Expanding Double Brackets

Prior Knowledge:

• Expanding single brackets.

• Collecting like terms and simplifying expressions.

• Adding and multiplying negative numbers.

Expanding double brackets is a bit trickier than expanding single brackets – this time, you must **multiply** everything in the **first bracket** by everything in the **second bracket**.

There are a number of different methods to expand double brackets – we'll look at two. The first is the **FOIL** method:

First	–	multiply the first term in each bracket together.
Outer	–	multiply the outside terms (the first term in the first bracket by the second term in the second bracket).
Inner	–	multiply the inside terms (the second term in the first bracket by the first term in the second bracket).
Last	–	multiply the second term in each bracket together.

The second is the grid method.

When **expanding** double brackets, you are left with **four terms**. Usually you're also asked to **fully simplify** an answer. Two terms will usually combine to leave you with three terms in a simplified answer.

Example 1

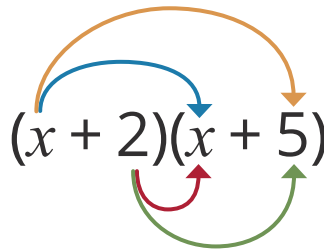Expand and simplify $(x + 2)(x + 5)$.

FOIL Method

F : $x \times x = x^2$

O : $x \times 5 = 5x$

I : $2 \times x = 2x$

L : $2 \times 5 = 10$

$(x + 2)(x + 5)$

Write out the terms as an expression:

$x^2 + 5x + 2x + 10$

$5x$ and $2x$ add to make $7x$ so the final answer is:

$x^2 + 7x + 10$

Grid Method

You can also use a multiplication grid to expand the brackets.

×	x	+2
x	x^2	+2x
+5	+5x	+10

Write out the terms as an expression and **simplify**:

$x^2 + 5x + 2x + 10$

$x^2 + 7x + 10$
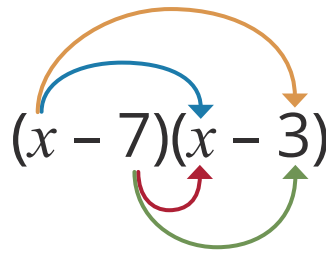
Example 2

Expand and simplify $(x – 7)(x – 3)$.

FOIL Method

F : $x × x = x^2$

O : $x × \text{-}3 = \text{-}3x$

I : $\text{-}7 × x = \text{-}7x$

L : $\text{-}7 × \text{-}3 = 21$

$(x – 7)(x – 3)$

Write out the terms as an expression:

$x^2 – 3x – 7x + 21$

-3x and -7x combine to make -10x, so the final answer is:

$x^2 – 10x + 21$

Grid Method

You can also use a multiplication grid to expand the brackets.

×	x	-7
x	x^2	-7x
-3	-3x	+21

$x^2 – 3x – 7x + 21$

$x^2 – 10x + 21$

Example 3

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

Remember, squaring is multiplying something by itself. This means $(x + 6)^2$ is the same as $(x + 6)(x + 6)$. When you see squared brackets, write them out as two brackets then expand as usual.

FOIL Method

F : $x \times x = x^2$

O : $x \times 6 = 6x$

I : $6 \times x = 6x$

L : $6 \times 6 = 36$

$$(x + 6)(x + 6)$$

$x^2 + 6x + 6x + 36$

$x^2 + 12x + 36$

Grid Method

You can also use a multiplication grid to expand the brackets.

×	x	+6
x	x^2	**+6x**
+6	**+6x**	**+36**

$x^2 + 6x + 6x + 36$

$x^2 + 12x + 36$

Your Turn

Expand and simplify each of the following:

1. $(x + 6)(x + 3)$

2. $(x + 8)(x + 4)$

3. $(x + 2)(x + 10)$

4. $(x - 5)(x + 3)$

5. $(x - 4)(x + 6)$

6. $(x + 12)(x - 3)$

7. $(x + 7)(x - 6)$

8. $(x + 11)(x + 2)$

9. $(x + 4)(x + 13)$

10. $(x + 2)(x - 10)$

11. $(x - 4)(x - 9)$

12. $(x - 5)(x - 2)$

13. $(x - 15)(x - 3)$

14. $(x + 9)(x - 8)$

15. $(x - 8)(x + 12)$

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16. $(x + 8)^2$

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17. $(x + 10)^2$

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18. $(x + 4)^2$

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19. $(x - 2)^2$

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20. $(x - 3)^2$

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21. $(2x + 2)(x + 5)$

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22. $(3x + 3)(x + 2)$

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23. $(2x - 4)(x - 3)$

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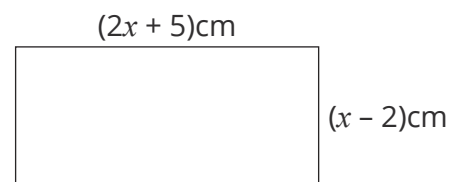
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24. $(2x + 3)^2$

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25. $(3x - 2)^2$

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Challenge

A rectangle is shown below.

Form a simplified expression for the area of the rectangle.

$(2x + 5)$cm

$(x - 2)$cm

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