Expanding and factorising quadratics

6 questions | 22 marks

Award the shown method marks for equivalent correct working.

1. Expand and simplify. [4 marks]

(a) $(x+3)(x+2)$

Four products $x^2+2x+3x+6$ [1]; collect to x^2+5x+6 [1].

Answer: x^2+5x+6.

(b) $(x+4)(x-1)$

Four products $x^2-x+4x-4$ [1]; collect to x^2+3x-4 [1].

Answer: x^2+3x-4.

2. Factorise. [4 marks]

(a) $x^2+7x+10$

Select $5, 2$ using sum and product [1]; write both brackets [1].

Answer: $(x+5)(x+2)$.

(b) $x^2-9x+20$

Select $-5, -4$ using sum and product [1]; write both brackets [1].

Answer: $(x-5)(x-4)$.

3. Factorise. [4 marks]

(a) x^2-16

Recognise a difference of squares [1]; write $(x-4)(x+4)$ [1].

Answer: $(x-4)(x+4)$.

(b) $x^2+10x+25$

Select $5, 5$ [1]; write $(x+5)^2$ or $(x+5)(x+5)$ [1].

Answer: $(x+5)^2$.

4. Factorise $x^2 - 3x - 18$. Check your answer by expanding. [3 marks]

Select $-6, 3$ from sum -3 and product -18 [1].
Write $(x - 6)(x + 3)$ [1].
Check: $x^2 + 3x - 6x - 18 = x^2 - 3x - 18$ [1].
Answer: $(x - 6)(x + 3)$

5. A rectangle has width $(x + 3)$ m and length $(x + 5)$ m. [4 marks]

(a) Expand an expression for its area.

Use $A = (x + 3)(x + 5)$ [1]; expand to $x^2 + 8x + 15$ [1].
Answer: $A = x^2 + 8x + 15$ m².

(b) Find its area when $x = 2$.

Substitute $x = 2$: $4 + 16 + 15$ or 5×7 [1]; state 35 m² [1].
Answer: 35 m².

6. Mia writes $(x + 4)^2 = x^2 + 16$. Explain her mistake and write the correct expansion. [3 marks]

Explain that both cross-products are needed [1].
Find $4x + 4x = 8x$ [1].
Write $x^2 + 8x + 16$ [1].
Answer: She left out the middle term $8x$. The expansion is $x^2 + 8x + 16$.