- Write many Arithmetic sequences and Find its nth term.

NOTES

Ans) i) $11, 22, 33, \ldots\ldots$

$f = x_1 = 11$

$d = x_2 - x_1 = 22 - 11 = 11$

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

$= 11 + (n-1)11$

$= 11 + 11n - 11$

$= 11n$

ii) $4, 18, 32, \ldots\ldots$

$x_1 = 4$

$d = 18 - 4 = 14$

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

$= 4 + (n-1)14$

$= 4 + 14n - 14$

$= 14n - 10$

iii) $2, 4, 6, \ldots\ldots$

$x_1 = 2$

$d = 2$

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

$= 2 + (n-1)2$

$= 2 + 2n - 2$

$= 2n$

iv) 5, 7, 9, ...

$x_1 = 5$

$d = 2$

$$x_n = f + (n-1)d$$
$$= 5 + (n-1)2$$
$$= 5 + 2n - 2$$
$$= \underline{2n+3}$$

v) 4, 10, 16, ...

$x_1 = 4$

$d = 6$

$$x_n = f + (n-1)d$$
$$= 4 + (n-1)6$$
$$= 4 + 6n - 6$$
$$= \underline{6n - 2}$$

vi) 7, 16, 25, ...

$x_1 = 7$

$d = 16 - 7 = \underline{9}$

$$x_n = f + (n-1)d$$
$$= 7 + (n-1)9$$
$$= 7 + 9n - 9$$
$$= \underline{9n - 2}$$

- Write the answers of the problems in Text book [page no. 35]

1. Find the sum of the first 25 terms of each of the arithmetic sequences below.

i) 11, 22, 33, ... ii) 12, 23, 34, ... iii) 21, 32, 43, ...

iv) 19, 28, 37, ... v) 1, 6, 11, ...

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

$x_1 = 11$

$d = 22 - 11 = 11$

$x_{25} = x_1 + 24d$

$= 11 + 24 \times 11$

$= 11 + 264$

$= 275$

$\text{Sum} = S_{25} = \frac{n}{2}(x_1 + x_{25})$

$= \frac{25}{2}(11 + 275)$

$= \frac{25}{2}(286)$

Sum of 1st 25 terms $= 3575$

ii) 12, 23, 34, ...

$x_1 = 12$

$d = 23 - 12 = 11$

$x_{25} = x_1 + 24d$

$= 12 + 24 \times 11$

$= 12 + 264$

$= 276$

$S_{25} = \frac{25}{2}(12 + 276)$

$= \frac{25}{2}(288)$

$= 3580$

iii) 21, 32, 43, ...

$x_1 = 21$

$d = 32 - 21 = 11$

$x_{25} = 21 + 24 \times 11$

$= 21 + 264$

$= 285$

$S_{25} = \frac{25}{2}(21 + 285)$

$= \frac{25}{2}(306)^{153}$

$= 3825$

$$\begin{array}{r} {}^{2}21 \\ 153 \times \\ 25 \\ \hline 765 \\ 306 \\ \hline 3825 \end{array}$$

iv) 19, 28, 37, ...

$x_1 = 19$

$d = 28 - 19 = 9$

$x_{25} = 19 + 24 \times 9$

$= 19 + 216$

$= 235$

$S_{25} = \frac{25}{2}[19 + 235]$

$= \frac{25}{2}(254)^{127}$

$= 3175$

$$\begin{array}{r} {}^{1}{}^{1} \\ 127 \times \\ 25 \\ \hline 635 \\ 254 \\ \hline 3175 \end{array}$$

v) 1, 6, 11, ...

$x_1 = 1$

$d = 6 - 1 = 5$

$x_{25} = 1 + 24 \times 5$

$= 1 + 120$

$= 121$

$S_{25} = \frac{25}{2}[1 + 121]$

$= \frac{25}{2}(122)^{61}$

$= 1525$

$$\begin{array}{r} {}^{2} \\ 24 \times \\ 5 \\ \hline 120 \end{array}$$

$$\begin{array}{r} {}^{3} \\ 25 \times \\ 61 \\ \hline 25 \\ 150 \\ \hline 1525 \end{array}$$

2) What is the difference between the sum of the first 20 terms and the next 20 terms of the arithmetic sequence 6, 10, 14, ... ?

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

$x_1 = 6$

$d = 10 - 6 = 4$

$x_{20} = x_1 + 19d$

$= 6 + 19 \times 4$

$= 6 + 76$

$= 82$

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

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

$= 10[88]$

$= 880$

Sequence of next 20 terms

= 86, 90, 94, ...

$x_1 = 86$

$d = 4$

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

$= 86 + 76$

$= 162$

$S_{20} = \frac{20}{2}(86 + 162)$

$= 10[248]$

$= 2480$

3) Calculate the difference between the sums of the 20 terms of the arithmetic sequences 6, 10, 14, ... and 15, 19, 23, ... ?

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

$x_1 = 6$

$d = 4$

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

$= 6 + 76$

$= \underline{82}$

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

$= 10(88)$

$= \underline{880}$

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

$x_1 = 15$

$d = 4$

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

$= 15 + 76$

$= \underline{91}$

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

$= 10(106)$

$= \underline{1060}$

$\therefore$ Difference $= 1060 - 880$

$= \underline{180}$

4) Find the sum of all 3-digit numbers, which are multiples of 9.

Ans) Sequence of 3-digit numbers =

$100, 101, 102, \cdots, 999$

$$9 \overline{)108} \quad 12, \quad 108, \quad 0$$

∴ sequence of 3-digit numbers which are multiples of 9

$= 108, 117, 126, \cdots 999$

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

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

$= 99 + 1$

$n = 100$

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

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

$= 50[1107]$

$= 55350$

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