Double Brackets: Four Ways

Year 9 · Friday ATL

One product, four pictures of it. Get fluent at moving between them.

Name: _____ Date: _____

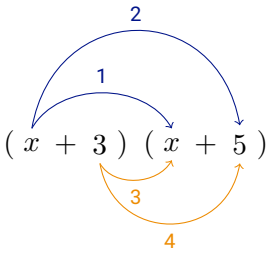
Worked example $(x+3)(x+5)$

1 · Split the first bracket

$$\begin{aligned}(x+3)(x+5) &= x(x+5)+3(x+5)\\ &= x^2+5x+3x+15\\ &= x^2+8x+15\end{aligned}$$

Each term of the first bracket multiplies the whole second bracket.

2 · Arrows: four products



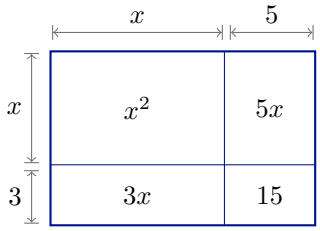
$$\underset{1}{x^2}+\underset{2}{5x}+\underset{3}{3x}+\underset{4}{15}=x^2+8x+15$$

3 · Grid

	x	$+5$
x	x^2	$+5x$
$+3$	$+3x$	$+15$

Add the four cells: $x^2+8x+15$

4 · Area



Total area $= (x+3)(x+5) = x^2+8x+15$

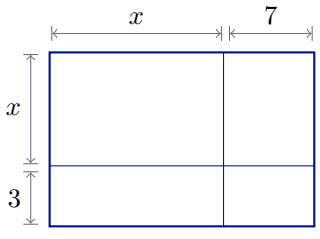
They are the same calculation. Arrows 1–4 are the four cells of the grid, which are the four rectangles of the area. The two middle cells, $5x$ and $3x$, combine into the middle term $8x$.

Move between them Translate

1. This grid is complete. Write the two brackets it came from, and the expanded answer.

□	□
x^2	$6x$
$2x$	12

2. Write this area model as a product of two brackets, then expand.



Move between them continued

3. Show $(x+4)(x+1)$ as a grid *and* as an area model. Check that both give the same answer.

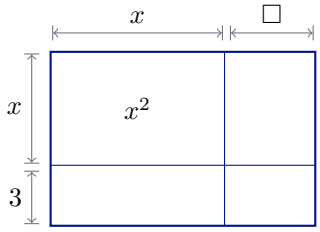
4. Mia wrote $x(x+6)+5(x+6)$. Which two brackets did she start with? Draw the grid that matches her line, then simplify.

Work backwards Missing pieces

5. Fill in the missing headers and the missing cell.

	x	$\square$
x	x^2	$9x$
$\square$	$\square$	36

6. A rectangle has area $x^2+8x+15$ and one side $(x+3)$. Fill in the area model and find the other side.



7. Sam drew only three arrows for $(x+3)(x+5)$ and got $x^2+5x+15$. Which arrow is missing? What is the correct answer?

8. $x^2+7x+10$ has been put into a grid with x^2 and 10 in place. Split $7x$ between the other two cells so that the grid works. Then write the brackets.

	$\square$	$\square$
$\square$	x^2	$\square$
$\square$	$\square$	10

Stretch the models Think

9. Use a grid to expand $(x-2)(x+7)$. Then explain why the *area* model is awkward here, but the grid still works.

10. Expand $(2x+3)(x+4)$ with the method of your choice. Then show it as an area model. How many x^2 pieces does the area need, and where do they go?

11. **Which picture?** For each, say which representation you would choose and why:
(a) $(x+10)(x+20)$ (b) $(x-3)(x-4)$ (c) $x^2+9x+20$ back into brackets