

Expanding Single 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)

(a) Expand $5(2m - 3)$

Multiply each term in the bracket by 5:

$$5 \times 2m = 10m$$

$$5 \times (-3) = -15$$

Answer: $10m - 15$

Tip: Stop at $10m - 15$. It cannot be simplified to $-5m$ or $15m$, because $10m$ and -15 are not like terms.

(b) Expand $2(a + d)$

Multiply each term in the bracket by 2:

$$2 \times a = 2a$$

$$2 \times d = 2d$$

Answer: $2a + 2d$

Tip: Both letters are multiplied by 2. The answer is not $2a + d$ or $2ad$.

2 (2 marks)

(a) Expand $3(4 - 2x)$

Multiply each term in the bracket by 3:

$$3 \times 4 = 12$$

$$3 \times (-2x) = -6x$$

Answer: $12 - 6x$

(b) Expand $7(p + q - 2)$

Multiply all three terms by 7:

$$7 \times p = 7p$$

$$7 \times q = 7q$$

$$7 \times (-2) = -14$$

Answer: $7p + 7q - 14$

3 (2 marks)

(a) Expand $y(y + 5)$

Multiply each term in the bracket by y :

$$y \times y = y^2$$

$$y \times 5 = 5y$$

Answer: $y^2 + 5y$

Tip: Remember to multiply the 5 by y as well. The answer is not $y^2 + 5$.

(b) Expand $4e(e + 2)$

Multiply each term in the bracket by $4e$:

$$4e \times e = 4e^2$$

$$4e \times 2 = 8e$$

Answer: $4e^2 + 8e$

4 (2 marks)

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

Expand each bracket:

$$2(x + 5) = 2x + 10$$

$$3(x - 1) = 3x - 3$$

Collect like terms: $2x + 10 + 3x - 3 = 5x + 7$

Answer: $5x + 7$

Marks: 1 mark for $2x + 10$ or $3x - 3$. 1 mark for $5x + 7$.

5 (2 marks)

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

Expand each bracket:

$$2(3x + 1) = 6x + 2$$

$$5(2 - x) = 10 - 5x$$

Collect the x terms: $6x - 5x = x$

Collect the numbers: $2 + 10 = 12$

Answer: $x + 12$

Tip: In $5(2 - x)$ the x term comes second. Take care with its sign: $5 \times (-x) = -5x$.

Marks: 1 mark for $6x + 2$ or $10 - 5x$. 1 mark for $x + 12$.

6 (1 mark)

Ben expands $3(2x - 4)$

He gets $6x - 4$

Explain what Ben has done wrong.

The correct working is:

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

$$3 \times (-4) = -12$$

So the answer should be $6x - 12$.

Ben did not multiply the -4 by 3 .

Answer: Ben has not multiplied the -4 by 3 . The answer should be $6x - 12$.

Tip: Be precise: say exactly which term was not multiplied ('he did not multiply the 4 by 3 '). Vague answers like 'he did not multiply everything' may not get the mark.

7 (2 marks)

Expand and simplify $6(k + 2) - 3(2 - k)$

Expand the first bracket: $6(k + 2) = 6k + 12$

Expand the second bracket, using -3 :

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

$$-3 \times (-k) = +3k \text{ (negative } \times \text{ negative = positive)}$$

$$\text{Collect like terms: } 6k + 12 - 6 + 3k = 9k + 6$$

Answer: $9k + 6$

Tip: When a bracket is subtracted, the sign of every term inside changes. $-3(2 - k)$ is $-6 + 3k$, not $-6 - 3k$.

Marks: 1 mark for $6k + 12$ or $-6 + 3k$. 1 mark for $9k + 6$.

8 (3 marks)

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

Multiply each term in the bracket by x :

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

$$x \times 7 = 7x$$

Answer: $2x^3 + 7x$

Tip: $x \times x^2 = x^3$ (add the powers: $1 + 2 = 3$). Remember to multiply the 7 by x too.

(b) Expand $3p(p^2 + 4p)$

Multiply each term in the bracket by $3p$:

$$3p \times p^2 = 3p^3$$

$$3p \times 4p = 12p^2$$

Answer: $3p^3 + 12p^2$

Marks: 2 marks for $3p^3 + 12p^2$. 1 mark for one correct term.

9 (4 marks)

A rope is cut into three pieces, A , B and C .

Piece A is x cm long.

Piece B is 4 cm shorter than piece A .

Piece C is 3 times as long as piece B .

(a) Write down an expression, in terms of x , for the length of piece B .

Piece B is 4 cm shorter than piece A .

So subtract 4 from x .

Answer: $x - 4$

(b) Write down an expression, in terms of x , for the length of piece C .
Give your answer without brackets.

Piece C is 3 times as long as piece B .

So the length of piece C is $3(x - 4)$.

Expand: $3x - 12$

Answer: $3x - 12$

Tip: Multiply both terms in the bracket by 3: $3(x - 4) = 3x - 12$, not $3x - 4$.

- (c) Find an expression, in terms of x , for the total length of the rope.
Give your answer in its simplest form.

