5. The quadratic equation

$$4x^2 + 3x + k = 0$$

where k is an integer, has roots α and β

(a) Write down, in terms of k where appropriate, the value of $\alpha + \beta$ and the value of $\alpha\beta$

(2)

(b) Determine, in simplest form in terms of k, the value of $\dfrac{\alpha}{\beta^2} + \dfrac{\beta}{\alpha^2}$

(4)

(c) Determine a quadratic equation which has roots

$$\frac{\alpha}{\beta^2} \text{ and } \frac{\beta}{\alpha^2}$$

giving your answer in the form $px^2 + qx + r = 0$ where p, q and r are integer values in terms of k

(3)

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Question 5 continued

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Question 5 continued

(Total for Question 5 is 9 marks)