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 $\frac{\mathrm{a}}{\mathrm{b}}\ is\ \frac{\mathrm{a}}{\mathrm{b}}\ and\ vice-versa.$
- The **reciprocal or multiplicative inverse** of the rational number $\frac{\mathrm{a}}{\mathrm{b}}\ is\ \frac{\mathrm{c}}{\mathrm{d}}\ if\ \frac{\mathrm{a}}{\mathrm{b}} \times \frac{\mathrm{c}}{\mathrm{d}} = 1$.
- 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 $\frac{-a}{b}$.
- **Mulitiplicative 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 is1 and of -1 is -1.