

- 8 The quadratic equation  $3x^2 - kx - 1 = 0$ , where  $k$  is a positive integer, has roots  $\alpha$  and  $\beta$

(a) Show that  $\alpha^2 + \beta^2 = \frac{k^2 + 6}{9}$  (3)

Given that  $\alpha^4 + \beta^4 = \frac{466}{81}$

(b) find the value of  $k$  (5)

- (c) Hence form an equation, with integer coefficients, which has roots

$$\frac{\alpha^3 + \beta}{\beta} \text{ and } \frac{\beta^3 + \alpha}{\alpha}$$

(6)

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**(Total for Question 8 is 14 marks)**

