

Expanding Double Brackets

Solutions

For Pearson Edexcel GCSE Mathematics (1MA1) • Foundation tier

Each question is shown in grey, followed by the working, one step per line. The final answer is in a box. *Marks* shows how the marks are usually given in the exam, and **Tip** points out a common mistake.

1 (2 marks)

Expand and simplify $(x + 2)(x + 6)$

Multiply each term in the first bracket by each term in the second bracket:

$$x \times x = x^2$$

$$x \times 6 = 6x$$

$$2 \times x = 2x$$

$$2 \times 6 = 12$$

$$\text{So } (x + 2)(x + 6) = x^2 + 6x + 2x + 12$$

$$\text{Collect the } x \text{ terms: } 6x + 2x = 8x$$

Answer: $x^2 + 8x + 12$

Tip: $x \times x = x^2$, not $2x$. A grid can help you find all four terms.

Marks: 1 mark for four terms with at least three correct. 1 mark for $x^2 + 8x + 12$.

2 (2 marks)

Expand and simplify $(n + 7)(n - 3)$

$$n \times n = n^2$$

$$n \times (-3) = -3n$$

$$7 \times n = 7n$$

$$7 \times (-3) = -21$$

$$\text{So } (n + 7)(n - 3) = n^2 - 3n + 7n - 21$$

$$\text{Collect the } n \text{ terms: } -3n + 7n = 4n$$

$$\text{Answer: } n^2 + 4n - 21$$

Tip: The number term comes from *multiplying* 7 and -3 to get -21 . Do not add them to get 4.

Marks: 1 mark for four terms with at least three correct. 1 mark for $n^2 + 4n - 21$.

3 (2 marks)

Expand and simplify $(x - 4)(x - 5)$

$$x \times x = x^2$$

$$x \times (-5) = -5x$$

$$-4 \times x = -4x$$

$$-4 \times (-5) = +20 \text{ (negative } \times \text{ negative = positive)}$$

$$\text{So } (x - 4)(x - 5) = x^2 - 5x - 4x + 20$$

$$\text{Collect the } x \text{ terms: } -5x - 4x = -9x$$

$$\text{Answer: } x^2 - 9x + 20$$

Marks: 1 mark for four terms with at least three correct. 1 mark for $x^2 - 9x + 20$.

4 (2 marks)

Expand and simplify $(y + 6)^2$

$$(y + 6)^2 \text{ means } (y + 6)(y + 6).$$

$$= y^2 + 6y + 6y + 36$$

$$= y^2 + 12y + 36$$

Answer: $y^2 + 12y + 36$

Tip: $(y + 6)^2$ is not $y^2 + 36$. Write out both brackets so you get the middle terms.

Marks: 1 mark for four terms with at least three correct. 1 mark for $y^2 + 12y + 36$.

5 (2 marks)

Expand and simplify $(x - 7)^2$

$(x - 7)^2$ means $(x - 7)(x - 7)$.

$$= x^2 - 7x - 7x + 49$$

$$= x^2 - 14x + 49$$

Answer: $x^2 - 14x + 49$

Marks: 1 mark for four terms with at least three correct. 1 mark for $x^2 - 14x + 49$.

6 (2 marks)

Expand and simplify $(2x + 5)(3x - 1)$

$$2x \times 3x = 6x^2$$

$$2x \times (-1) = -2x$$

$$5 \times 3x = 15x$$

$$5 \times (-1) = -5$$

$$\text{So } (2x + 5)(3x - 1) = 6x^2 - 2x + 15x - 5$$

Collect the x terms: $-2x + 15x = 13x$

Answer: $6x^2 + 13x - 5$

Tip: $2x \times 3x$: multiply the numbers ($2 \times 3 = 6$) and the letters ($x \times x = x^2$). The answer is $6x^2$, not $6x$.

Marks: 1 mark for four terms with at least three correct. 1 mark for $6x^2 + 13x - 5$.

7 (2 marks)

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

$$4x \times x = 4x^2$$

$$4x \times 2 = 8x$$

$$-3 \times x = -3x$$

$$-3 \times 2 = -6$$

$$\text{So } (4x - 3)(x + 2) = 4x^2 + 8x - 3x - 6$$

Collect the x terms: $8x - 3x = 5x$

Answer: $4x^2 + 5x - 6$

Marks: 1 mark for four terms with at least three correct. 1 mark for $4x^2 + 5x - 6$.

