ONLINE MATHS CLASS - X - 08 (05 / 07 /2021)

1. ARITHMETIC SEQUENCE - CLASS 6

What did we study in the last class ?

- **Each term of a sequence is related to its position .**
- **The n^{th} term of a sequence is its general form .**
- **The n^{th} term of a sequence is also called its *algebraic form* .**
- **An *arithmetic sequence* is a sequence in which we get the same number on subtracting from any term , the term immediately preceding it .**
- **The difference between any two terms of an arithmetic sequence is the product of the difference of positions and the common difference**
- $$Common\ \ difference = \frac{Term\ \ difference}{Position\ \ difference}$$

Activity 1

Consider the sequence of natural numbers .

1 , 2 , 3 , 4 , 5 , . . .

10^{th} term	**10**
50^{th} term	**50**
100^{th} term	**100**
199^{th} term	**199**
n^{th} term	**n**

Algebraic form of the sequence of natural numbers = n

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Activity 2

Consider the sequence of even numbers .

2 , 4 , 6 , 8 , 10 , . . .

First term	2 x 1 = 2
Second term	2 x 2 = 4
Fifth term	2 x 5 = 10
10^{th} term	2 x 10 = 20
50^{th} term	2 x 50 = 100
100^{th} term	2 x 100 = 200
n^{th} term	2 x n

Algebraic form of the sequence of even numbers = 2 n

Even numbers are the numbers obtained by multiplying natural numbers by 2

Activity 3

Consider the sequence of odd numbers .

1 , 3 , 5 , 7 , 9 , . . .

First term	2 – 1 = 1	2 x 1 – 1 = 2 – 1 = 1
Second term	4 – 1 = 3	2 x 2 – 1 = 4 – 1 = 3
Fifth term	10 – 1 = 9	2 x 5 – 1 = 10 – 1 = 9
10^{th} term	20 – 1 = 19	2 x 10 – 1 = 20 – 1 = 1 9
50^{th} term	100 – 1 = 99	2 x 50 – 1 = 100 – 1 = 99
n^{th} term	2 n - 1	2 x n – 1

Algebraic form of the sequence of odd numbers = $2n - 1$

The sequence of odd numbers got by multiplying natural numbers by 2 and subtracting 1

Activity 4

Consider the sequence of multiples of 5 .

5 , 10 , 15 , 20 , 25 , . . .

First term	5 x 1 = 5
Second term	5 x 2 = 10
Fifth term	5 x 5 = 25
10^{th} term	5 x 10 = 50
50^{th} term	5 x 50 = 250
100^{th} term	5 x 100 = 500
n^{th} term	5 x n

Algebraic form of the sequence of multiples of 5 = $5n$

Multiples of 5 are the numbers obtained by multiplying natural numbers by 5

Activity 5

	Number sequence	Algebraic form
Multiples of 3	3 , 6 , 9 , . . .	$3n$
Multiples of 4	4 , 8 , 12 , . . .	$4n$
Multiples of 6	6 , 12 , 18 , . . .	$6n$
Multiples of 7	7 , 14 , 21 , . . .	$7n$
Multiples of 10	10 , 20 , 30 , . . .	$10n$

Findings

	Number sequence	Common difference	Algebraic form
Natural numbers	1 , 2 , 3 , . . .	1	n
Even numbers	2 , 4 , 6 , . . .	2	$2n$
Odd numbers	1 , 3 , 5 , . . .	2	$2n - 1$
Multiples of 5	5 , 10 , 15 , . . .	5	$5n$
Multiples of 3	3 , 6 , 9 , . . .	3	$3n$
Multiples of 4	4 , 8 , 12 , . . .	4	$4n$
Multiples of 6	6 , 12 , 18 , . . .	6	$6n$
Multiples of 7	7 , 14 , 21 , . . .	7	$7n$
Multiples of 10	10 , 20 , 30 , . . .	10	$10n$

- The coefficient of n in the algebraic form of each arithmetic sequence is its common difference .

NOTE :

> The sequence obtained by multiplying natural numbers by a fixed number and adding or subtracting a fixed number is an arithmetic sequence .

Activity 6

	Number sequence .
Multiples of 5	5 , 10 , 15 , 20 , 25 , . . .
Add 1 to the multiples of 5	6 , 11 , 16 , 21 , 26 , . . .

Consider the sequence obtained by adding 1 to the multiples of 5 .

First term	5 x 1 + 1 = 5 + 1 = 6
Second term	5 x 2 + 1 = 10 + 1 = 11
Fifth term	5 x 5 + 1 = 25 + 1 = 26
10^{th} term	5 x 10 + 1 = 50 + 1 = 51
50^{th} term	5 x 50 + 1 = 250 + 1 = 251
100^{th} term	5 x 100 + 1 = 500 + 1 = 501
n^{th} term	5 x n + 1 = 5 n + 1

Algebraic form of this sequence = 5 n + 1

Activity 7

	Number sequence .
Multiples of 3	3 , 6 , 9 , 12 , 15 , . . .
Add 2 to the multiples of 3	5 , 8 , 11 , 14 , 17 , . . .

