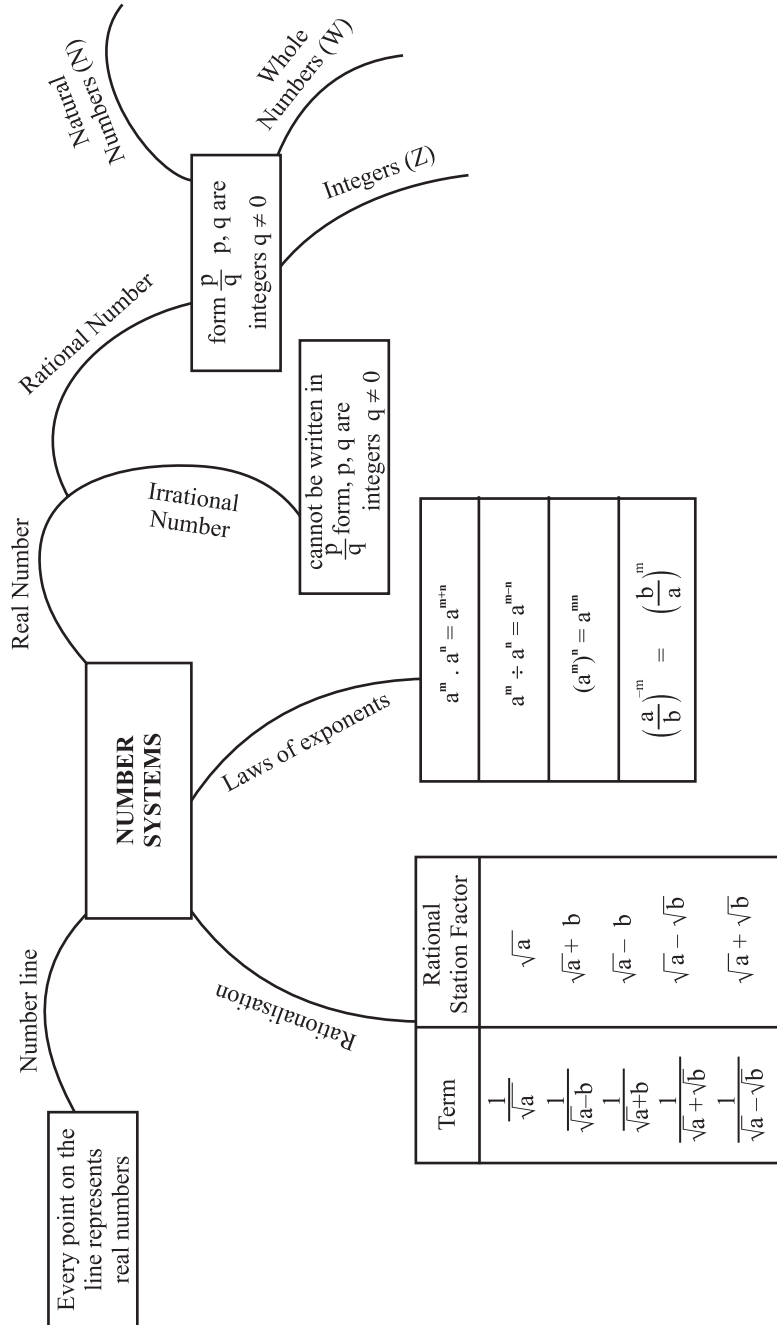


CHAPTER-1

NUMBER SYSTEMS

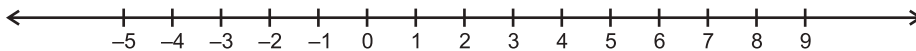
MIND MAP



CHAPTER-1

NUMBER SYSTEMS

KEY POINTS



- 1, 2, 3, are natural numbers which are represented by N.
- 0, 1, 2, 3, are whole numbers which are represented by W.
- -3, -2, -1, 0, 1, 2, 3, are Integers which are represented by Z or I.
- A number is a rational number if
 - (a) it can be represented in the form of $\frac{p}{q}$, where p and q are integers and $q \neq 0$.
 - or
 - (b) its decimal expansion is terminating (e.g. $\frac{2}{5} = 0.4$)
 - or
 - (c) its decimal expansion is non-terminating recurring (repeating) (e.g. $0.\overline{1234} = 0.1234234.....$)
- A number is irrational number if
 - (a) it can not be represented in the form of $\frac{p}{q}$, where p and q are integers and $q \neq 0$.
 - or
 - (b) its decimal expansion is non-terminating non-recurring (e.g. 0.1010010001.....)
- All rational and irrational numbers collectively form real numbers.
- There are infinite rational numbers between any two rational numbers.
