Mathematics Online Class X On 24-06-2021
ARITHMETIC SEQUENCE Click

Number Sequence

A group of numbers written as the first, second, third and so on using a particular condition is called a number sequence.

Terms of a number sequence

Each number in a sequence is called a term. First term, Second term, Third term, . . . , 10 th term, . . . , 100 th term, . . . n th term.

They are denoted by x_1, x_2, x_3, . . . , x_{10}, . . . , x_{100}, . . ., x_n

Algebraic form or n th term of a sequence

n th term is the general term and hence it is called the algebraic form of the sequence.

1. In the sequence of natural numbers 1, 2, 3, 4, . . .

First term $x_1 = 1$

Second term $x_2 = 2$

Third term $x_3 = 3$

Tenth term $x_{10} = 10$

Hundredth term $x_{100} = 100$

n th term $x_n = n$

2. In the sequence of even numbers 2, 4, 6, 8, . . .

First term $x_1 = 1 \times 2 = 2$

Second term $x_2 = 2 \times 2 = 4$

Third term $x_3 = 3 \times 2 = 6$

Tenth term $x_{10} = 10 \times 2 = 20$

Hundredth term $x_{100} = 100 \times 2 = 200$

n th term $x_n = 2 \times n = 2n$

3. In the sequence of square numbers 1, 4, 9, 16, 25, . . .

First term $x_1 = 1^2 = 1$

Second term $x_2 = 2^2 = 4$

Third term $x_3 = 3^2 = 9$

Tenth term $x_{10} = 10^2 = 100$

Hundredth term, $x_{100} = 100^2 = 10000$

n th term, $x_n = n^2$

4. In the sequence of reciprocals of natural numbers

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

That is $1 \, , \, \frac{1}{2} \, , \, \frac{1}{3} \, , \, \frac{1}{4} \, , \, ...$

First term $x_1 = 1$

Second term $x_2 = \frac{1}{2}$

Third term $x_3 = \frac{1}{3}$

Fourth term $x_4 = \frac{1}{4}$

Hundredth term $x_{100} = \frac{1}{100}$

n th term $x_n = \frac{1}{n}$

5. In the sequence of numbers 1, 3, 6, 10, . . .

First term $x_1 = 1$

Second term $x_2 = 1 + 2 = 3$

Third term $x_3 = 1 + 2 + 3 = 6$

Fourth term $x_4 = 1 + 2 + 3 + 4 = 10$

Tenth term $x_{10} = 1 + 2 + 3 + 4 + . . . + 10$

Hundredth term $x_{100} = 1 + 2 + 3 + 4 + . . . + 100$

n th term $x_n = 1 + 2 + 3 + 4 + . . . + n$

6. In the sequence sum of inner angles of polygons (triangle, square, pentagon, hexagon, . . .)

$180°, 360°, 540°, 720°, . . .$

First term $x_1 = 1 \times 180 = 180$

Second term $x_2 = 2 \times 180 = 360$

Third term $x_3 = 3 \times 180 = 540$

Fourth term $x_4 = 4 \times 180 = 720$

Tenth term $x_{10} = 10 \times 180 = 1800$

Hundredth term $x_{100} = 100 \times 180 = 18000$

n th term $x_n = n \times 180 = 180n$

7. In the sequence of prime numbers 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31,. . .

There is no algebraic form exists for the sequence of prime numbers. There fore some sequences have no algebraic form.

Assignment (Page No.14 questions 1 to 3 of text book)

(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:

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 obtained by continuing this process.