

Expanding Single Brackets

Solutions

For AQA GCSE Mathematics (8300) • 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 (3 marks)

(a) Multiply out $4(x + 3)$

Multiply each term in the bracket by 4:

$$4 \times x = 4x$$

$$4 \times 3 = 12$$

Answer: $4x + 12$

(b) Multiply out $5(2y - 1)$

Multiply each term in the bracket by 5:

$$5 \times 2y = 10y$$

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

Answer: $10y - 5$

(c) Multiply out $3(10 - x)$

Multiply each term in the bracket by 3:

$$3 \times 10 = 30$$

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

Answer: $30 - 3x$ (or $-3x + 30$)

Tip: Stop at $30 - 3x$. It cannot be simplified to $27x$ or 27 , because 30 and $-3x$ are not like terms.

2 (1 mark)

Which expression is equivalent to $6(2a - 3)$?

Circle your answer.

Options: $12a - 3$, $8a - 9$, $12a - 18$, $12a + 18$

Multiply *both* terms by 6:

$$6 \times 2a = 12a$$

$$6 \times (-3) = -18$$

Answer: $12a - 18$

Tip: $12a - 3$ is a common wrong answer. It only multiplies the first term by 6.

3 (3 marks)

(a) Multiply out $x(x - 4)$

Multiply each term in the bracket by x :

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

$$x \times (-4) = -4x$$

Answer: $x^2 - 4x$

Tip: The x outside multiplies the -4 too, so the second term is $-4x$. The answer is not $x^2 - 4$.

(b) Multiply out $3x(2x - 5)$

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

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

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

Answer: $6x^2 - 15x$

Marks: 2 marks for $6x^2 - 15x$. 1 mark for $6x^2$ or $-15x$.

4 (1 mark)

Sam multiplies out $5(3y - 2)$

He writes $15y - 2$

What mistake has Sam made?

The correct working is:

$$5 \times 3y = 15y$$

$$5 \times (-2) = -10$$

So the answer should be $15y - 10$.

Sam did not multiply the -2 by 5.

Answer: He has not multiplied the -2 by 5 (he only multiplied the first term). It should be $15y - 10$.

Tip: When asked for the mistake, describe what went wrong ('he did not multiply the 2 by 5'). Just giving the right answer may not get the mark.

5 (4 marks)

(a) Expand and simplify $3(x + 2) + 4(x + 5)$

Expand each bracket:

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

$$4(x + 5) = 4x + 20$$

Collect like terms: $3x + 6 + 4x + 20 = 7x + 26$

Answer: $7x + 26$

Marks: 1 mark for $3x + 6$ or $4x + 20$. 1 mark for $7x + 26$.

(b) Simplify fully $3(m - 4) + 2m$

Expand the bracket: $3(m - 4) = 3m - 12$

Add the $2m$: $3m - 12 + 2m$

Collect the m terms: $3m + 2m = 5m$

Answer: $5m - 12$

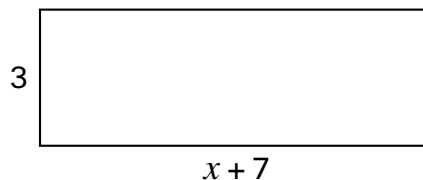
Tip: The 3 only multiplies what is inside the bracket. Do not multiply the $2m$ by 3.

Marks: 1 mark for $3m - 12$. 1 mark for $5m - 12$.

6 (2 marks)

Here is a rectangle.

All lengths are in centimetres.



Not drawn accurately

Work out an expression for the area of the rectangle.

Give your answer without brackets.

Area = length $\times$ width

Area = $3(x + 7)$

Expand the bracket: $3 \times x + 3 \times 7 = 3x + 21$

Answer: $3x + 21 \text{ cm}^2$

Marks: 1 mark for $3(x + 7)$ or $3 \times x + 3 \times 7$. 1 mark for $3x + 21$.

