Number Theory

Number theory is a branch of mathematics which helps to study the set of positive whole numbers, say 1, 2, 3, 4, 5, 6,. . . , which are also called the set of natural numbers and sometimes called "higher arithmetic".

Number theory helps to study the relationships between different sorts of numbers. Natural numbers are separated into a variety of times. Here are some of the familiar and unfamiliar examples with quick number theory introduction.

Introduction to Number Theory

In number theory, the numbers are classified into different types, such as natural numbers, whole numbers, complexnumbers, and so on. The sub-classifications of the natural number are given below:

- Odd Numbers – 1, 3, 5, 7, 9, 11, 13, 15, 17, 19.....

- Even Numbers – 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22 . . .

- Square Numbers – 4, 9, 16, 25, 36, 49, 64, 81,100 . . .

- Cube Numbers – 8, 27, 64, 125, 216, 343, 512 . . .

- Prime Numbers – 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47,53, 59, 61 . . .

- Composite Numbers – 4, 6, 8, 9, 10, 12, 14, 15, 16,18, 20, 21, 22, 24 . . .

- 1 (modulo 4) Numbers – 1, 5, 9, 13, 17, 21, 25, . . .

- 3 (modulo 4) Numbers – 3, 7, 11, 15, 19, 23, 27, . . .

- Triangular Numbers – 3, 6, 10, 15, 21, 28, 36, 45,. . .

- Perfect Numbers – 6, 28, 496, 8128, . . .

- Fibonacci Numbers -1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89. . .

Many of these types of numbers like odd, even, square, cube prime and composite numbers are already familiar to you. Other cases, such as the "modulo 4" numbers, Triangular numbers, perfect numbers and Fibonacci numbers are not familiar to you.

Number Theory Topics

Even Numbers: The numbers that are evenly divided by 2 are called even numbers.

Odd Numbers: The numbers that are not evenly divided by 2 are called odd numbers.

Square Numbers: A number multiplied by itself is called square numbers

Cube Numbers: A number multiplied by itself 3 times is called cube numbers.

Prime numbers: If a number has only two factors: 1 and the number is called prime numbers

Co Prime Numbers: Two numbers are called co prime numbers, if the highest common factor between the two is 1.

Composite Numbers: Composite number has more than two factors. The composite numbers are numbers which are not prime numbers. The number 1 is neither prime nor composite.

Modulo 4 Numbers: A number is said to be 1 (modulo 4) number if it leaves a remainder 1 when divided by 4.Similarly, if a number leaves a remainder 3 when divided by 4, it is said to be 3 (modulo 4) number.

Triangular Numbers: A number is said to be a triangular number when that number of pebbles can be arranged in a triangle using one pebble at the top, two pebbles in next row, three pebbles in next row and so on.

Fibonacci Numbers: Fibonacci numbers are created starting with 1 and 1, then get the next number in the list and adds the previous two numbers. Say, 1+1 =2 and then add 1+2 you get 3, then adds 2+3 gives 5, then 3+5 gives 8 and so on.

Also, read:

- ➢ Even Numbers
- ➢ Odd Numbers
- ➢ Square Numbers
- ➢ Divisibility Rules

Applications of Number Theory

Here are some of the most important number theory applications. Number theory is used to find some of the important divisibility tests, whether a given integer m divides the integer n. Number theory have countless applications in mathematics as well in practical applications such as

- ➢ Security System like in banking securities
- ➢ E-commerce websites
- ➢ Coding theory
- ➢ Barcodes
- ➢ Making of modular designs
- ➢ Memory management system
- ➢ Authentication system

It is also defined in hash functions, linear congruences, Pseudorandom numbers and fast arithmetic operations.

Problems and Solutions

Go through the given number theory problems once to get a better understanding.

Problem 1: Find the Greatest Common Divisor(G.C.D) of a number 30 and 52

Solution:

Divisors of 30 are 1, 2, 3, 5, 6, 10, 15, 30

Divisors of 52 are 1, 2, 4, 13, 26, 52

The common divisors in 30 and 52 is 2

Therefore, the G.C.D of 30 and 52 is 2

G.C.D (30,52)= 2

Problem 2: Find the common factors of 10 and 16

Solution:

Factors of 10 are:

$2 \times 5 = 10$

$1 \times 10 = 10$

Therefore, the factors are 1, 2, 5 and 10

Factors of 16 are

$4 \times 4 = 16$

$1 \times 16 = 16$

$2 \times 8 = 16$

Therefore, the factors of 16 are as follows: 1, 2, 4, 8, 16

Then, the common factors are 1 and 2.

Problem 3: Show that the greatest factor of a number is the number itself.

Solution:

Assume the number 24

The factors of 24 are

$1 \times 24 = 24$

$12 \times 2 = 24$

$8 \times 3 = 24$

$6 \times 4 = 24$

The factors of 24 are 1, 2, 3, 4, 6, 8, 12 and 24

From this, we can say that 24 is the greatest factor of a number 24.

Hence proved