ONLINE MATHS CLASS - X - 04 (24 / 06 /2021)

1. ARITHMETIC SEQUENCE - CLASS 2

What we studied in the last class ? .

Number sequences

A set of numbers written as the first , second , third and so on , according to a particular rule is called a Number sequence

Terms of a sequence

The numbers forming a sequence are called its *terms*

Activity 1

Consider the sequence of natural numbers .

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

First term	Second term	Third term	Fourth term	Fifth term
1	2	3	4	5

10^{th} term	25^{th} term	50^{th} term	100^{th} term	n^{th} term
10	25	50	100	n

That is ,

Position of the term	1	2	3	4	5	. . .	10	25	50	100	n
Term	1	2	3	4	5	. . .	10	25	50	100	n

Activity 2

Consider the sequence of even numbers .

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

First term	Second term	Third term	Fourth term	Fifth term
2	4	6	8	10

10^{th} term	25^{th} term	50^{th} term	100^{th} term	n^{th} term
20	50	100	200	2n

That is ,

Position of the term	1	2	3	4	5	. . .	10	25	50	100	n
Term	2 x 1	2 x 2	2 x 3	2 x 4	2 x 5	. . .	2 x 10	2 x 25	2 x 50	2 x 100	2 x n

Activity 3

Consider the sequence of perfect squares .

1 , 4 , 9 , 16 , 25 , . . .

First term	Second term	Third term	Fourth term	Fifth term
1	4	9	16	25

10^{th} term	21^{th} term	30^{th} term	50^{th} term	n^{th} term
100	441	900	2500	n^2

That is ,

Position of the term	1	2	3	4	5	. . .	10	21	30	50	n
Term	1 x 1	2 x 2	3 x 3	4 x 4	5 x 5	. . .	10x 10	21 x 21	30 x 30	50 x 50	n x n

Activity 4

Consider the sequence of reciprocal of the natural numbers .

$\frac{1}{1}$, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, . . .

First term	Second term	Third term	Fourth term	Fifth term
$\frac{1}{1}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$

10^{th} term	25^{th} term	50^{th} term	100^{th} term	n^{th} term
$\frac{1}{10}$	$\frac{1}{25}$	$\frac{1}{50}$	$\frac{1}{100}$	$\frac{1}{n}$

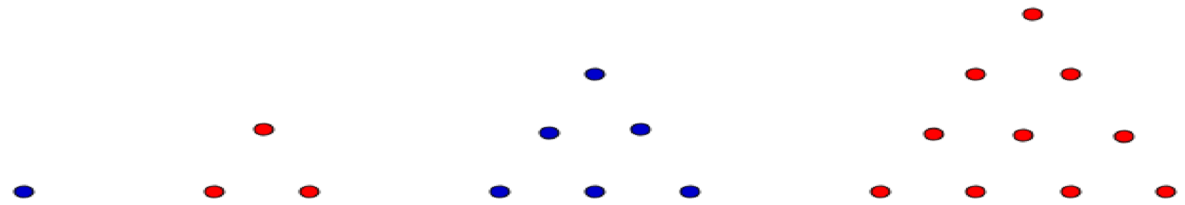
That is ,

Position of the term	1	2	3	4	5	. . .	10	25	50	100	n
Term	$\frac{1}{1}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	. . .	$\frac{1}{10}$	$\frac{1}{25}$	$\frac{1}{50}$	$\frac{1}{100}$	$\frac{1}{n}$

Activity 5

Lets arrange the dots as shown in the figure . This process is going on in order .

Consider the sequence of number of dots in each set .



1 , 3 , 6 , 10 , 15 , . . .

First term	Second term	Third term	Fourth term	Fifth term
1	1 + 2	1 + 2 + 3	1 + 2 + 3 + 4	1 + 2 + 3 + 4 +5

10^{th} term	25^{th} term	50^{th} term	100^{th} term	n^{th} term
1+2+3 + . . . +10	1+2+3 + . . . +25	1+2+3 + . . . +50	1+2+3 + . . . +100	1+2+3 + . . . +n

