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CLASS : IX

SUBJECT : MATHEMATICS

DATE: 08.04.2021

Number System Class 9 Notes - Chapter 1

Introduction to Number Systems

Numbers

Number: Arithmetical value representing a particular quantity. The various types of numbers are Natural Numbers, Whole Numbers, Integers, Rational Numbers, Irrational Numbers, Real Numbers etc.

Natural Numbers

Natural numbers(**N**) are positive numbers i.e. 1, 2, 3 ..and so on.

Whole Numbers

Whole numbers (**W**) are 0, 1, 2,..and so on. Whole numbers are all Natural Numbers including '0'. Whole numbers do not include any fractions, negative numbers or decimals.

Integers

Integers are the numbers that includes whole numbers along with the negative numbers.

Rational Numbers

A number 'r' is called a rational number if it can be written in the form p/q , where p and q are integers and $q \neq 0$.

Irrational Numbers

Any number that cannot be expressed in the form of p/q , where p and q are integers and $q \neq 0$, is an irrational number. Examples: $\sqrt{2}$, 1.010024563..., e, π

Real Numbers

Any number which can be represented on the number line is a Real Number(**R**). It includes both rational and irrational numbers. Every point on the number line represents a unique real number.

Irrational Numbers

Representation of Irrational numbers on the Number line

Let \sqrt{x} be an irrational number. To represent it on the number line we will follow the following steps:

- Take any point A. Draw a line $AB = x$ units.
- Extend AB to point C such that $BC = 1$ unit.
- Find out the mid-point of AC and name it 'O'. With 'O' as the centre draw a semi-circle with radius OC.
 - Draw a straight line from B which is perpendicular to AC, such that it intersects the semi-circle at point D.

Decimal Representation of Rational Numbers

Decimal expansion of Rational and Irrational Numbers

The decimal expansion of a rational number is terminating or non-terminating and recurring.

Example: $1/2 = 0.5$, $1/3 = 3.33.....$

The decimal expansion of an irrational number is non-terminating and non-recurring.

Examples: $\sqrt{2} = 1.41421356..$