



# MATHEMATICS

CLASS - X

## MODULE-1

- REAL NUMBERS
- PAIR OF LINEAR EQUATIONS IN TWO VARIABLES
- SIMILAR TRIANGLES
- POLYNOMIALS
- INTRODUCTION TO TRIGONOMETRY
- STATISTICS



**NEEV**

A Pre-Foundation Division



**BANSAL CLASSES**  
PRIVATE LIMITED

*Ideal for Scholars*



# CONTENT

TOPIC NAME	PAGE NO.
<b>1. REAL NUMBERS</b>	
1.1 INTRODUCTION .....	01
1.2 RATIONAL NUMBERS .....	02
1.3 IRRATIONAL NUMBERS .....	07
1.4 REAL NUMBERS .....	08
1.5 TEST OF DIVISIBILITY .....	09
1.6 RADICALS .....	10
1.7 RATIONALISATION OF DENOMINATOR .....	11
1.8 TO FIND THE NUMBER OF DIVISORS OF A COMPOSITE NUMBER .....	14
1.9 ABSOLUTE VALUE OR MODULUS OF A RATIONAL NUMBER .....	15
1.10 HCF AND LCM OF FRACTIONS .....	16
1.11 TO FIND UNIT DIGIT IN EXPONENTIAL EXPRESSION .....	16
1.12 DIVISIBILITY .....	17
1.13 EUCLID'S DIVISION LEMMA .....	18
1.14 THE FUNDAMENTAL THEOREM OF ARITHMETIC .....	22
1.15 DETERMINING THE NATURE OF THE DECIMAL EXPANSION OF RATIONAL NUMBERS .....	22
SOLVED EXAMPLES .....	24
CONCEPT APPLICATION LEVEL - I (NCERT Questions) .....	28
CONCEPT APPLICATION LEVEL - II (Previous Year Questions) .....	30
CONCEPT APPLICATION LEVEL - III .....	32
ANSWER KEY .....	36
<b>2. POLYNOMIALS</b>	
2.1 INTRODUCTION .....	37
2.2 POLYNOMIALS .....	37
2.3 HCF OF GIVEN POLYNOMIALS .....	44
2.4 LCM OF GIVEN POLYNOMIALS .....	45
2.5 RATIONAL EXPRESSIONS .....	46
2.6 BASIC OPERATIONS ON POLYNOMIALS .....	48
2.7 CONCEPT OF SQUARE ROOTS .....	51
SOLVED EXAMPLES .....	54
CONCEPT APPLICATION LEVEL - I (NCERT Questions) .....	59
CONCEPT APPLICATION LEVEL - II (Previous Year Questions) .....	63
CONCEPT APPLICATION LEVEL - III .....	66
ANSWER KEY .....	70



### 3. PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

3.1	INTRODUCTION .....	71
3.2	LINEAR EQUATION IN TWO VARIABLES .....	72
3.3	ALGEBRAIC METHODS OF SOLVING A PAIR OF LINEAR EQUATIONS .....	73
3.4	DEFINITION OF A STRAIGHT LINE .....	78
3.5	SOLVING THE WORD PROBLEMS .....	82
3.6	SOLUTION OF A SYSTEM OF A PAIR OF EQUATIONS REDUCIBLE TO THE SYSTEM OF A PAIR OF LINEAR EQUATIONS IN TWO VARIABLES.....	83
	SOLVED EXAMPLES .....	84
	CONCEPT APPLICATION LEVEL - I (NCERT Questions) .....	89
	CONCEPT APPLICATION LEVEL - II (Previous Year Questions) .....	115
	CONCEPT APPLICATION LEVEL - III .....	117
	ANSWER KEY .....	120

