

## Chapter – 01 Rational Numbers

- Rational numbers are **closed** under the operations of addition, subtraction and multiplication.
- The operations addition and multiplication are
  - (i) **commutative** for rational numbers.
  - (ii) **associative** for rational numbers.
- The rational number 0 is the **additive identity** for rational numbers.
- The rational number 1 is the **multiplicative identity** for rational numbers.
- The additive inverse of the rational number  $\frac{a}{b}$  is  $-\frac{a}{b}$  and vice-versa.
- The **reciprocal or multiplicative inverse** of the rational number  $\frac{a}{b}$  is  $\frac{c}{d}$  if  $\frac{a}{b} \times \frac{c}{d} = 1$
- Distributivity of rational numbers: For all rational numbers a, b and c,  
 $a(b + c) = ab + ac$  and  $a(b - c) = ab - ac$
- Rational numbers can be represented on a number line.
- Between any two given rational numbers there are countless rational numbers. The idea of mean helps us to find rational numbers between two rational numbers.
- **Positive Rationals:** Numerator and Denominator both are either positive or negative.  
 Example:  $\frac{4}{7}, \frac{-3}{-4}$
- **Negative Rationals:** Numerator and Denominator both are of opposite signs.  
 Example:  $\frac{-2}{11}, \frac{4}{-9}$
- **Additive Inverse:** Additive inverse (negative)  $\frac{a}{b} + \frac{-a}{b} = \frac{-a}{b} + \frac{a}{b} = 0$ ,  $\frac{-a}{b}$  is the additive inverse of  $\frac{a}{b}$  and  $\frac{a}{b}$  is the additive inverse of  $\frac{-a}{b}$ .
- **Multiplicative Inverse (reciprocal):**  $\frac{a}{b} \times \frac{c}{d} = 1 = \frac{c}{d} \times \frac{a}{b}$  where  $\frac{c}{d}$  is the reciprocal of  $\frac{a}{b}$ .  
 Zero has no reciprocal. The reciprocal of 1 is 1 and of -1 is -1.