Add the three lengths: $x + (x - 4) + (3x - 12)$

Collect the x terms: $x + x + 3x = 5x$

Collect the numbers: $-4 - 12 = -16$

Answer: $5x - 16$

Marks: 1 mark for $x + (x - 4) + (3x - 12)$ (using your answers to (a) and (b)). 1 mark for $5x - 16$.

10 (2 marks)

Expand and simplify $4(2y - 3) + 3(y + 5)$

Expand each bracket:

$$4(2y - 3) = 8y - 12$$

$$3(y + 5) = 3y + 15$$

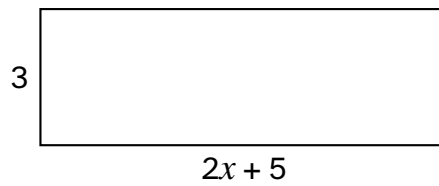
$$\text{Collect like terms: } 8y - 12 + 3y + 15 = 11y + 3$$

Answer: $11y + 3$

Marks: 1 mark for $8y - 12$ or $3y + 15$. 1 mark for $11y + 3$.

11 (5 marks)

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



*Diagram **NOT** accurately drawn*

- (a) Show that the area of the rectangle, in cm^2 , can be written as $6x + 15$

Area = length $\times$ width

$$\text{Area} = 3(2x + 5)$$

$$= 6x + 15$$

- (b) The area of the rectangle is 45 cm^2
Work out the perimeter of the rectangle.

Make an equation: $6x + 15 = 45$

Subtract 15 from both sides: $6x = 30$

Divide both sides by 6: $x = 5$

Length = $2 \times 5 + 5 = 15 \text{ cm}$

Width = 3 cm

Perimeter = $15 + 3 + 15 + 3 = 36 \text{ cm}$

Answer: 36 cm

Tip: Finding $x = 5$ is not the end. Use it to find the length, then the perimeter.

Marks: 1 mark for $6x + 15 = 45$. 1 mark for $x = 5$. 1 mark for a length of 15. 1 mark for 36.

12 (2 marks)

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

Expand the first bracket: $2(x + 3) = 2x + 6$

The minus sign changes the sign of each term in the second bracket:

$$-(x - 4) = -x + 4$$

Collect like terms: $2x + 6 - x + 4 = x + 10$

Answer: $x + 10$

Marks: 1 mark for $2x + 6$ or $-x + 4$. 1 mark for $x + 10$.

13 (2 marks)

Write numbers in the boxes to make this statement correct.

$$5(2x - \boxed{}) = \boxed{}x - 15$$

$5 \times 2x = 10x$, so the second box is 10.

$5 \times (\text{first box}) = 15$, so the first box is 3.

Answer: $5(2x - 3) = 10x - 15$

Marks: 1 mark for 3. 1 mark for 10.

14 (2 marks)

Show that $5(x + 2) + 3(x - 4) = 2(4x - 1)$

Left-hand side:

$$5(x + 2) + 3(x - 4) = 5x + 10 + 3x - 12$$

$$= 8x - 2$$

Right-hand side:

$$2(4x - 1) = 8x - 2$$

Both sides are equal to $8x - 2$.

Marks: 1 mark for expanding the brackets on either side correctly. 1 mark for showing both sides equal $8x - 2$.

15 (3 marks)

The diagram shows a small rectangle cut out of a large rectangle.
All measurements are in centimetres.

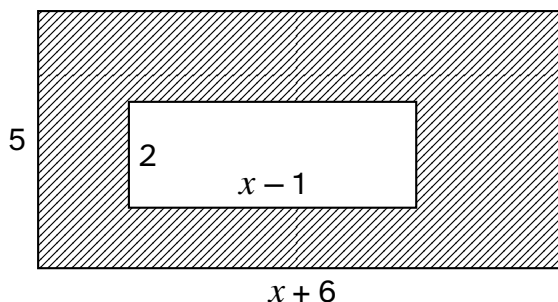


Diagram **NOT** accurately drawn

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

Shaded area = large rectangle – small rectangle

Large rectangle: $5(x + 6) = 5x + 30$

Small rectangle: $2(x - 1) = 2x - 2$

Shaded area = $5x + 30 - (2x - 2)$

$= 5x + 30 - 2x + 2$

$= 3x + 32$

Answer: $3x + 32 \text{ cm}^2$

Tip: Put the small area in a bracket before you subtract it. Then $-(2x - 2)$ gives $-2x + 2$.

Marks: 1 mark for $5(x + 6)$ or $2(x - 1)$. 1 mark for $5(x + 6) - 2(x - 1)$. 1 mark for $3x + 32$.

16 (2 marks)

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

Expand the first bracket: $3x(x + 4) = 3x^2 + 12x$

Expand the second bracket, using $-2x$:

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

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

Collect like terms: $3x^2 - 2x^2 = x^2$ and $12x + 2x = 14x$

Answer: $x^2 + 14x$

Marks: 1 mark for three of the four terms correct. 1 mark for $x^2 + 14x$.
