

Name _____

Date _____

2.4 Expanding brackets — worked answers

Expand brackets in algebraic expressions. · 56 questions

A · Fluency — Expand single brackets, then expand and simplify.

1 Expand: $4(n + 3)$ **Answer: $4n + 12$** Multiply every term inside the brackets by the term outside: $4(n + 3) = 4n + 12$.**2** Expand: $2(x - 5)$ **Answer: $2x - 10$** Multiply every term inside the brackets by the term outside: $2(x - 5) = 2x - 10$.**3** Expand: $3(2g + h - 7)$ **Answer: $6g + 3h - 21$** Multiply every term inside the brackets by the term outside: $3(2g + h - 7) = 6g + 3h - 21$.**4** Expand: $5(a + 2)$ **Answer: $5a + 10$** Multiply every term inside the brackets by the term outside: $5(a + 2) = 5a + 10$.**5** Expand: $6(b - 1)$ **Answer: $6b - 6$** Multiply every term inside the brackets by the term outside: $6(b - 1) = 6b - 6$.**6** Expand: $2(3c + 4)$ **Answer: $6c + 8$** Multiply every term inside the brackets by the term outside: $2(3c + 4) = 6c + 8$.**7** Expand: $7(2 - d)$ **Answer: $-7d + 14$** Multiply every term inside the brackets by the term outside: $7(2 - d) = -7d + 14$.**8** Expand: $4(3e + 2f)$ **Answer: $12e + 8f$** Multiply every term inside the brackets by the term outside: $4(3e + 2f) = 12e + 8f$.**9** Expand: $3(x + 9)$ **Answer: $3x + 27$** Multiply every term inside the brackets by the term outside: $3(x + 9) = 3x + 27$.**10** Expand: $3(y - 1)$ **Answer: $3y - 3$** Multiply every term inside the brackets by the term outside: $3(y - 1) = 3y - 3$.

11 Expand: $8(2m + 3)$

Answer: $16m + 24$

Multiply every term inside the brackets by the term outside: $8(2m + 3) = 16m + 24$.

12 Expand: $5(4 - 2p)$

Answer: $-10p + 20$

Multiply every term inside the brackets by the term outside: $5(4 - 2p) = -10p + 20$.

13 Expand: $x(x + 3)$

Answer: $x^2 + 3x$

Multiply every term inside the brackets by the term outside: $x(x + 3) = x^2 + 3x$.

14 Expand: $a(a - 2)$

Answer: $a^2 - 2a$

Multiply every term inside the brackets by the term outside: $a(a - 2) = a^2 - 2a$.

15 Expand: $2x(x + 4)$

Answer: $2x^2 + 8x$

Multiply every term inside the brackets by the term outside: $2x(x + 4) = 2x^2 + 8x$.

16 Expand: $-2(x + 3)$

Answer: $-2x - 6$

Multiply every term inside the brackets by the term outside: $-2(x + 3) = -2x - 6$.

17 Expand: $-3(y - 2)$

Answer: $-3y + 6$

Multiply every term inside the brackets by the term outside: $-3(y - 2) = -3y + 6$.

18 Expand: $-(x + 7)$

Answer: $-x - 7$

Multiply every term inside the brackets by the term outside: $-(x + 7) = -x - 7$.

19 Expand and simplify: $2(x + 3) + 3(x + 1)$

Answer: $5x + 9$

Expand each bracket, then collect like terms: $2(x + 3) + 3(x + 1) = 5x + 9$.

20 Expand and simplify: $4(a + 2) - 2(a + 1)$

Answer: $2a + 6$

Expand each bracket, then collect like terms: $4(a + 2) - 2(a + 1) = 2a + 6$.

21 Expand and simplify: $3(2y + 1) + 2(y - 4)$

Answer: $8y - 5$

Expand each bracket, then collect like terms: $3(2y + 1) + 2(y - 4) = 8y - 5$.

