3. (i) Given that

- $f(x) = 4x^3 + 6x + k$, where k is a constant
- $(x + 2)$ is a factor of $f(x)$

find the remainder when $f(x)$ is divided by $(x - 5)$

(4)

(ii) Find the remainder, R, and the quotient, $Q(x)$, when

$$6x^3 - 15x^2 - 21x + 8$$

is divided by $(2x + 3)$

(3)

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Question 3 continued

(Total for Question 3 is 7 marks)

4. **In this question you must show all stages of your working.**
Solutions relying entirely on calculator technology are not acceptable.

Given that k is a positive constant and

$$\int_k^{2k} \left(\frac{12}{x^2} + 4 \right) \mathrm{d}x = 14$$

find the possible values of k.

(5)

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