### 4. INTRODUCTION TO TRIGONOMETRY

4.1	INTRODUCTION .....	121
4.2	MEASUREMENT OF ANGLES .....	121
4.3	STANDARD POSITION OF THE ANGLE .....	121
4.4	COTERMINAL ANGLES .....	122
4.5	SYSTEMS OF MEASUREMENT OF ANGLE .....	122
4.6	RELATION BETWEEN DEGREES AND RADIANS .....	123
4.7	RELATION BETWEEN THREE SYSTEMS OF MEASUREMENT OF AN ANGLE .....	124
4.8	TRIGONOMETRIC RATIOS .....	126
4.9	TRIGONOMETRIC RATIOS OF SOME SPECIFIC ANGLES $0^\circ, 30^\circ, 45^\circ, 60^\circ$ & $90^\circ$ .....	128
4.10	TRIGONOMETRIC RATIOS OF COMPLEMENTARY ANGLES .....	131
4.11	TRIGONOMETRIC IDENTITIES .....	132
4.12	RELATION BETWEEN AN ARC, RADIUS AND ANGLE SUBTENDED BY THE ARC AT THE CENTRE OF THE CIRCLE .....	133
4.13	TRIGONOMETRIC RATIOS OF COMPOUNDS ANGLES .....	133
4.14	SIGNS OF TRIGONOMETRIC RATIOS .....	134
	SOLVED EXAMPLES .....	136
	CONCEPT APPLICATION LEVEL - I (NCERT Questions) .....	140
	CONCEPT APPLICATION LEVEL - II (Previous Year Questions) .....	148
	CONCEPT APPLICATION LEVEL - III .....	150
	ANSWER KEY .....	154

TOPIC NAME	PAGE NO.
<b>5. SIMILAR TRIANGLES</b>	
5.1 INTRODUCTION .....	155
5.2 SIMILAR POLYGONS .....	155
5.3 SIMILARITY OF TRIANGLES .....	156
5.4 BASIC PROPORTIONALITY THEOREM (THALES THEOREM) .....	157
5.5 CONVERSE OF BASIC PROPORTIONALITY THEOREM .....	158
5.6 ANGLE-ANGLE-ANGLE SIMILARITY (AAA-SIMILARITY) (THEOREM) .....	160
5.7 SIDE-SIDE-SIDE SIMILARITY (SSS-SIMILARITY) (THEOREM) .....	162
5.8 SIDE-ANGLE-SIDE SIMILARITY (SAS-SIMILARITY) (THEOREM) .....	163
5.9 RELATION BETWEEN AREAS OF TWO SIMILAR TRIANGLES (THEOREM) .....	164
5.10 RESULT ON AREA OF SIMILAR TRIANGLES .....	166
5.11 PYTHAGORAS THEOREM .....	167
5.12 CONVERSE OF PYTHAGORAS THEOREM (THEOREM) .....	167
5.13 SOME IMPORTANT RESULTS DEDUCED FROM PYTHAGORAS THEOREM .....	168
5.14 VERTICAL ANGLE BISECTOR THEOREM .....	169
5.15 CONVERSE OF VERTICAL ANGLE BISECTOR THEOREM .....	169
5.16 CONCURRENCY-GEOMETRIC CENTRES OF A TRIANGLE .....	170
SOLVED EXAMPLES .....	172
CONCEPT APPLICATION LEVEL - I (NCERT Questions) .....	178
CONCEPT APPLICATION LEVEL - II (Previous Year Questions) .....	196
CONCEPT APPLICATION LEVEL - III .....	200
ANSWER KEY .....	204

TOPIC NAME	PAGE NO.
------------	----------

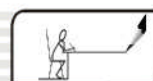
## 6. STATISTICS

6.1	INTRODUCTION .....	205
6.2	SOME BASIC DEFINITIONS .....	205
6.3	TABULATION OR PRESENTATION OF DATA .....	208
6.4	CENTRAL TENDENCY .....	209
6.5	MEAN (ARITHMETIC MEAN OF INDIVIDUAL OBSERVATIONS) OR UNGROUPED DATA .....	210
6.6	SOME IMPORTANT RESULTS ABOUT MEAN .....	216
6.7	MEDIAN .....	216
6.8	SOME IMPORTANT FACTS ABOUT MEDIAN .....	219
6.9	MODE .....	220
6.10	SOME IMPORTANT FACTS ABOUT MODE .....	221
6.11	EMPIRICAL RELATIONSHIP AMONG MEAN, MEDIAN AND MODE .....	222
6.12	GRAPHICAL REPRESENTATION .....	223
6.13	MEDIAN BY GRAPH .....	227
	SOLVED EXAMPLES .....	229
	CONCEPT APPLICATION LEVEL - I (NCERT Questions) .....	235
	CONCEPT APPLICATION LEVEL - II (Previous Year Questions) .....	245
	CONCEPT APPLICATION LEVEL - III .....	248
	ANSWER KEY .....	252