7 (1 mark)

Simplify $8b - (3b + 4)$

Circle your answer.

Options: $5b + 4$, $5b - 4$, $11b - 4$, $5b$

The minus sign in front of the bracket applies to *both* terms.

$$8b - (3b + 4) = 8b - 3b - 4$$

$$8b - 3b = 5b$$

So the answer is $5b - 4$

Answer: $5b - 4$

Tip: Think of $-(3b + 4)$ as $-1 \times (3b + 4)$. Every term inside changes sign.

8 (2 marks)

Tick **one** box for each statement.

	True	False
$2(x + 4) = 2x + 8$	✓	
$3(y - 2) = 3y - 2$		✓
$-(a - 5) = -a + 5$	✓	
$x(x + 1) = x^2 + 1$		✓
$2(x + 4) = 2x + 8$ ✓		
$3(y - 2) = 3y - 6$, not $3y - 2$		

$$-(a - 5) = -a + 5 \quad \checkmark$$

$$x(x + 1) = x^2 + x, \text{ not } x^2 + 1$$

Marks: 2 marks for all four correct. 1 mark for two or three correct.

9 (3 marks)

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

Expand the first bracket: $4(3c + 2) = 12c + 8$

Expand the second bracket, using -2 :

$$-2 \times c = -2c$$

$$-2 \times (-5) = +10 \quad (\text{negative} \times \text{negative} = \text{positive})$$

$$\text{Collect like terms: } 12c + 8 - 2c + 10 = 10c + 18$$

Answer: $10c + 18$

Tip: The most common mistake is $-2(c - 5) = -2c - 10$. Multiply by -2 , including the sign:
 $-2 \times (-5) = +10$.

Marks: 1 mark for $12c + 8$. 1 mark for $-2c + 10$. 1 mark for $10c + 18$.

10 (2 marks)

(a) Write the missing terms in the boxes.

$$4(\boxed{} + 3) = 8x + \boxed{}$$

$4 \times (\text{first box}) = 8x$, so the first box is $2x$.

$4 \times 3 = 12$, so the second box is 12.

Answer: $4(2x + 3) = 8x + 12$

- (b) Write the missing numbers in the boxes.

$$\boxed{}(3y - \boxed{}) = 15y - 10$$

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

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

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

11 (5 marks)

Priya works in a shop.

On weekdays she is paid $\pounds h$ per hour.

At the weekend she is paid $\pounds 3$ more per hour than on weekdays.

One week she works 6 hours on weekdays and 4 hours at the weekend.

- (a) Write an expression, in terms of h , for the total amount, in pounds, that Priya is paid that week.

Give your answer in its simplest form.

At the weekend she is paid $h + 3$ pounds per hour.

Weekdays: $6 \times h = 6h$

Weekend: $4(h + 3) = 4h + 12$

Total: $6h + 4h + 12 = 10h + 12$

Answer: $\pounds(10h + 12)$

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

Marks: 1 mark for $4(h + 3)$ or $4h + 12$. 1 mark for $6h + 4(h + 3)$. 1 mark for $10h + 12$.

- (b) That week Priya is paid $\pounds 132$ in total.

Work out how much she is paid per hour at the weekend.

Make an equation: $10h + 12 = 132$

Subtract 12 from both sides: $10h = 120$

Divide both sides by 10: $h = 12$

h is the weekday rate, so the weekend rate is $12 + 3 = 15$

Answer: £15

Tip: $h = 12$ is the weekday rate. The question asks for the weekend rate, so add the £3.

Marks: 1 mark for $10h + 12 = 132$ (using your answer to (a)). 1 mark for 15.

12 (3 marks)

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

Left-hand side:

$$\begin{aligned} 4(x + 3) + 2(x - 1) &= 4x + 12 + 2x - 2 \\ &= 6x + 10 \end{aligned}$$

Right-hand side:

$$2(3x + 5) = 6x + 10$$

Both sides simplify to $6x + 10$, so they are identical.

