30/7/2020
THURSDAY

MATHEMATICS

STD - X
class - 16

Assignment

Text book page no. 35 Questions Answers.

1. Ans) i) 11, 22, 33, ...

first term = $x_1 = 11$

common difference $= d = 22 - 11 = \underline{\underline{11}}$

25th term $= x_{25} = x_1 + 24d$

$= 11 + 24 \times 11$

$= 11 + 264$

$= \underline{\underline{275}}$

$n = \frac{x_{25} - x_1}{d} + 1$

$= \frac{275 - 11}{11} + 1$

$= 24 + 1$

$n = \underline{\underline{25}}$

∴ Sum of the first 25 terms $= S_{25}$

$= \frac{n}{2}[x_1 + x_{25}]$

$= \frac{25}{2}[11 + 275]$

$= \frac{25}{\cancel{2}}[\overset{143}{\cancel{286}}]$

$= 25 \times 143$

$S_{25} = \underline{\underline{3575}}$

ii) 12, 23, 34, ...

$x_1 = 12$

$d = 23 - 12$

$= \underline{\underline{11}}$

$x_{25} = x_1 + 24d$

$= 12 + 24 \times 11$

$= 12 + 264$

$= \underline{\underline{276}}$

$n = \frac{276 - 12}{11} + 1$

$n = \underline{\underline{25}}$

∴ Sum of the first 25 terms = S_{25} =

$$\frac{n}{2}\left[x_1 + x_{25}\right]$$

$$= \frac{25}{2}\left[12 + 276\right]$$

$$= \frac{25}{\cancel{2}}\left[\overset{144}{\cancel{288}}\right]$$

$$= \underline{\underline{3600}}$$

iii) 21, 32, 43, ...

$x_1 = 21$

$d = 32 - 21$

$= \underline{\underline{11}}$

$$x_{25} = x_1 + 24d$$

$$= 21 + 24 \times 11$$

$$= 21 + 264$$

$$= \underline{\underline{285}}$$

$$n = \frac{285 - 21}{11} + 1$$

$$n = \underline{\underline{25}}$$

Sum of the first 25 terms = S_{25} =

$$\frac{n}{2}\left[x_1 + x_{25}\right]$$

$$= \frac{25}{2}\left[21 + 285\right]$$

$$= \frac{25}{\cancel{2}}\left[\overset{153}{\cancel{306}}\right]$$

$$= \underline{\underline{3825}}$$

iv) 19, 28, 37, ...

$x_1 = 19$

$d = 28 - 19$

$= \underline{\underline{9}}$

$x_{25} = x_1 + 24d$

$= 19 + 24 \times 9$

$= 19 + 216$

$= \underline{\underline{235}}$

$n = \dfrac{235 - 19}{9} + 1$

$= \underline{\underline{25}}$

$S_{25} = \dfrac{n}{2}\left[x_1 + x_{25}\right]$

$= \dfrac{25}{2}\left[19 + 235\right]$

$= \dfrac{25}{\cancel{2}}\left[\overset{127}{\cancel{254}}\right]$

$= 25 \times 127$

$S_{25} = \underline{\underline{3175}}$

v) 1, 6, 11, ...

$x_1 = 1$

$d = 6 - 1 = \underline{\underline{5}}$

$x_{25} = x_1 + 24d$

$= 1 + 24 \times 5$

$= \underline{\underline{121}}$

$n = \dfrac{121 - 1}{5} + 1$

$= \dfrac{120}{5} + 1$

$= \underline{\underline{25}}$

$S_{25} = \dfrac{25}{2}\left[1 + 121\right]$

$= \dfrac{25}{\cancel{2}}\left[\overset{61}{\cancel{122}}\right]$

$= \underline{\underline{1525}}$

2. Ans) Sequence = 6, 10, 14, ...

$x_1 = 6$

$d = 10 - 6 = \underline{\underline{4}}$

$x_{20} = x_1 + 19d$

$= 6 + 19 \times 4$

$= 6 + 76$

$= \underline{\underline{82}}$

$S_{20} = \frac{n}{2}[x_1 + x_{20}]$

$= \frac{20}{2}[6 + 82]$

$= 10[88]$

$= \underline{\underline{880}}$

Sequence of next 20 terms = 86, 90, 94, ...

$x_1 = 86$

$d = 4$

$x_{20} = 86 + 19 \times 4$

$= 86 + 76$

$= \underline{\underline{162}}$

$S_{20} = \frac{20}{2}[86 + 162]$

$= 10(248)$

$= \underline{\underline{2480}}$

3. Ans) first sequence = 6, 10, 14, ...

$x_1 = 6$

$d = 4$

$x_{20} = 6 + 19 \times 4$

$= 6 + 76$

$= \underline{\underline{82}}$

$S_{20} = \frac{20}{2}(6 + 82)$

$= 10(88)$

$= \underline{\underline{880}}$

second sequence = 15, 19, 23, ...