That is ,

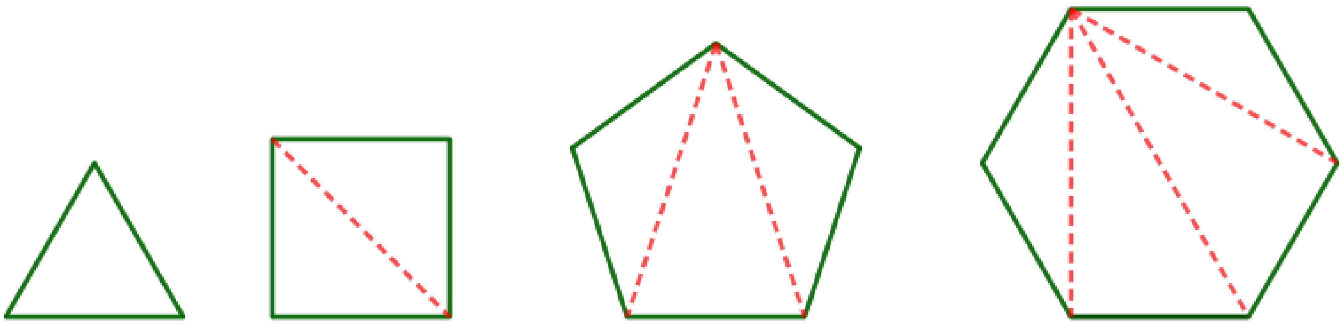
Position of the term	1	2	3	4	5
Term	1	1 + 2	1 + 2 + 3	1 + 2 + 3 + 4	1 + 2 + 3 + 4 +5

10	25	50	100	n
1+2+3 + . . . +10	1+2+3 + . . . +25	1+2+3 + . . . +50	1+2+3 + . . . +100	1+2+3 + . . . + n

Activity 6

Consider the sequence of regular polygons starting with an equilateral triangle . Consider the sequence of their sums of inner angles .

(By drawing maximum number of diagonals from one vertex of each polygon , we can divide it into triangles . Hence we can find their sum of inner angles .)



180^0 , 360^0 , 540^0 , 720^0, . . .

First term	Second term	Third term	Fourth term	Fifth term
180^0	2×180^0	3×180^0	4×180^0	5×180^0

10^{th} term	25^{th} term	50^{th} term	100^{th} term	n^{th} term
10×180^0	25×180^0	50×180^0	100×180^0	$n \times 180^0$

That is ,

Position of the term	1	2	3	4	5	. . .	10	25	50	100	n
Term	180^0	360^0	540^0	720^0	900^0	. . .	1800^0	4500^0	9000^0	18000^0	$n \times 180^0$

Findings

- **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* .**

Activity	Number sequence	Algebraic form
1	1 , 2 , 3 , 4 , 5 , . . .	n
2	2 , 4 , 6 , 8 , 10 , . . .	2n
3	1 , 4 , 9 , 16 , 25 , . . .	n^2
4	$\frac{1}{1}$, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, . . .	$\frac{1}{n}$ . .
5	1 , 3 , 6 , 10 , 15 , . . .	1 + 2 + 3 + . . . + n
6	180^0 , 360^0 , 540^0 , 720^0 , . . .	$n \times 180^0$

Conclusion

Algebraic form of a number sequence is the algebraic expression of the relationship between the term and its position .

More activty .

(1) Write the algebraic expression for each of the sequences below:

i) Sequence of odd numbers

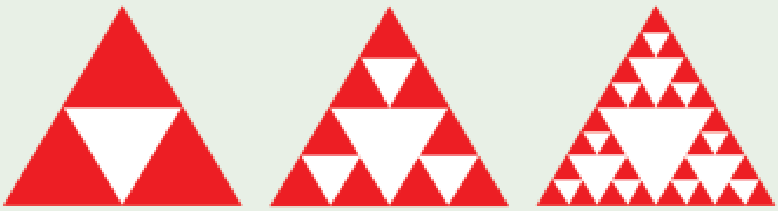
ii) Sequence of natural numbers which leave remainder 1 on division by 3.

iii) The sequence of natural numbers ending in 1.

iv) The sequence of natural numbers ending in 1 or 6.

(2) For the sequence of regular polygons starting with an equilateral triangle, write the algebraic expressions for the sequence of the sums of inner angles, the sums of the outer angles, the measures of an inner angle, and the measures of an outer angle.

(3) Look at these pictures:



BA4X62

The first picture is got by removing the small triangle formed by joining the midpoints of an equilateral triangle. The second picture is got by removing such a middle triangle from each of the red triangles of the first picture. The third picture shows the same thing done on the second.

i) How many red triangles are there in each picture?

ii) Taking the area of the original uncut triangle as 1, compute the area of a small triangle in each picture.

iii) What is the total area of all the red triangles in each picture?

iv) Write the algebraic expressions for these three sequences