1 Two formulas for the perimeter of a rectangle are $2(l + w)$ and $2l + 2w$, where l is the length and w is the width.

(a) Work out both when $l = 7$ and $w = 3$ (1)

(b) Work out both when $l = 5$ and $w = 5$ (1)

(c) Expand $2(l + w)$ (1)

(d) Explain why your answer to (c) proves the two formulas are equal for *every* rectangle, in a way that (a) and (b) never could (2)

(7 marks)

2 Decide whether each pair is equal. Show your working.

(a) $2(l + w)$ and $2l + w$ (2)

(b) $3(a + b + c)$ and $3a + 3b + 3c$ (2)

(c) $5(2x - 3)$ and $2(5x - 7) - 1$ (2)

(6 marks)

3 A C-shaped figure is made from a rectangle 6 units tall and $(3x + 1)$ units wide, with a rectangle 2 units tall and x units wide removed from the middle of one side.

(a) Write an expression for the area of the whole rectangle, expanded (1)

(b) Write an expression for the area of the piece removed (1)

(c) Write an expression for the area of the C-shape, simplified (1)

(d) Factorise your answer to (c) fully (1)

(5 marks)

4 A rectangle has an area of $8x + 12$ square units.

(a) Factorise $8x + 12$ fully (1)

(b) Write down a possible height and width for the rectangle (2)

(c) Which form of the area did you need in order to answer (b) – $8x + 12$ or $4(2x + 3)$? Explain. (2)

(5 marks)

5 A shop sells pens at x shillings each. A pack of 6 pens costs 300 shillings less than buying 6 pens separately.

(a) Write an expression for the cost of 6 separate pens (1)

(b) Write an expression for the cost of a pack (1)

(c) Factorise your answer to (b) fully (1)

(d) Your factorised answer says the pack costs the same as 6 pens at a different price. What is that price? (2)

(5 marks)

6 **Open question.** Write down **four different expressions** that are all equal to $12x + 18$. At least one must contain a bracket and at least one must have four or more terms.

(4 marks)