RELATIONSHIP BETWEEN ROOTS AND COEFFICIENTS

1 If α and β are roots of the equation $x^2 + 8x - 5 = 0$, find the quadratic equation whose roots are $\dfrac{\alpha}{\beta}$ and $\dfrac{\beta}{\alpha}$.

2 If α and β are roots of the equation $x^2 + 4x + 1 = 0$, find the value of:

    (a) $\alpha + \beta$ **(b)** $\alpha\beta$ **(c)** $\alpha^2 + \beta^2$ **(d)** $\alpha^3 + \beta^3$

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4 If α and β are roots of the equation $px^2 + qx + r = 0$, find the following in terms of p, q and r.

   (a) $\dfrac{1}{\alpha} + \dfrac{1}{\beta}$ **(b)** $\dfrac{1}{\alpha^2} + \dfrac{1}{\beta^2}$

6 Solve the equation $x^3 - 3x^2 - 4x + 12 = 0$, given that the sum of two of its roots is zero.

9 Solve the equation $3x^3 - 17x^2 - 8x + 12 = 0$, given that the product of two of the roots is 4.

11 Find two values of m, such that the roots of the equation $x^3 + 2x^2 + mx - 16 = 0$ are α, β, $\alpha\beta$. Using these values of m, find α and β.

15 Solve the equation $4x^3 - 12x^2 + 9x - 2 = 0$, given that two of its roots are equal.

19 Solve the equation $8x^4 - 2x^3 - 27x^2 + 6x + 9 = 0$, given that the sum of two of its roots is zero.

20 If α, β, γ are the roots of $3x^3 + 8x^2 - 1 = 0$, find the value of: $\left(\beta + \dfrac{1}{\gamma}\right)\left(\gamma + \dfrac{1}{\alpha}\right)\left(\alpha + \dfrac{1}{\beta}\right).$