## MALAPPURAM EDUCATIONAL DISTRICT
## X Maths(EM)-1.03
## ARITHMETIC SEQUENCES

# Algebra (n$^{th}$ term) of Arithmetic Sequence [x$_n$]

In the arithmetic Sequence $x_1$, $x_2$, $x_3$………. , if $x_1$ = f and common difference is 'd' then,

$x_2$ = f + 1d, $x_3$ = f + 2d, $x_4$ = f + 3d …………………………… $x_n$ = f + (n – 1)d

ie  $x_n$ = f + dn – d = dn + (f – d)

> **Algebra of Arithmetic Sequence**
> = **Common difference × n + difference of first term and common difference**
> $x_n$ = **dn + (f – d)**

eg :-  Algebra of 5, 8, 11, 14…………………….. is 3n + 2

Algebra of 20, 15, 10, 5………………..….. is -5n + 25

Algebra of  $\frac{1}{2}$ , 1 $\frac{1}{4}$ , 2, 2 $\frac{3}{4}$  ………….. is  $\frac{3}{4}$ n - $\frac{1}{4}$

- **Algebraic form of an arithmetic sequence is a first degree polynomial in the form an + b.**

eg:- 2n + 3. But $n^2$ + 5n is not the algebraic form of an arithmetic sequence.

- **In the algebra of arithmetic sequence the coefficient of 'n' is the common difference of the arithmetic sequence.**

eg:-  If the algebra of an arithmetic sequence is 2n + 1, its common difference is 2.

- I**n the algebra of arithmetic sequence the sum of the coefficients is the first term of the sequence.**

eg:- If the algebra of an arithmetic sequence is 5n - 2, its first term is 5 – 2 = 3

- **In the algebraic form of an arithmetic sequence if 'n' is given any number, the term at that position is obtained.**

eg:- if $x_n$ = 4n + 1, then $x_{20}$ = 4 × 20 + 1 = 81

# WORK SHEET 1.03

1. In the following table write the algebra of each sequence by suitably filling the column

| Arithmetic Sequence | First Term (f) | Common Difference (d) | f - d | Algebra $x_n = dn + (f - d)$ |
|---|---|---|---|---|
| 5, 8, 11, 14...... | 5 | 3 | 2 | 3n + 2 |
| 2, 10, 18, 26.... | | | | |
| 20, 13, 6, -1...... | | | | |
| $\frac{1}{2}$ , 1, 1 $\frac{1}{2}$ ,2....... | | | | |
| 5, 10, 15, 20.... | | | | |

2. In the following table algebra of some arithmetic sequences are given. Write the sequence using the first term and common difference. Also compute the terms mentioned in the last column of the table.

| Algebra ($x_n$) | f | d | Sequence | Term |
|---|---|---|---|---|
| 2n + 1 | 2 + 1 = 3 | 2 | 3, 5, 7, 9..... | $X_{10} = 2 \times 10 + 1 = 21$ |
| 3n + 2 | | | | $X_{100} = .....................$ |
| 5n - 3 | | | | $X_{20} = .....................$ |
| -4n + 5 | | | | $X_{25} = .....................$ |
| $\frac{1}{4}$ n + $\frac{3}{4}$ | | | | $X_{30} = .....................$ |

3. Consider the Arithmetic Sequence 1, 7, 13, 19 ……….
a) What is the common difference of the sequence ?
b) what is the remainder when 1 is divided by the common difference ?
c) what is the remainder when 7 is divided by the common difference ?
d) What is the algebra of the sequence ?
e) which is the number without n in the algebraic form ?
f) what is the relation between this number and common difference of this sequence ?
g) what is the remainder when 217 is divided by common difference ?
h) Is 217 a term of this sequence? Why ?

4. Prove that the arithmetic sequence with first term $\frac{1}{5}$ and common difference $\frac{1}{10}$ contains all natural numbers ?

5. How many three digit numbers are there which are multiples of 7 ?
(Hint : Use the idea of algebraic form)