



A Level Maths

Topic: Roots and Relationships (Symmetric Functions)

Instructions

Answer all questions. Show complete working. Use the relationships between roots and coefficients where appropriate.

Practice Questions

1. If the roots of the quadratic equation $ax^2 + bx + c = 0$ are p and q , find:
 - (i) The sum of the roots $p + q$
 - (ii) The product of the roots pq
 - (iii) Express the quadratic equation in terms of its roots.
2. For the cubic equation $x^3 + px^2 + qx + r = 0$, if the roots are α , β , and γ , use the relationships between the roots and the coefficients to find:
 - (i) The sum of the roots $\alpha + \beta + \gamma$
 - (ii) The sum of the products of the roots taken two at a time $\alpha\beta + \beta\gamma + \gamma\alpha$
 - (iii) The product of the roots $\alpha\beta\gamma$
3. Find the values of p and q if the roots of the equation $x^2 + px + q = 0$ are 3 and -4 .
4. For the polynomial $2x^3 - 4x^2 + 3x - 6 = 0$, find the relationships between the roots using Vieta's formulas.
5. The equation $x^3 - 6x^2 + 11x - 6 = 0$ has roots α , β , and γ . Use Vieta's relations to find:
 - (i) $\alpha + \beta + \gamma$

- (ii) $\alpha\beta + \beta\gamma + \gamma\alpha$
 (iii) $\alpha\beta\gamma$
6. Given that the roots of the equation $x^3 - 3x^2 + 2x - 1 = 0$ are p , q , and r , find the following symmetric sums:
- (i) $p + q + r$
 (ii) $pq + qr + rp$
 (iii) pqr
7. For the quadratic equation $4x^2 - 5x + 1 = 0$, find the sum and product of its roots using Vieta's formulas.
8. If the roots of the cubic equation $x^3 - 5x^2 + 8x - 4 = 0$ are p , q , and r , find the values of $p + q + r$, $pq + qr + rp$, and pqr using the relationships between the roots and coefficients.

Multiple-Choice Questions

1. If the roots of the quadratic equation $x^2 - 7x + 12 = 0$ are p and q , then the value of $p + q$ is:
- A. 12
 B. -12
 C. 7
 D. -7
2. For the equation $x^3 - 4x^2 + 5x - 2 = 0$, if the roots are p , q , and r , the sum $p + q + r$ is:
- A. 4
 B. -4
 C. 2
 D. -2
3. For the equation $x^3 - 2x^2 - 5x + 6 = 0$, if the roots are p , q , and r , the value of pqr is:
- A. 6
 B. -6
 C. 5
 D. -5