

Expanding Quadratics

Exam Style Questions

1. Expand and simplify $(x + 1)(x + 2)$

$$x^2 + 2x + x + 2$$

$$x^2 + 3x + 2$$

$$\dots\dots\dots x^2 + 3x + 2 \dots\dots\dots \text{ (2 marks)}$$

2. Expand and simplify $(2x + 3)(x + 4)$

$$= 2x^2 + 8x + 3x + 12$$

$$= 2x^2 + 11x + 12$$

$$\dots\dots\dots 2x^2 + 11x + 12 \dots\dots\dots \text{ (2 marks)}$$

3. Expand and simplify $(x - 7)(2x + 1)$

$$= 2x^2 + x - 14x - 7$$

$$= 2x^2 - 13x - 7$$

$$\dots\dots\dots 2x^2 - 13x - 7 \dots\dots\dots \text{ (2 marks)}$$

4. Expand and simplify $(2x - 1)(3x - 2)$

$$= 6x^2 - 3x - 4x + 2$$

$$= 6x^2 - 7x + 2$$

..... $6x^2 - 7x + 2$ (2 marks)

5. Expand and simplify $(x - 3)(x + 3)$

$$= x^2 + 3x - 3x - 9$$

$$= x^2 - 9$$

..... $x^2 - 9$ (2 marks)

6. Expand and simplify $(2x + 1)(2x - 1)$

$$= 4x^2 - 2x + 2x - 1$$

$$= 4x^2 - 1$$

..... $4x^2 - 1$ (2 marks)

7. Expand and simplify $7(x - 5)(x - 1)$

$$= 7(x^2 - x - 5x + 5)$$

$$= 7(x^2 - 6x + 5)$$

$$= 7x^2 - 42x + 35$$

..... $7x^2 - 42x + 35$ (2 marks)

8. Expand and simplify $(4x + 1)^2$

$$\begin{aligned} (4x+1)(4x+1) &= 16x^2 + 4x + 4x + 1 \\ &= 16x^2 + 8x + 1 \end{aligned}$$

..... $16x^2 + 8x + 1$ (2 marks)

9. Expand and simplify $(x + 1)(x - 2) + (x + 7)(x - 3)$

$$\begin{aligned} (x^2 - 2x + x - 2) &+ (x^2 - 3x + 7x - 21) \\ (x^2 - x - 2) &+ (x^2 + 4x - 21) \\ 2x^2 + 3x - 23 \end{aligned}$$

..... $2x^2 + 3x - 23$ (3 marks)

10. Expand and simplify $(x - 1)(2x + 3) - (4x - 1)(x - 3)$

$$\begin{aligned} &= (2x^2 + 3x - 2x - 3) - (4x^2 - 12x - x + 3) \\ &= (2x^2 + x - 3) - (4x^2 - 13x + 3) \\ \left[\begin{array}{l} 2x^2 - 4x^2 = -2x^2 \\ x - 13x = -12x \\ -3 - 3 = -6 \end{array} \right] &= -2x^2 + 14x - 6 \end{aligned}$$

..... $-2x^2 + 14x - 6$ (3 marks)

11. Expand and simplify $x - (6x + 1)(x + 3)$

$$\begin{aligned} &= x - (6x^2 + 18x + x + 3) \\ &= x - (6x^2 + 19x + 3) \\ &= x - 6x^2 - 19x - 3 \\ &= -6x^2 - 18x - 3 \end{aligned}$$

..... $-6x^2 - 18x - 3$ (3 marks)

12. Expand and simplify $3x^2 - 4x - (x + 2)(4x + 1)$

$$= 3x^2 - 4x - (4x^2 + x + 8x + 2)$$

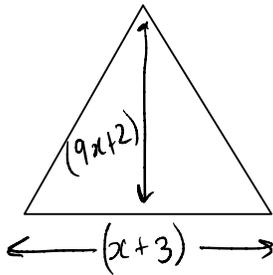
$$= 3x^2 - 4x - (4x^2 + 9x + 2)$$

$$= 3x^2 - 4x - 4x^2 - 9x - 2$$

$$= -x^2 - 13x - 2$$

..... $-x^2 - 13x - 2$ (3 marks)

13. A triangle has a base $(x + 3)$ cm and height $(9x + 2)$ cm. Show that the area, A , can be written in the form $A = ax^2 + bx + c$ where a , b and c are values to be determined.



$$A = \frac{1}{2}bh$$

$$= \frac{1}{2}(9x+2)(x+3)$$

$$= \frac{1}{2}(9x^2 + 27x + 2x + 6)$$

$$= \frac{1}{2}(9x^2 + 29x + 6)$$

$$= 4.5x^2 + 14.5x + 3$$

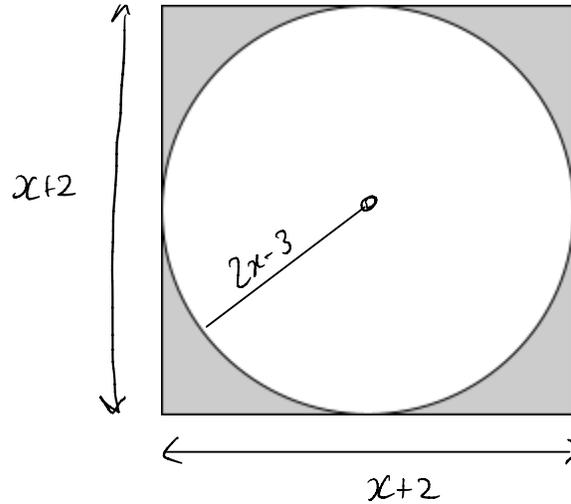
$$a = 4.5$$

$$b = 14.5$$

$$c = 3$$

..... $A = 4.5x^2 + 14.5x + 3$ (3 marks)

14. Below is a circle enclosed within a square. The circle has a radius $(2x - 3)$ cm and the square has length $(x + 2)$ cm. Show that the area of the shaded region can be written in the form $Ax^2 + Bx + C$, where A , B and C are expressions in terms of π .



$$\begin{aligned} \text{Area Square} &= (x+2)^2 \\ &= x^2 + 4x + 4 \end{aligned}$$

$$\text{Area Circle} = \pi(2x-3)^2$$

$$\begin{aligned} \text{Area Shaded} &= (x^2 + 4x + 4) - \pi(2x-3)^2 \\ &= (x^2 + 4x + 4) - \pi(4x^2 - 12x + 9) \\ &= x^2 + 4x + 4 - 4\pi x^2 + 12\pi x - 9\pi \\ &= (1-4\pi)x^2 + (4+12\pi)x + (4-9\pi) \end{aligned}$$

$$A = 1-4\pi$$

$$B = 4+12\pi$$

$$C = 4-9\pi$$

..... (5 marks)