CBSE Class–10 Mathematics
Revision Notes
CHAPTER 01
REAL NUMBERS

- **Natural numbers**: Counting numbers are called Natural numbers. These numbers are denoted by N = {1, 2, 3, ...}
- **Whole numbers**: The collection of natural numbers along with 0 is the collection of Whole number and is denoted by W.
- **Integers**: The collection of natural numbers, their negatives along with the number zero are called Integers. This collection is denoted by Z.
- **Rational number**: The numbers, which are obtained by dividing two integers, are called Rational numbers. **Division by zero is not defined**.
- **Coprime**: If HCF of two numbers is 1, then the two numbers area called relatively prime or coprime.

1. **Euclid's division lemma :**

For given positive integers 'a' and 'b' there exist unique whole numbers 'q' and 'r' satisfying the relation $\mathrm{a} = \mathrm{bq} + \mathrm{r},\ 0 \leqslant \mathrm{r} < \mathrm{b}$..

Theorem: If a and b are non-zero integers, the least positive integer which is expressible as a linear combination of a and b is the HCF of a and b, i.e., if d is the HCF of a and b, then these exist integers x_1 and y_1, such that $d = ax_1 + by_1$ and d is the smallest positive integer which is expressible in this form.

The HCF of a and b is denoted by HCF(a, b).

2. **Euclid's division algorithms :**

HCF of any two positive integers a and b. With a > b is obtained as follows:

Step 1 : Apply Euclid's division lemma to a and b to find q and r such that

$\mathrm{a} = \mathrm{bq} + \mathrm{r}\ ,\ 0 \leqslant \mathrm{r} < \mathrm{b}.$

b = Divisor

q = Quotient

r = Remainder

Step II: If r = 0, HCF (a,b)=b if $r \neq 0$, apply Euclid's lemma to b and r.

Step III: Continue the process till the remainder is zero. The divisor at this stage will be the required HCF.

3. **The Fundamental Theorem of Arithmetic :**

Every composite number can be expressed (factorized) as a product of primes and this factorization is unique, apart from the order in which the prime factors occur.

$$Ex: \quad 24 = 2 \times 2 \times 2 \times 3 = 3 \times 2 \times 2 \times 2$$

4. Let $x = \frac{p}{q}, q \neq 0$ to be a rational number, such that the prime factorization of 'q' is of the form 2m+5n, where m, n are non-negative integers. Then x has a decimal expansion which is terminating.

5. Let $x = \frac{p}{q}, \ q \neq 0$ be a rational number, such that the prime factorizationof q is not of the form 2m+5n, where m, n are non-negative integers. Then x has a decimal expansion which is non-terminating repeating.

6. $\sqrt{p}$ is irrational, which p is a prime. A number is called irrational if it cannot be written in the form $\frac{P}{q}$ where p and q are integers and q $\neq$ 0.

8. If a and b are two positive integers, then HCF(a, b) x LCM(a, b) = a x b

i.e., (HCF x LCM) of two intergers = Product of intergers.

9. A rational number which when expressed in the lowest term has factors 2 or 5 in the denominator can be written as terminating decimal otherwise a non-terminating recurring decimal. In other words, if the rational number $\frac{a}{b}$ is, such that the prime factorization of b is of form $2^m.5^n$, where m and n are natural numbers, then $\frac{a}{b}$ has a terminating decimal expansion.

10. We conclude that every rational number can be represented in the form of terminating or non-terminating recurring decimal.