22 Expand and simplify: $5(b - 2) + 3(b + 4)$

Answer: $8b + 2$

Expand each bracket, then collect like terms: $5(b - 2) + 3(b + 4) = 8b + 2$.

23 Expand and simplify: $2(3m + 1) - (m + 5)$

Answer: $5m - 3$

Expand each bracket, then collect like terms: $2(3m + 1) - (m + 5) = 5m - 3$.

- 24** Expand and simplify: $6(c + 2) - 4(c - 1)$

Answer: $2c + 16$

Expand each bracket, then collect like terms: $6(c + 2) - 4(c - 1) = 2c + 16$.

B · Reasoning — Spot the mistake and check by substituting.

- 25** Copy and complete: $2(x + 9) = 2 \times x + 2 \times 9 = 2x + ?$

Answer: 18

$2 \times 9 = 18$, so $2(x + 9) = 2x + 18$.

- 26** Copy and complete: $3(y - 1) = 3 \times y - 3 \times 1 = 3y - ?$

Answer: 3

$3 \times 1 = 3$, so $3(y - 1) = 3y - 3$.

- 27** Marcus writes $4(n + 3) = 4n + 3$. What has he done wrong?

- ☐ He multiplied the 3 by 4 twice
- ☐ He forgot to multiply the 3 by the 4
- ☐ He should have added instead
- ☐ Nothing — it is correct

Answer: He forgot to multiply the 3 by the 4

Every term inside the brackets must be multiplied: $4(n + 3) = 4n + 12$.

- 28** Sofia writes $2(x - 5) = 2x + 10$. What has she done wrong?

- ☐ She multiplied wrongly
- ☐ She kept the wrong sign
- ☐ She forgot the x
- ☐ Nothing — it is correct

Answer: She kept the wrong sign

The sign in front of the 5 is a minus, so the answer is $2x - 10$.

- 29** Expand $4(-n + 3)$.

Answer: $-4n + 12$

$4 \times (-n) = -4n$ and $4 \times 3 = 12$, giving $-4n + 12$, usually written $12 - 4n$.

- 30** Write an expression, without brackets, for the area of a rectangle with width 5 and length $x + 4$.

Answer: $5x + 20$

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

- 31** Write an expression, without brackets, for the area of a rectangle with width x and length $x + 6$.

Answer: $x^2 + 6x$

Area = $x(x + 6) = x^2 + 6x$.

- 32** Which expression is equivalent to $3(2g + h - 7)$?

- ☐ $6g + h - 7$
- ☐ $6g + 3h - 21$
- ☐ $5g + 4h - 4$
- ☐ $6g + 3h - 7$

Answer: $6g + 3h - 21$

Multiply all three terms by 3: $3 \times 2g = 6g$, $3 \times h = 3h$, $3 \times 7 = 21$.

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

Answer: $5x + 14$

$$2x + 8 + 3x + 6 = 5x + 14.$$

- 34** Expand and simplify $5(y + 3) - 2(y + 1)$.

Answer: $3y + 13$

$$5y + 15 - 2y - 2 = 3y + 13. \text{ Notice the minus sign applies to both terms in the second bracket.}$$

- 35** Expand $6(x + 2)$ and then substitute $x = 3$. What is the value?

Answer: 30

$$6(x + 2) = 6x + 12, \text{ and } 6 \times 3 + 12 = 30. \text{ (Or } 6 \times 5 = 30 \text{ directly — a good check.)}$$

- 36** Expand $4(2x - 1)$ and then substitute $x = 5$. What is the value?

Answer: 36

$$4(2x - 1) = 8x - 4, \text{ and } 8 \times 5 - 4 = 36.$$

C · Challenge — Two brackets, letters outside and reversing.

- 37** Expand and simplify $3(2a + 5) - 2(3a - 4)$.

Answer: 23

$$6a + 15 - 6a + 8 = 23. \text{ The } a \text{ terms cancel completely.}$$

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

Answer: $3x^2 + 5x$

$$2x^2 + 6x + x^2 - x = 3x^2 + 5x.$$

- 39** Expand and simplify $4(p + 2q) - 3(p - q)$.

