Grade 12 (English medium)

Combined Mathematics – Quadratic Equations

1. If the roots of the quadratic equation $x^2 + 7x - 5 = 0$, are α and β then show that, $(\alpha^3 + \beta^3) + 7(\alpha^2 + \beta^2) - (\alpha + \beta) = 0$

2. Show that $ax^2 + bx + c > 0$ when $a > 0$ and $b^2 - 4ac > 0$

3. If the roots of the quadratic equation $ax^2 - bx + c = 0$, are $\sin\theta$ and $\cos\theta$ then show that, $a^2 + 2ac - b^2 = 0$

4. If the roots of the quadratic equation $x^2 + x - 1 = 0$, α and β then show that, $\alpha^2 = \beta + 2$ and $\beta^2 = \alpha + 2$

5. If the roots of quadratic equation $\lambda x^2 + \mu(2x + 1) = 0$ has imaginary roots then show that $\mu x^2 + (\mu - \beta)x = \beta + \lambda - \mu$. Here β , λ and μ are real constant.

6. The roots of the quadratic equation $4x(x + 1) - 35 = 0$, are α and β. If the roots of the quadratic equation $\lambda x(x + \mu) - 27 = 0$ are $2\alpha + \beta$ and $2\beta + \alpha$ find the value of λ and μ.

7. The roots of the quadratic equation $px^2 + qx + r = 0$, are α and β. Then find the quadratic equation which the roots are $\alpha + \frac{1}{\alpha}$ and $\beta + \frac{1}{\beta}$. Here $p \neq 0$ and $q \neq 0$

8. Find the necessary condition of one root equal to the n times of the other root of the quadratic equation $ax^2 + bx + c = 0$

9. α and β are the roots of the quadratic equation $ax^2 + 2bx + c = 0$ and γ and δ are the roots of the quadratic equation $px^2 + 2qx + r = 0$. If α , β, γ and δ are terms of a arithmetic series then show that $p^2(b^2 - ac) = a^2(q^2 - pr)$.

10. *F(x) = (n + 1) x + (n -1)*. Here *x* is a real number and $x \neq 0$. n is a integer which is greater than 1. Show that F(x) is not between $-2\sqrt{n^2-1}$ and $2\sqrt{n^2-1}$. If $k > 2\sqrt{n^2-1}$ then show that the two roots of the quadratic equation F(x) = k

11. a and b are two real constant. Show that the roots of the quadratic equation $a^2(x^2 + 5bx + 4b^2) = 1$ are real and distinct. If $a > 0$ and α, β are the roots of the above equation and $\alpha + \beta = 5$ and $\alpha^2 + \beta^2 = 23$. Then find the value of a, b and α, β.

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