2) = -11.2$.

$a_7 = a_6 + d = (-11.2) + (-2) = -13.2$.

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

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

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

Thus, the given sequence is an AP.

$a_1 = -10, d = 4$.

$a_5 = a_4 + d = 2 + 4 = 6$, $a_6 = a_5 + d = 6 + 4 = 10$.

$a_7 = a_6 + d = 10 + 4 = 14$.

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

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

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

Thus, the given sequence is an AP.

$a_1 = 3$, $d = \sqrt{2}$.

$a_5 = a_4 + d = 3 + 3\sqrt{2} + \sqrt{2} = 3 + 4\sqrt{2}$.

Q4.(v) $a_6 = a_5 + d = 3+4\sqrt{2} + \sqrt{2} = 3+5\sqrt{2}$.

$a_7 = a_6 + d = 3+5\sqrt{2} + \sqrt{2} = 3+6\sqrt{2}$.

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

$a_2 - a_1 = 0.22 - 0.2 = 0.02$.

$a_3 - a_2 = 0.222 - 0.22 = 0.002$.

$a_3 - a_2 \neq a_2 - a_1$.

$\therefore$ the given sequence is not AP.

(vii) $1, 3, 9, 27, \ldots$

$a_2 - a_1 = 3 - 1 = 2$.

$a_3 - a_2 = 9 - 3 = 6$.

$a_3 - a_2 \neq a_2 - a_1$.

$\therefore$ Thus, the given sequence is not an AP.

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HW// Exercise 4.4.

Q1. i) $2x^2 - 3x + 5 = 0$.

here, $a = 2, b = -3$ & $c = 5$.

$\therefore D = b^2 - 4ac$.

$= (-3)^2 - 4 \times 2 \times 5$.

$= 9 - 40 = -31 < 0$.

$\therefore$ hence, the roots are imaginary.

(ii) $3x^2 - 4\sqrt{3}x + 4 = 0$.

here, $a = 3$

$b = -4\sqrt{3}$.

$c = 4$.

$\therefore D = b^2 - 4ac$.

$= (-4\sqrt{3})^2 - 4 \times 3 \times 4$.

$= 48 - 48 = 0$.

$\therefore$ the roots are real & equal.

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$,

$x = \dfrac{-(-4\sqrt{3}) \pm \sqrt{(-4(\sqrt{3}))^2 - 4 \times 3 \times 4}}{2 \times 3}$.

$= \dfrac{4\sqrt{3} \pm \sqrt{48 - 48}}{6} = \dfrac{4\sqrt{3}}{6} = \dfrac{2}{\sqrt{3}}$.

$\therefore$ Hence, the equal roots are $\frac{2}{\sqrt{3}}$ & $\frac{2}{\sqrt{3}}$

(iii) given: $2x^2 - 6x + 3 = 0$.

here $a = 2$.

$b = -6$.

$c = 3$.

$\therefore D = b^2 - 4ac$.

$= (-6)^2 - 4 \times 2 \times 3$.

$= 36 - 24 = 12 > 0$.