

Chapter 04

QUADRATIC EQUATIONS

Relation between the roots and Coefficients:

(I) If α, β are the roots of $ax^2 + bx + c = 0$ then

(i) Sum of the roots: $\alpha + \beta = \frac{-b}{a} = \frac{-(\text{co-efficient of } x)}{(\text{co-efficient of } x^2)}$

(ii) Product of the roots: $\alpha\beta = \frac{c}{a} = \frac{\text{constant}}{(\text{co-efficient of } x^2)}$

(iii) Difference of the roots: $|\alpha - \beta| = \frac{\sqrt{b^2 - 4ac}}{|a|}$

(II) Same Roots:

If $a_1x^2 + b_1x + c_1 = 0$ and $a_2x^2 + b_2x + c_2 = 0$ have the same roots then $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

(III) One root is common:

The equations:

$$a_1x^2 + b_1x + c_1 = 0$$

and

$$a_2x^2 + b_2x + c_2 = 0$$

Where $a_1b_2 - a_2b_1 \neq 0$, $a_1a_2 \neq 0$ have one common root

then $(c_1a_2 - c_2a_1)^2 = (a_1b_2 - a_2b_1)(b_1c_2 - b_2c_1)$ and the

common root is $\frac{c_1a_2 - c_2a_1}{a_1b_2 - a_2b_1}$ (or) $\frac{b_1c_2 - b_2c_1}{c_1a_2 - c_2a_1}$.