Answer: $p + 11q$

$$4p + 8q - 3p + 3q = p + 11q.$$

- 40** A rectangle has width 3 and length $2x + 5$. A square has side x . Write a simplified expression for the total area.

Answer: $x^2 + 6x + 15$

$$3(2x + 5) = 6x + 15, \text{ plus } x^2, \text{ giving } x^2 + 6x + 15.$$

- 41** Expand and simplify $5(2n - 3) - (n - 4)$.

Answer: $9n - 11$

$$10n - 15 - n + 4 = 9n - 11.$$

- 42** $a(x + b)$ expands to $3x + 12$. What is the value of a ?

Answer: 3

$$\text{The } x \text{ term is } ax = 3x, \text{ so } a = 3 \text{ (and then } b = 4).$$

- 43** $a(x + b)$ expands to $3x + 12$. What is the value of b ?

Answer: 4

$$a = 3, \text{ and } ab = 12, \text{ so } b = 4. \text{ Check: } 3(x + 4) = 3x + 12 \checkmark$$

- 44** Write an expression for the area of a rectangle of width $2x$ and length $x + 7$, and expand it.

Answer: $2x^2 + 14x$

$$2x(x + 7) = 2x^2 + 14x.$$

D · Word problems — Expanding in context.

- 45** A box holds $x + 4$ pencils. Write an expanded expression for the number of pencils in 6 boxes.
Answer: $6x + 24$
 $6(x + 4) = 6x + 24$.
- 46** A ticket costs $\$y$ and there is a $\$3$ booking fee per ticket. Write an expanded expression for the cost of 5 tickets.
Answer: $5y + 15$
 $5(y + 3) = 5y + 15$.
- 47** A rectangular flowerbed is 4 m wide and $(x + 6)$ m long. Write an expanded expression for its area, in m^2 .
Answer: $4x + 24$
 $4(x + 6) = 4x + 24$.
- 48** A shop reduces every item by $\$2$. Write an expanded expression for the cost of 7 items that originally cost $\$p$ each.
Answer: $7p - 14$
 $7(p - 2) = 7p - 14$.
- 49** A minibus carries n passengers. Three minibuses each carry 2 more than n . Write an expanded expression for the total number carried.
Answer: $3n + 6$
 $3(n + 2) = 3n + 6$.
- 50** A square patio has side x m. A border 2 m wide is added to the length only, making a rectangle x by $(x + 2)$. Write an expanded expression for the new area, in m^2 .
Answer: $x^2 + 2x$
 $x(x + 2) = x^2 + 2x$.
- 51** A team scores t points a match. Over 4 matches they score 3 extra bonus points each time. Write an expanded expression for their total.
Answer: $4t + 12$
 $4(t + 3) = 4t + 12$.
- 52** A hall has r rows of $(s + 2)$ seats. Write an expanded expression for the total number of seats.
Answer: $2r + rs$
 $r(s + 2) = rs + 2r$.
- 53** A phone plan costs $\$(m - 5)$ a month after a discount. Write an expanded expression for the cost of a year.
Answer: $12m - 60$
 $12(m - 5) = 12m - 60$.
- 54** A pack contains $2x + 1$ stickers. Write an expanded expression for the number in 5 packs.
Answer: $10x + 5$
 $5(2x + 1) = 10x + 5$.
- 55** Two rectangles: one is 3 by $(x + 1)$, the other is 2 by $(x + 4)$. Write a simplified expression for their total area.
Answer: $5x + 11$
 $3x + 3 + 2x + 8 = 5x + 11$.

- 56** A gardener plants 4 rows of $(n + 3)$ plants and then 2 rows of $(n - 1)$ plants. Write a simplified expression for the total.

Answer: $6n + 10$

$$4n + 12 + 2n - 2 = 6n + 10.$$