- There is a unique real number corresponding to every point on the number line. Also, corresponding to each real number, there is a unique point on the number line.
- Rationalisation of a denominator means to change the Irrational denominator to rational form.
- To rationalise the denominator of $\frac{1}{\sqrt{a} + b}$, We multiply this by $\frac{\sqrt{a} - b}{\sqrt{a} - b}$, where a is a natural number and b is an integer.

- Laws of Exponents : Let $a > 0$ be a real number and m and n are rational numbers, then

$$1) a^m a^n = a^{m+n}$$

$$2) a^m \div a^n = a^{m-n}$$

$$3) (a^m)^n = a^{mn}$$

$$4) a^m \cdot b^m = (ab)^m$$

$$5) a^0 = 1$$

$$6) a^{-m} = \frac{1}{a^m}$$

- For positive real number a and b , the following Identities hold

$$1) \sqrt{a} \cdot \sqrt{b} = \sqrt{ab}$$

$$2) \sqrt{a} \div \sqrt{b} = \sqrt{\frac{a}{b}}$$

$$3) (\sqrt{a} + \sqrt{b})(\sqrt{a} - \sqrt{b}) = a - b$$

$$4) (\sqrt{a} + \sqrt{b})^2 = a + 2\sqrt{ab} + b$$

$$5) (a + \sqrt{b})(a - \sqrt{b}) = a^2 - b$$

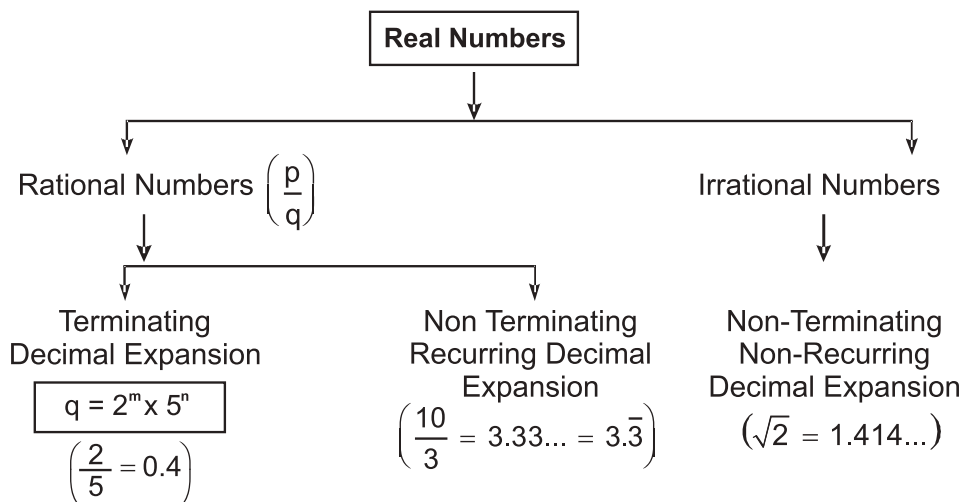
All natural numbers, whole numbers and integers are rational

