Number System

Natural Numbers:

- Numbers which are naturally used for counting and ordering are called natural numbers.
- 1, 2, 3, 4, 5, 6, 7,.....n are called natural numbers.
- The smallest natural number is 1.
  0 (zero) is not a natural number.
- The biggest natural number cannot be determined. It is infinite.

Whole Numbers:

- zero and natural numbers together are called whole numbers.
- 0, 1, 3, 4, 5, 6, 7,.....n are called whole numbers.
- 0 is the smallest whole number.

Prime numbers:

- A number which is divisible only by one and by itself and no other natural number.
- A prime number has only two factors - 1 and the number itself.
- 2 is the smallest prime number.
- 2 is the only number which is prime as well as even number.

Composite numbers:

- Numbers which are not prime numbers are composite numbers
- They have more than 2 factors.
- 1 is not a composite number.

Co-Prime numbers (Relative primes):

- Two numbers which have only 1 as a common factor. E.g. 7 and 6, 3 and 8 etc
- They need not be prime numbers individually.

Twin Primes:

- Two consecutive prime numbers which have a difference of two. E.g. 11 and 13, 17 and 19 etc.

Factors

Factors of a number are the numbers which divide the number completely without leaving a remainder. A number can have multiple factors.

E.g.

Factors of 12=3 X 4, 1 X 12, 2 X 6, 2 X 2 X 3

Prime factors: If factors of a number are prime numbers then they are called prime factors.

E.g.

Prime factors of 12=1 X 2 X 2 X 3

Common factors: Factor common between two numbers are called common factors.

E.g.

9=**1** X **3** X **3**

6=**1** X 2 X **3**

1 and 3 are common between the two numbers thus they are common factors between the two numbers.

H.C.F. of two numbers is the greatest common factor which divides the two numbers completely. It is also known as G.C.F or greatest common factor.

E.g.

12=**1** X **2** X 2 X **3 , 2 X 6**

18=**1** X **2** X 3 X **3 , 3 X 6**

Common factors between 12 and 18 are 1, 2, 3 and 6.**6** is the **greatest** among all factors so **6 is the H.C.F. of 12 and 18**.

Co-prime: If two numbers have only 1 as the common factor they are known as co-prime numbers. E.g. 3 and 5.

Multiples

The numbers we get by multiplying a given number are called multiples of the given number. These are essentially the numbers found in the multiplication table of the number.

The smallest multiple of a number is the number itself. Biggest multiple of a number is very big and can't be determined. Multiples of a number are unlimited.

**Factors of a number are limited in numbers and the biggest factor of a number is the number itself.*

E.g.

Multiples of 6 are 6 X 1, 6 X 2, 6 X 3, 6 X 4 , 6 X 5, 6 X 6 etc.

or we can say 6, 12, 18, 24, 30, 36 etc. are multiples of six.

Common multiples: The multiples which are common between 2 numbers are called multiples. Common multiples of two numbers are infinite.

L.C.M. or lowest common multiple: The lowest number between the common multiples of two numbers is called the L.C.M. of two numbers.

E.g.

Multiples of 6 are 6, 12, 18,**24**, 30, 36, 42,**48**, 54, 60, 66,**72** etc

Multiples of 8 are 8, 16,**24**, 32, 40,**48**, 56, 64,**72**, 80, 88, 96 etc

24, 48 and 72 and so on are common multiples of 6 and 8. 24 is the lowest common multiple so it is the L.C.M. of 6 and 8.

Imp Concept:

Rules of divisibility

1. If a number is even it is divisible by 2.
2. A number is divisible by 3 if the sum of the digits of the number is divisible 3**E.g.** Is 4635 divisible by 3? 4 + 6 + 3 + 5=18. 18 is divisible by 3 so the number 4635 is divisible by 3.
3. A number is divisible by 4 if the number formed by its last two digits is divisible by 4. E.g. to check if 47932 is divisible by 4, check if last 2 digits 32 is divisible by 4. Yes, 32 is divisible by 4 so the number 47932 is divisible by 4.
4. If a number has 0 or 5 as the last digit then the number is divisible by 5.
5. A number is divisible by 9 if the sum of the digits of the number is divisible by 9**E.g.** Is 4635 divisible by 9? 4 + 6 + 3 + 5=18. 18 is divisible by 9 so the number 4635 is divisible by 9.
6. A number is divisible by 10 if the last digit is 0.

Perfect numbers: When the sum of all the factors of a number is twice of the number itself, the number is known as a perfect number. E.g. 6.

Factors of 6: 1, 2, 3, 6

Sum of factors = 1 + 2 + 3 + 6 = 12 = **2 X 6.**

Prime factorization: When factors of a number are reduced to prime numbers such that their product gives the number, the process is known as prime-factorization and factors are known as prime factors. Every natural number can be represented as a product of its prime factors.