($\equiv$ means 'is identical to': true for every value of x .)

Marks: 1 mark for $4x + 12$ or $2x - 2$. 1 mark for $6x + 10$ from the left-hand side. 1 mark for showing the right-hand side is also $6x + 10$.

13 (3 marks)

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

Expand the first bracket: $x(x + 5) = x^2 + 5x$

Expand the second bracket, using -3 :

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

Collect like terms: $x^2 + 5x - 3x + 6$

$5x - 3x = 2x$, so the answer is $x^2 + 2x + 6$

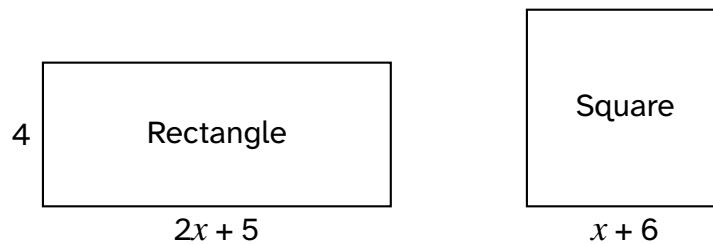
Answer: $x^2 + 2x + 6$

Marks: 1 mark for $x^2 + 5x$. 1 mark for $-3x + 6$. 1 mark for $x^2 + 2x + 6$.

14 (3 marks)

Here are a rectangle and a square.

All lengths are in centimetres.



Not drawn accurately

Show that the perimeter of the square is always 6 cm more than the perimeter of the rectangle.

Rectangle: two lengths of $2x + 5$ and two widths of 4.

$$\text{Perimeter} = 2(2x + 5) + 2 \times 4 = 4x + 10 + 8 = 4x + 18$$

Square: four sides of $x + 6$.

$$\text{Perimeter} = 4(x + 6) = 4x + 24$$

$$\text{Difference: } (4x + 24) - (4x + 18) = 6$$

The answer is 6 whatever x is, so the square's perimeter is always 6 cm more.

Marks: 1 mark for $4x + 18$. 1 mark for $4x + 24$. 1 mark for showing the difference is 6.

15 (3 marks)

Jo thinks of a number, n .

She multiplies it by 3 and then adds 4.

She then multiplies the result by 2.

- (a) Write an expression, in terms of n , for Jo's final answer.
Give your answer without brackets.

Multiply by 3: $3n$

Add 4: $3n + 4$

Multiply the result by 2: $2(3n + 4)$

Expand: $2(3n + 4) = 6n + 8$

Answer: $6n + 8$

Tip: 'Multiply the result by 2' means the whole of $3n + 4$ is doubled, so you need a bracket. $2 \times 3n + 4$ is wrong.

Marks: 1 mark for $2(3n + 4)$. 1 mark for $6n + 8$.

- (b) Jo says,
 'If n is a whole number, my final answer is always even.'

Is she correct? Tick a box.

Give a reason for your answer.

$$6n + 8 = 2(3n + 4)$$

This is 2 times a whole number.

So it is always even.

Answer: Yes, because $6n + 8 = 2(3n + 4)$ is a multiple of 2 (both $6n$ and 8 are even).

16 (3 marks)

a and b are whole numbers.

$$5(2x + a) - 3x \equiv bx + 20$$

Work out the values of a and b .

Expand the bracket: $5(2x + a) = 10x + 5a$

Simplify the left-hand side: $10x + 5a - 3x = 7x + 5a$

So $7x + 5a \equiv bx + 20$

Compare the x terms: $b = 7$

Compare the numbers: $5a = 20$

So $a = 4$

Answer: $a = 4$, $b = 7$

Tip: In an identity, the x terms on both sides must match, and the number terms must match. Simplify the left-hand side fully before you compare.

Marks: 1 mark for $10x + 5a$. 1 mark for $7x + 5a$ (or $b = 7$). 1 mark for $a = 4$ and $b = 7$.
