

1. If the roots of the equation  $(a - b)x^2 + (b - c)x + (c - a) = 0$  are equal, prove that  $2b = a + c$ .
2. If the equation  $(1 + m^2)x^2 + 2mcx + c^2 - a^2 = 0$  has equal roots, show that  $c^2 = a^2(1 + m^2)$
3. If  $\sin \theta$  and  $\cos \theta$  are roots of the equation  $ax^2 + bx + c = 0$ , prove that  $a^2 - b^2 + 2ac = 0$
4. Determine the condition for one root of the quadratic equation  $ax^2 + bx + c = 0$  to be thrice of the other.
5. Solve for  $x$ :  $2\left(\frac{2x-1}{x+3}\right) - 3\left(\frac{x+3}{2x-1}\right) = 5$ ;  $x \neq -3, \frac{1}{2}$
6. Solve for the equation:  $\frac{4}{x} - 3 = \frac{5}{2x+3}$ ;  $x \neq 0, -\frac{3}{2}$ , for  $x$
7. Solve for  $x$ :  $\frac{16}{x} - 1 = \frac{15}{x+1}$ ;  $x \neq 0, -1$
8. Using quadratic formula, solve the following equation for  $x$ :  $abx^2 + (b^2 - ac)x - bc = 0$
9. Find the value of  $p$  for which the quadratic equation  $(2p + 1)x^2 - (7p + 2)x + (7p - 3) = 0$  has equal roots. Also find these roots.
10. Solve for  $x$ :  $\frac{x-4}{x-5} + \frac{x-6}{x-7} = \frac{10}{3}$ ;  $x \neq 5, 7$