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6. The quadratic equation

$$2x^2 + x + 4 = 0$$

has roots α and β

Without solving the quadratic equation,

(a) write down the value of $(\alpha + \beta)$ and the value of $\alpha\beta$

(1)

(b) find the value of

(i) $\alpha^2 + \beta^2$

(ii) $\alpha^3 + \beta^3$

(4)

(c) find a quadratic equation that has roots

$$\left(\alpha^3 + \frac{1}{\beta}\right) \text{ and } \left(\beta^3 + \frac{1}{\alpha}\right)$$

giving your answer in the form $px^2 + qx + r = 0$, where p, q and r are integers.

(4)

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Question 6 continued

Q6

(Total 9 marks)