

MODULE-1

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| – REAL NUMBERS
– PAIR OF LINEAR EQUATIONS IN TWO VARIABLES
– SIMILAR TRIANGLES | – POLYNOMIALS
– INTRODUCTION TO TRIGONOMETRY
– STATISTICS |
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NEEV
A Pre-Foundation Division



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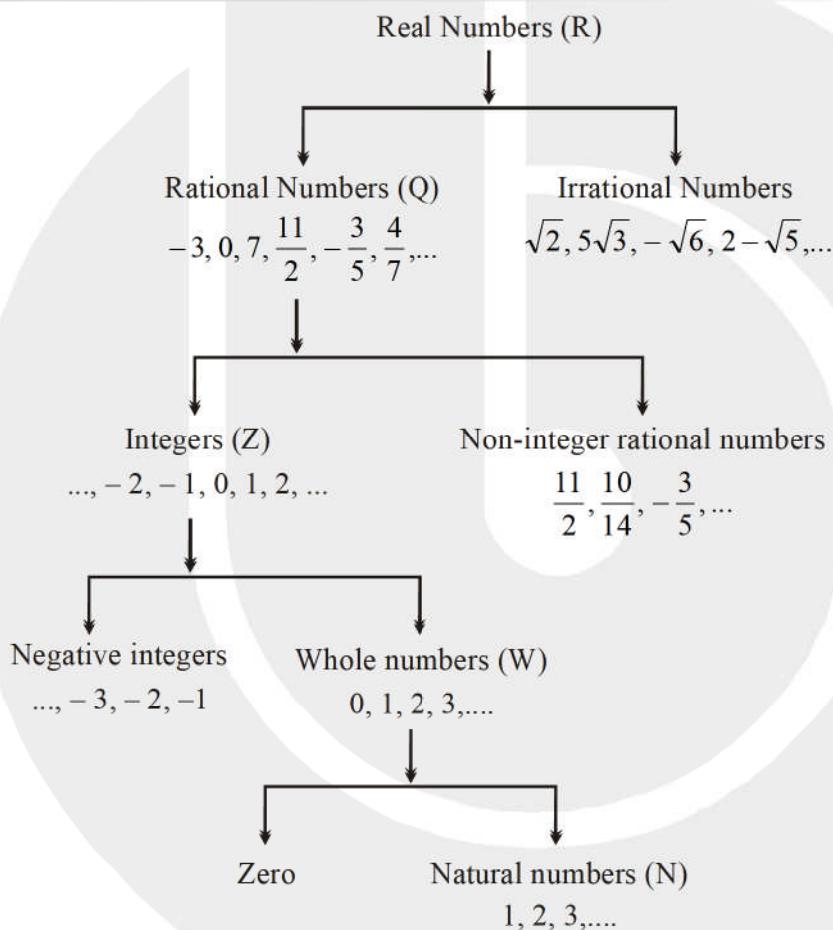
REAL NUMBERS

' THEORY

1.1 INTRODUCTION :



KEY CONCEPT



- **Natural numbers :** The counting numbers 1,2,3..... are called natural numbers. It is denoted by N.

$$N = \{1, 2, 3, \dots\}$$

- **Whole numbers :** In the set of natural number if we include the number 0, the resulting set is known as the set of whole numbers.

It is represented by W.

$$W = \{0, 1, 2, \dots\}$$

- **Integers :** Natural numbers along with 0 and their negatives are called integers and the set of integers is denoted by I

$$I = \{ \dots, -4, -3, -2, -1, 0, 1, 2, 3, \dots \}$$

- **Rational numbers :** A rational number is a number which can be expressed in the form of p/q , where p and q are integers and q is not zero.

- **Irrational numbers :** A number is called irrational if it can not be written in the form of p/q , where p and q are integers and $q \neq 0$

The system R of real numbers includes rational as well irrational numbers.

