TERMS AND SUMS-NOTE: 1

PREVIOUS KNOWLEDGE

- SEQUENCE : A set of numbers by a law written as the first, second, third and so on.
- **ARITHMETIC SEQUENCE:** A sequence got by starting a fixed Number and adding or subtracting a fixed number repeatedly.
- **COMMON DIFFERENCE (d):** The constant difference got by subtracting from any term the just previous term is called the common difference of an arithmetic Sequence.
- $x_1, x_2, x_3, x_4, x_5, x_6,\ldots\ldots$ Are the terms of an arithmetic sequence and suffix denote position

TERMS AND SUMS

- Sum of three consecutive Natural numbers

  $1 + 2 + 3 = 6 = 3 \times 2$

  $2 + 3 + 4 = 9 = 3 \times 3$

  $4 + 5 + 6 = 15 = 3 \times 5$

  In general suppose x is the middle term from the any three consecutive Natural numbers.

  $(x - 1) + x + (x + 1) = 3 \times X$

  Here we can see that,

  Sum of three consecutive Natural numbers is Three times its middle term

- Sum of three consecutive Even numbers

  $2 + 4 + 6 = 12 = 3 \times 4$

  $4 + 6 + 8 = 18 = 3 \times 6$

  $6 + 8 + 10 = 24 = 3 \times 8$

  In general suppose x is the middle term from the any three consecutive even numbers.

  $(x - 2) + x + (x + 2) = 3 \times X$

  Here we can see that,

  Sum of three consecutive even numbers is Three times its middle term

- Sum of three consecutive numbers(terms) of any arithmetic sequence

  Suppose x is the middle term and y is the common difference of the arithmetic sequence

  Then Sum of three consecutive terms

  $(x - y) + x + (x + y) = 3 \times X$

  From this we can say that

  For any arithmetic sequence the sum of three consecutive terms is three times the middle term.

  E.g.: consider arithmetic sequence 88, 92, 96, 100……..

  sum of three consecutive terms = 88 + 92 + 96 = 3 x 92 = 276

- If x, y, z are three consecutive terms of an arithmetic sequence then

  $x + y + z = 3y$

  Middle term= y = $\frac{(x+z)}{2}$

- From these we can also say that
  - In any arithmetic sequence the sum of the five consecutive terms is five times the middle term

    $(x - 2y) + (x - y) + x + (x + y) + (x + 2y) = 5 \times X$
  - *In any arithmetic sequence the sum of the seven consecutive terms is seven times the middle term*

  From this we can maid a principle

  In any arithmetic sequence the sum of the odd number of consecutive terms is the product of number of terms and middle term.

  Sum = no of terms x middle term

  E.g.: the sum 9 terms of an arithmetic sequence is 108. What is its 5^{th} term?

  5^{th} term = middle term = $\frac{sum}{no\ of\ terms} = \frac{108}{9} = 12$

MORE QUSTIONS TO PRACTICE

1. Find the sum of the following
   i. 8 + 9 + 10 = ……..
   ii. 13 + 15 + 17 + 19 +21 = …….
   iii. 1 + 2 + 3 + 4 + 5 + 6 + 7 =……..
   iv. 1 + 6 + 11 + 16 + 21 = …….

2. 6^{th} term of an arithmetic sequence is 10.
    i. What is the sum of first 11 terms of the arithmetic sequence?
    ii. Write the arithmetic sequence?

3. The sum of first five consecutive terms is 250.
    i. Find its 3^{rd} term
    ii. If the first term is 10 then what is its common difference
    iii. Write the arithmetic sequence.

4. Write three arithmetic sequence with 30 as the sum of the first five terms.
    An: the middle term is …….
        (Choose any number as the common difference)

5. The first term of an arithmetic sequence is 1 and the sum of the first 4 terms is 100.find the first 4 terms
    An: first term = x_1 = …….
        Sum of last 3 terms= $x_2 + x_3 + x_4$ = …….
        Middle term=3^{rd} term = …….
        ……
        ……

[*Click here and watch the video class for better understand*]

6.

Write the first three terms of each of the arithmetic sequences described below:

(i) First term 30; the sum of the first three terms is 300

(ii) First term 30; the sum of the first four terms is 300

(iii) First term 30; the sum of the first five terms is 300

(iv) First term 30; the sum of the first six terms is 300

Do this problem based on question no. 5

7.

The sum of the first five terms of an arithmetic sequence is 150 and the sum of the first ten terms is 550.

(i) What is the third term of the sequence?

(ii) What is the eighth term?

(iii) What are the first three terms of the sequence?

i. $x_1 + x_2 + x_3 + x_4 + x_5$ = ……

3^{rd} term =……..

ii. $x_1 + x_2 + x_3 + x_4 + x_5 + x_6 + x_7 + x_8 + x_9 + x_{10}$ = ……

$x_6 + x_7 + x_8 + x_9 + x_{10}$ = ……

5^{th} term = ……

iii. the common difference is ……..