$x_1 = 15$

$d = 4$

$x_{20} = 15 + 19 \times 4$

$= 15 + 76$

$= \underline{\underline{91}}$

$S_{20} = \frac{20}{2}(15 + 91)$

$= 10(106)$

$= \underline{\underline{1060}}$

$\therefore$ Difference $= 1060 - 880$

$= \underline{\underline{180}}$

4. Ans) sequence of 3-digit numbers =

100, 101, 102, . . . , 999

$\therefore$ sequence of 3-digit numbers which are multiples of 9

$$\begin{array}{r} 12 \\ 9\overline{)108} \\ 108 \\ \hline 0 \end{array}$$

= 108, 117, 126, . . . 999

No. of terms, $n = \frac{999-108}{9} + 1$

$= \frac{891}{9} + 1$

$= 99 + 1$

$n = 100$

Sum $= \frac{n}{2}$ [first term + last term]

$= \frac{100}{2}$ [108 + 999]

$= 50$ [1107]

$= 55350$

5. Ans) i) $n^2 + 2n$

Sum of the first one term = first term $= 1^2 + 2\times 1$

$= 1 + 2$

$= \underline{\underline{3}}$

Sum of the first 2 terms $= 2^2 + 2\times 2$

$= 4 + 4$

$= \underline{\underline{8}}$

$f = 3$

$d = 5 - 3 = 2$

$x_1 + x_2 = 8$

$3 + x_2 = 8,$

$\therefore x_2 = 8 - 3 = \underline{\underline{5}}$

$x_1 = 3$

$d = 2$

$\therefore x_n = f + (n-1)d$

$= 3 + (n-1)2$

$= 3 + 2n - 2$

$= \underline{\underline{2n + 1}}$

ii) $2n^2+n$

$$x_1 = 2\times 1^2+1$$
$$= 2\times 1+1$$
$$= \underline{\underline{3}}$$

$$S_2 = 2\times 2^2+2$$
$$= 2\times 4+2$$
$$= 8+2$$
$$= \underline{\underline{10}}$$

$$\therefore x_2 = S_2 - x_1$$
$$= 10-3$$
$$= \underline{\underline{7}}$$

$$\therefore d = x_2 - x_1$$
$$= 7-3$$
$$= \underline{\underline{4}}$$

$$\therefore x_n = 3+(n-1)4$$
$$= 3+4n-4$$
$$= \underline{\underline{4n-1}}$$

iii) n^2-2n

$$x_1 = 1^2-2\times 1$$
$$= 1-2$$
$$= \underline{\underline{-1}}$$

$$S_2 = 2^2-2\times 2$$
$$= 4-4$$
$$= \underline{\underline{0}}$$

$$x_2 = S_2 - x_1$$
$$= 0 - -1$$
$$= \underline{\underline{1}}$$

$$\therefore d = 1 - -1$$
$$= \underline{\underline{2}}$$

$$\therefore x_n = f+(n-1)d$$
$$= -1+(n-1)2$$
$$= -1+2n-2$$

$$\therefore x_n = \underline{\underline{2n-3}}$$

iv) $2n^2 - n$

$$x_1 = 2 \times 1^2 - 1$$
$$= 2 - 1$$
$$= \underline{\underline{1}}$$

$$S_2 = 2 \times 2^2 - 2$$
$$= 2 \times 4 - 2$$
$$= 8 - 2$$
$$= \underline{\underline{6}}$$

$$\therefore x_2 = S_2 - x_1$$
$$= 6 - 1$$
$$= \underline{\underline{5}}$$

$$\therefore d = 5 - 1$$
$$= \underline{\underline{4}}$$

$$\therefore x_n = f + (n-1)d$$
$$= 1 + (n-1)4$$
$$= 1 + 4n - 4$$
$$= \underline{\underline{4n - 3}}$$

v) $n^2 - n$

$$x_1 = 1^2 - 1$$
$$= \underline{\underline{0}}$$

$$S_2 = 2^2 - 2$$
$$= 4 - 2$$
$$= \underline{\underline{2}}$$

$$\therefore x_2 = S_2 - x_1$$
$$= 2 - 0$$
$$= \underline{\underline{2}}$$

$$\therefore d = 2 - 0$$
$$= \underline{\underline{2}}$$

$$\therefore x_n = f + (n-1)d$$
$$= 0 + (n-1)2$$
$$= \underline{\underline{2n - 2}}$$

6. i). Ans) Here, $S_5 = 150$

x_3 is the mid term

$$\therefore x_3 = \frac{\text{Sum}}{\text{no. of terms}}$$

$$= \frac{150}{5}$$

$$\therefore x_3 = \underline{\underline{30}}$$

ii) $S_{10} = 550$

$x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8, x_9, x_{10}$

$$(x_3 + x_8) \times 5 = 550$$

$$x_3 + x_8 = \frac{550}{5} = \underline{\underline{110}}$$

$$x_8 = 110 - x_3$$

$$= 110 - 30$$

$$x_8 = \underline{\underline{80}}$$

iii) first three terms $= x_1, x_2, 30$

$$x_1 = \frac{30}{3} = \underline{\underline{10}}$$

$\therefore$ sequence $= \underline{\underline{10, 20, 30}}, \ldots$

7. Ans) Sequence = 16, 24, 32, ...

$$x_1 = 16$$

$$d = 24 - 16 = \underline{\underline{8}}$$

$$\text{nth term} = x_1 + (n-1)d$$

$$= 16 + (n-1)8$$

$$= 16 + 8n - 8$$

$$x_n = \underline{\underline{8n+8}}$$

$$\text{Sum of first n terms} = S_n = \frac{n}{2}\left[x_1 + x_n\right]$$

$$= \frac{n}{2}\left[16 + 8n + 8\right]$$

$$= \frac{n}{2}\left[8n + 24\right]$$

$$= \frac{n}{2} \times 8\left(n+3\right)$$

$$= 4n\left[n+3\right]$$

$$= 4n^2 + 12n$$

9 added to this sum $= 4n^2 + 12n + 9$

$$4n^2 + 12n + 9 = (2n+3)^2$$

This is a square of $2n+3$. So the sum of any number of terms of this sequence added to 9 is a perfect square.