

- 9 Chloe is attempting to write $\frac{2x^2 + x}{(x + 1)(x + 2)^2}$ as partial fractions, with constant numerators.

Her incorrect attempt is shown below.

$$\text{Step 1} \quad \frac{2x^2 + x}{(x + 1)(x + 2)^2} \equiv \frac{A}{x + 1} + \frac{B}{(x + 2)^2}$$

$$\text{Step 2} \quad 2x^2 + x \equiv A(x + 2)^2 + B(x + 1)$$

$$\text{Step 3} \quad \begin{aligned} \text{Let } x = -1 &\Rightarrow A = 1 \\ \text{Let } x = -2 &\Rightarrow B = -6 \end{aligned}$$

$$\text{Answer} \quad \frac{2x^2 + x}{(x + 1)(x + 2)^2} \equiv \frac{1}{x + 1} - \frac{6}{(x + 2)^2}$$

- 9 (a) (i) By using a counter example, show that the answer obtained by Chloe cannot be correct.

[2 marks]

- 9 (a) (ii) Explain her mistake in Step 1.

[1 mark]

- 9 (b) Write $\frac{2x^2 + x}{(x + 1)(x + 2)^2}$ as partial fractions, with constant numerators.

[4 marks]