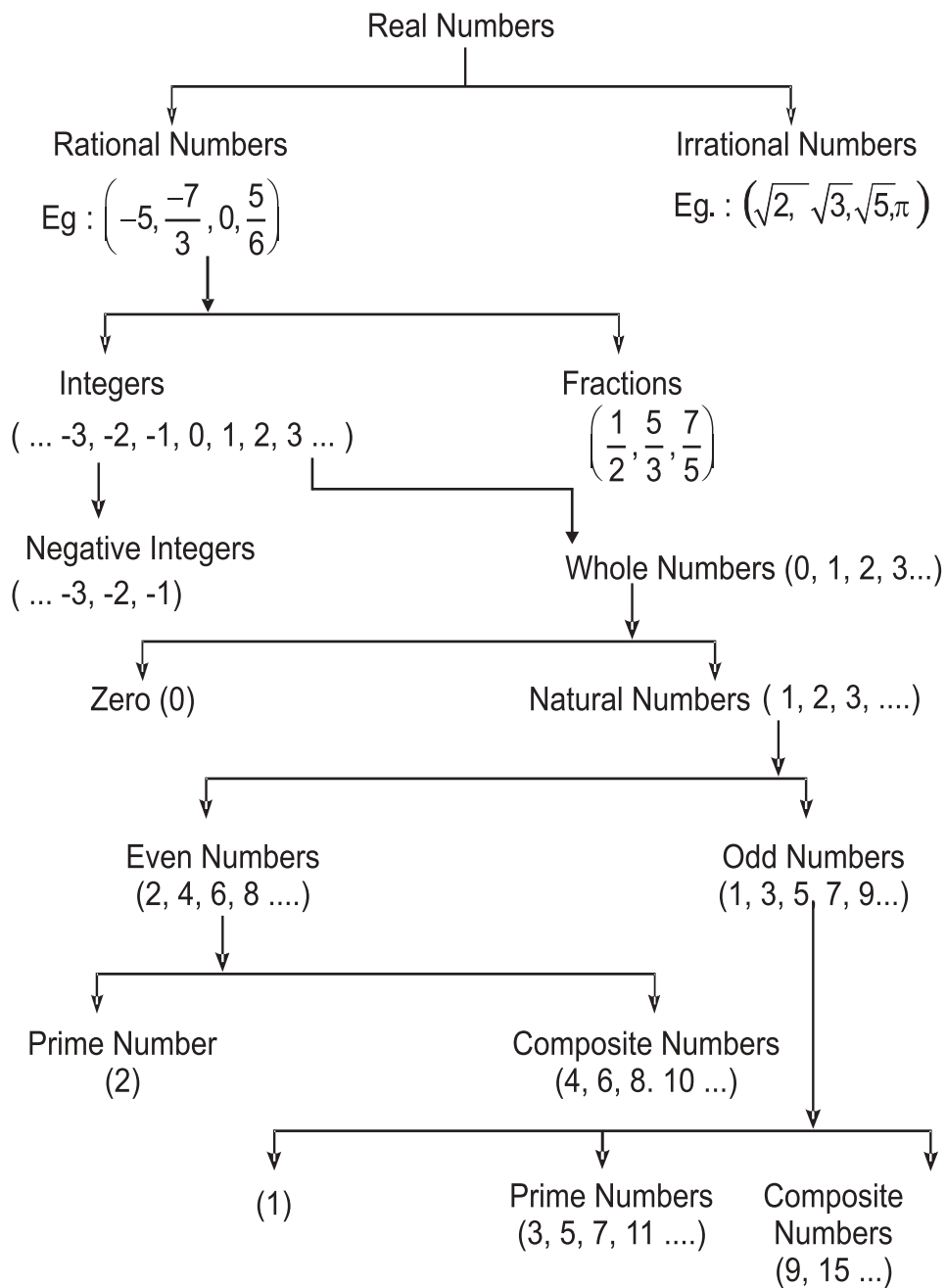
Prime Numbers : All natural numbers that have exactly two factors (i.e., 1 and itself) are called prime numbers. e.g., 2, 3, 5, 7, 11, 13, 17, 19, 23, ... etc.

Composite Numbers : Those natural numbers which have more than two factors are known as composite numbers. e.g., 4, 6, 8, 10, 12, ...

1 is neither prime nor composite.

Types of Numbers





* $\sqrt[n]{a} = a^{1/n}$

where 'a' is a positive real number and n is a positive integer.

$$a^{\frac{m}{n}} = \left(n\sqrt{a} \right)^m = n\sqrt{a^m}$$

where 'a' is a positive real number, m and n are co prime integers, and $n > 0$.