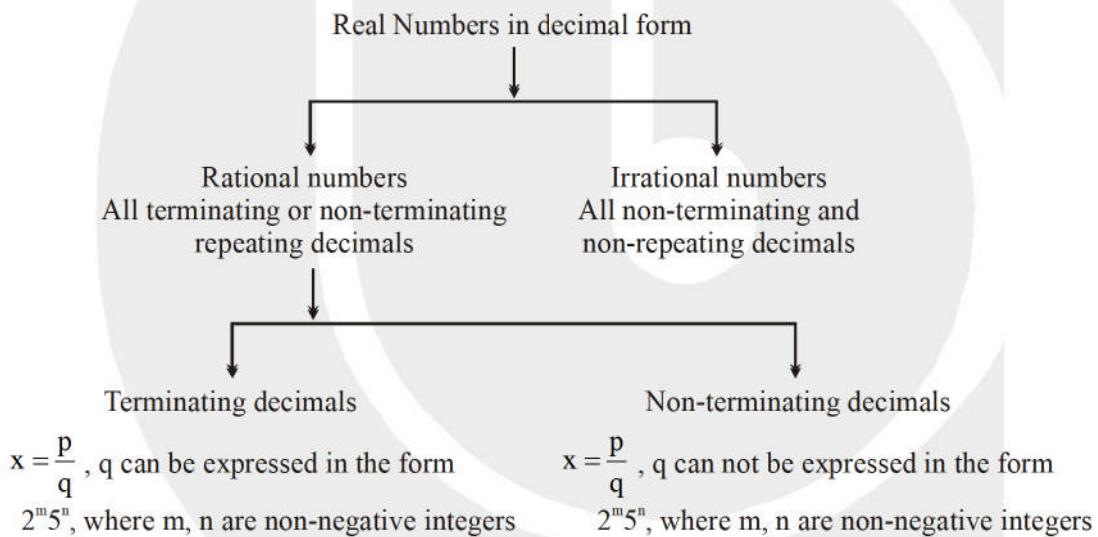
In this chapter we will begin with a brief recall of divisibility of integers as well state some important properties of integers.

1.2 RATIONAL NUMBERS

Decimal Representation of Rational Numbers :



KEY CONCEPT



- (i) **Finite or Terminating Decimal :** Every fraction p/q can be expressed as a decimal, if the decimal expression of p/q terminates, i.e. comes to an end, then the decimal so obtained is called a terminating decimal.

$$\text{e.g., } 1/4 = 0.25, \ 5/8 = 0.625, \ 2\frac{3}{5} = \frac{13}{5} = 2.6$$

Thus, each of the numbers $\frac{1}{4}$, $\frac{5}{8}$ and $2\frac{3}{5}$ can be expressed in the form of a terminating decimal.

Important : A fraction p/q is a terminating decimal only, when prime factors of q are 2 and 5 only.

e.g. Each one of the fractions $\frac{1}{2}$, $\frac{3}{4}$, $\frac{7}{20}$, $\frac{13}{25}$ is a terminating decimal, since the denominator of each has no prime factor other than 2 and 5.

- (ii) **Repeating (or Recurring) Decimals:** A decimal in which a digit or a set of digits repeats periodically, is called a repeating or a recurring decimal.

In a recurring decimal, we place a bar over the first block of the repeating part and omit the other repeating blocks.

e.g. (i) $\frac{2}{3} = 0.666 \dots = 0.\overline{6}$

(ii) $\frac{15}{7} = 2.142857142857 \dots = 2.\overline{142857}$



REMEMBER

Special Characteristics of Rational Numbers :

- (i) Every rational number is expressible either as a terminating decimal or as a repeating decimal.
- (ii) Every terminating decimal is a rational number.
- (iii) Every repeating decimal is a rational number.

Fractions :

- | | | |
|------------------------|---|---|
| (a) Common fraction | : | Fractions whose denominator is not 10. |
| (b) Decimal fraction | : | Fractions whose denominator is 10 or any power of 10. |
| (c) Proper fraction | : | Numerator < Denominator i.e. $\frac{2}{7}$ |
| (d) Improper fraction | : | Numerator > Denominator i.e. $\frac{7}{2}$ |
| (e) Mixed fraction | : | Consists of integral as well as fractional part i.e. $5\frac{2}{9}$ |
| (f) Compound fraction | : | Fraction whose numerator and denominator themselves are fractions. i.e. $\frac{4/5}{3/7}$. |
| (g) Continued fraction | : | Fraction consists of the fractional denominators. |

$$\text{i.e., } 1 + \cfrac{1}{2 - \cfrac{3}{5 + \cfrac{4}{7}}}$$