# 1

# REAL NUMBERS

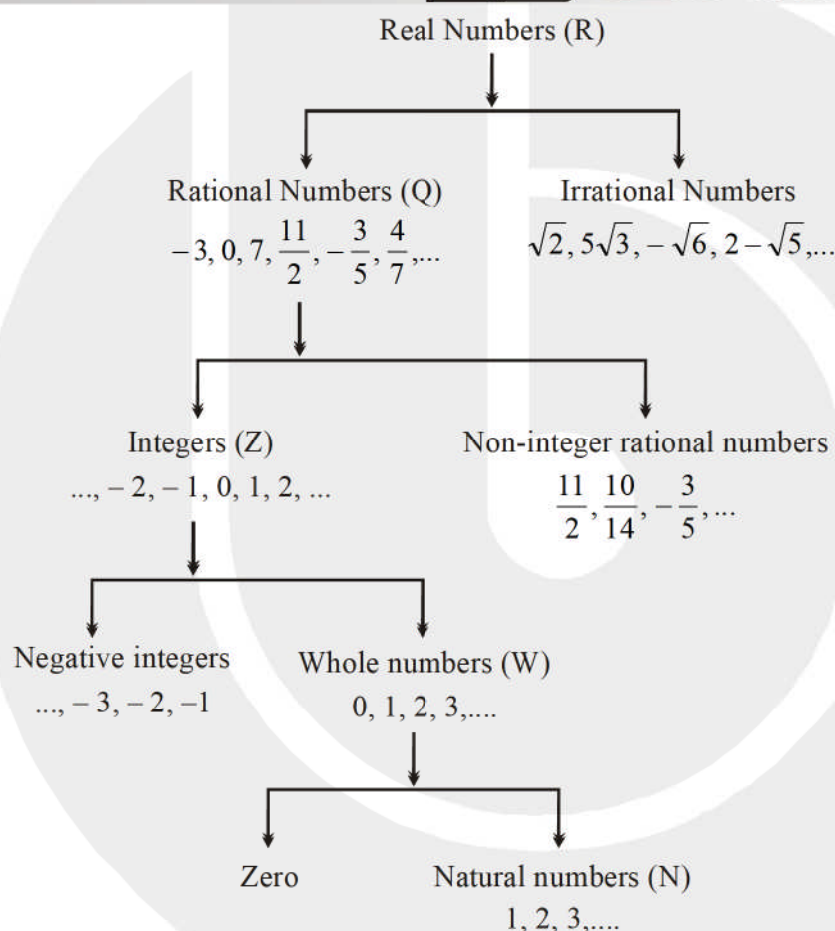


## THEORY

### 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

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

- **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.

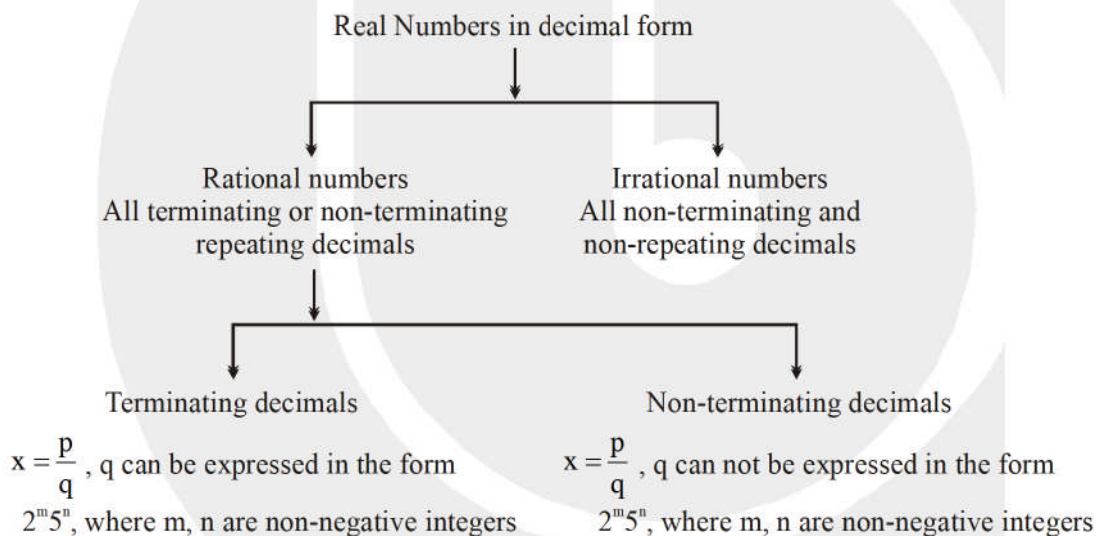
In this chapter we will begin with a brief recall of divisibility of integers as well state some important properties of integers.

## 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.

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.

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