Consider the sequence obtained by adding 2 to the multiples of 3 .

First term	3 x 1 + 2 = 3 + 2 = 5
Second term	3 x 2 + 2 = 6 + 2 = 8
Fifth term	3 x 5 + 2 = 15 + 2 = 17
10^{th} term	3 x 10 + 2 = 30 + 2 = 32
50^{th} term	3 x 50 + 2 = 150 + 2 = 152
100^{th} term	3 x 100 + 2 = 300 + 2 = 302
n^{th} term	3 x n + 2 = 3 n + 2

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Algebraic form of this sequence = $3n + 2$

Activity 8

	Number sequence .
Multiples of 3	3 , 6 , 9 , 12 , 15 , . . .
Subtract 1 from the multiples of 3	2 , 5 , 8 , 11 , 14 , . . .

Consider the sequence of obtained by subtracting 1 from the multiples of 3 .

First term	3 x 1 – 1 = 3 – 1 = 2
Second term	3 x 2 – 1 = 6 – 1 = 5
Fifth term	3 x 5 – 1 = 15 – 1 = 14
10^{th} term	3 x 10 – 1 = 30 – 1 = 29
50^{th} term	3 x 50 – 1 = 150 – 1 = 149
100^{th} term	3 x 100 – 1 = 300 – 1 = 299
n^{th} term	3 x n – 1 = 3 n – 1

Algebraic form of this sequence = $3n - 1$

Findings

- The terms of the arithmetic sequence 6 , 11 , 16 , 21 , 26 , . . . are obtained by adding 1 to the multiples of the common difference .
- Algebraic form of the arithmetic sequence 6 , 11 , 16 , 21 , 26 , . . . is $5n + 1$
- The terms of the arithmetic sequence 5 , 8 , 11 , 14 , 17 , . . . are obtained by adding 2 to the multiples of common difference .
- Algebraic form of the arithmetic sequence 5 , 8 , 11 , 14 , 17 , . . . is $3n + 2$
- The terms of the arithmetic sequence 2 , 5 , 8 , 11 , 14 , . . . are obtained by subtracting 1 from the multiples of the common difference .

- Algebraic form of the arithmetic sequence 2 , 5 , 8 , 11 , 14 , . . . is $3n - 1$
- Each term of an arithmetic sequence is got by multiplying the position number by the common difference and adding or subtracting a fixed number .
- Terms of an arithmetic sequence are got by multiplying natural numbers by the common difference and adding or subtracting fixed number .
- The coefficient of n in the algebraic form of an arithmetic sequence is its common difference .

Conclusion

The algebraic form of any arithmetic sequence is of the form $an + b$, where a and b are fixed numbers . a is the common difference .

Activity 9

NOTE :

The n^{th} term of a sequence is its general form .

The n^{th} term of a sequence is also called its *algebraic form* .

If the first term of an arithmetic sequence is f and its common difference is d , then

Second term = $f + d$

Third term = $f + 2d$

Fourth term = $f + 3d$

Fifth tetrm = $f + 4d$

. . .

n^{th} term = $f + (n - 1)d$

That is , n^{th} term is obtained by adding ($n - 1$) times common difference to the first term .

NOTE :

★ n^{th} term $= f + (n - 1)\,d = f + n \times d - d = f + dn - d = dn + f - d$

★ If the first term of an arithmetic sequence is f and its common difference is d , then its n^{th} term is $dn + f - d$.

★ Algebraic of any arithmetic sequence is of the form $an + b$

($a = d$, $b = f - d$)

Activity 10

What is the algebraic form of the arithmetic sequence 2 , 5 , 8 , ...

Answer

n^{th} term $= dn + f - d$ ($f = 2$, $d = 5 - 2 = 3$)

$= 3 \times n + 2 - 3 = 3n - 1$

(Here the common difference is 3 . The terms of this sequence got by subtracting 2 from the multiples of 3 .By this way also we can find the algebraic form without using formula)

Activity 11

Consider the sequence of natural numbers which leave a remainder 2 on division by 3 .

a) Write down the sequence .

b) What is the algebraic form of this sequence ?

Answer

a) 2 , 5 , 8 , . . . ($f = 2$, $d = 5 - 2 = 3$)

b) n^{th} term $= dn + f - d = 3 \times n + 2 - 3 = 3n - 1$

More activity

Consider the sequence of natural numbers which leave a remainder 1 on division by 4 .

a) Write down the sequence .

b) What is the algebraic form of this sequence ?