

Chapter 05

QUADRATIC EQUATIONS

1. Solve $x^2 + x - 12 \leq 0$

Sol: $x^2 + 4x - 3x - 12 \leq 0$

$$x(x+4) - 3(x+4) \leq 0$$

$$(x+4)(x-3) \leq 0 \quad (\because a(x-\alpha)(x-\beta) \leq 0 \Rightarrow \alpha \leq x \leq \beta)$$

$$\Rightarrow -4 \leq x \leq 3 \text{ (or) } x \in [-4, 3]$$

2. Find the values of 'm' for which the equation have equal roots?

$$x^2 - 15 - m(2x - 8) = 0$$

Sol: $x^2 - 2mx + 8m - 15 = 0$ has equal roots

$$\Rightarrow b^2 - 4ac = 0 \Rightarrow (-2m)^2 - 4(8m - 15) = 0$$

$$\Rightarrow 4m^2 - 4(8m - 15) = 0 \text{ (cancel '4')}$$

$$\Rightarrow m^2 - 8m + 15 = 0$$

$$\Rightarrow (m-3)(m-5) = 0$$

$$\Rightarrow m = 3 \text{ or } 5$$

3. If $x^2 + 4ax + 3 = 0$ and $2x^2 + 3ax - 9 = 0$ have a common root, then find the values of a and the common root.

Sol: If α is the common root then

$$\alpha^2 + 4a\alpha + 3 = 0 \longrightarrow (1)$$

$$2\alpha^2 + 3a\alpha - 9 = 0 \longrightarrow (2)$$

$$2(1) - (2) \Rightarrow 5a\alpha + 15 = 0 \Rightarrow a\alpha = -3$$

$$(1) \Rightarrow \alpha^2 - 12 + 3 = 0 \Rightarrow \alpha^2 = 9 \Rightarrow \alpha = \pm 3$$

$$a\alpha = -3 \Rightarrow a(+3) = -3 \Rightarrow a = \pm 1$$