8 (2 marks)

Expand and simplify $(x + 8)(x - 8)$

$$x \times x = x^2$$

$$x \times (-8) = -8x$$

$$8 \times x = 8x$$

$$8 \times (-8) = -64$$

$$\text{So } (x + 8)(x - 8) = x^2 - 8x + 8x - 64$$

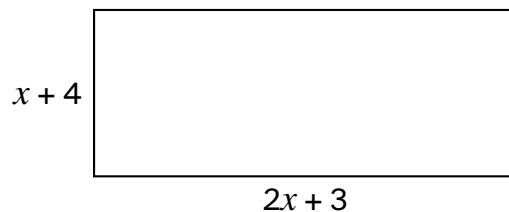
The x terms cancel out: $-8x + 8x = 0$

Answer: $x^2 - 64$

Marks: 1 mark for four terms with at least three correct. 1 mark for $x^2 - 64$.

9 (2 marks)

The diagram shows a rectangle.
All measurements are in centimetres.



*Diagram **NOT** accurately drawn*

Show that the area of the rectangle, in cm^2 , can be written as $2x^2 + 11x + 12$

Area = length $\times$ width

$$\text{Area} = (2x + 3)(x + 4)$$

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

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

Marks: 1 mark for $(2x + 3)(x + 4)$ with at least three terms correct. 1 mark for a complete correct expansion.

10 (1 mark)

Ben expands $(x + 3)^2$

He gets $x^2 + 9$

Explain the mistake Ben has made.

$$(x + 3)^2 = (x + 3)(x + 3)$$

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

$$= x^2 + 6x + 9$$

Ben only squared each term, so he missed the middle term, $6x$.

Answer: He has missed the middle term: $(x + 3)^2 = x^2 + 6x + 9$

11 (3 marks)

Show that $(x + 5)(x - 2) - 3x \equiv x^2 - 10$

Expand the brackets:

$$\begin{aligned}(x + 5)(x - 2) &= x^2 - 2x + 5x - 10 \\ &= x^2 + 3x - 10\end{aligned}$$

Now subtract $3x$:

$$x^2 + 3x - 10 - 3x = x^2 - 10$$

Marks: 1 mark for four terms with at least three correct. 1 mark for $x^2 + 3x - 10$. 1 mark for completing the working to reach $x^2 - 10$.

12 (2 marks)

Expand and simplify $(2x - 1)^2$

$(2x - 1)^2$ means $(2x - 1)(2x - 1)$.

$$2x \times 2x = 4x^2$$

$$2x \times (-1) = -2x$$

$$-1 \times 2x = -2x$$

$$-1 \times (-1) = +1$$

$$\text{So } (2x - 1)^2 = 4x^2 - 2x - 2x + 1 = 4x^2 - 4x + 1$$

Answer: $4x^2 - 4x + 1$

Tip: The 2 is squared as well: $2x \times 2x = 4x^2$, not $2x^2$.

Marks: 1 mark for four terms with at least three correct. 1 mark for $4x^2 - 4x + 1$.

13 (2 marks)

Write numbers in the boxes to make this identity correct.

$$(x + \boxed{})(x + \boxed{}) \equiv x^2 + 9x + 20$$

The two numbers must multiply to make 20.

They must also add to make 9.

$$4 \times 5 = 20 \quad \text{and} \quad 4 + 5 = 9$$

So the numbers are 4 and 5.

Answer: $(x + 4)(x + 5)$

Marks: 2 marks for 4 and 5. 1 mark for two numbers that multiply to 20 or add to 9.

14 (3 marks)

The diagram shows a small square inside a large square.
All measurements are in centimetres.

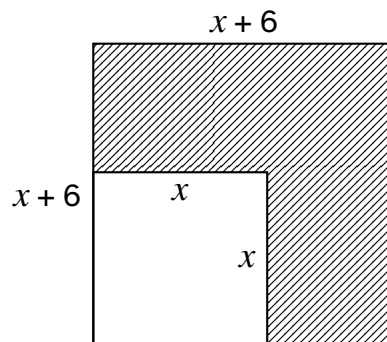


Diagram **NOT** accurately drawn

Find an expression, in terms of x , for the area of the shaded region.
Give your answer in its simplest form.

Shaded area = large square – small square

$$\begin{aligned} \text{Large square: } (x+6)^2 &= (x+6)(x+6) \\ &= x^2 + 12x + 36 \end{aligned}$$

$$\text{Small square: } x \times x = x^2$$

$$\text{Shaded area} = x^2 + 12x + 36 - x^2$$

$$= 12x + 36$$

Answer: $12x + 36 \text{ cm}^2$

Tip: Expand $(x + 6)^2$ as $(x + 6)(x + 6)$. Writing it as $x^2 + 36$ loses the $12x$ term.

Marks: 1 mark for $(x + 6)^2$. 1 mark for $x^2 + 12x + 36$. 1 mark for $12x + 36$.
