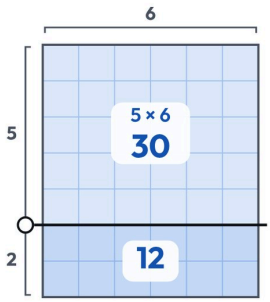
Names (pair) _____ Date _____

Properties of Multiplication and Mental Calculation

Example

7 × 6 = 5 × 6 + 2 × 6 = 30 + 12 = 42

The rectangle is cut into 2 parts. The products in the parts add up to the whole product.

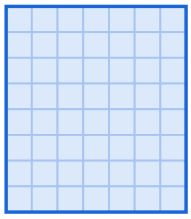


We split a harder product into easier ones. The cut splits the rectangle 7×6 into 5×6 and 2×6:

$$7 \times 6 = 5 \times 6 + 2 \times 6 = 30 + 12 = 42$$

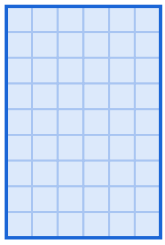
This property is called the **distributive law**.

1 ON YOUR OWN Draw a cut on the rectangle and complete the calculation.



$8 \times 7 = \square \times 7 + \square \times 7$

$= \square + \square = \square$



$9 \times 6 = \square \times 6 + \square \times 6$

$= \square + \square = \square$

2 IN PAIRS **Shortcuts.** Complete.

× 5 is half of × 10	$5 \times 16 = 160 \div 2 = \square$	$5 \times 48 = \square$
× 9 is × 10 take away one	$9 \times 14 = 140 - 14 = \square$	$9 \times 23 = \square$
× 4 is double, then double again	$4 \times 23 = 2 \times 46 = \square$	$4 \times 35 = \square$

Why does the × 9 shortcut work? Show it on a 9×14 rectangle.

Names (pair) _____ Date _____

Remember

We can **swap** and **group** factors as we like: $25 \times 7 \times 4 = (25 \times 4) \times 7 = 100 \times 7 = 700$. When multiplying by 10, 100 or $1{,}000$ every digit moves one, two or three places to the left, so zeros appear at the end: $37 \times 100 = 3{,}700$.

3 ON YOUR OWN Calculate in a clever order.

$25 \times 7 \times 4 =$ ☐ $2 \times 39 \times 5 =$ ☐

$5 \times 13 \times 20 =$ ☐ $50 \times 8 \times 2 \times 3 =$ ☐

4 ON YOUR OWN Multiplying by 10, 100 and $1{,}000$.

$37 \times 10 =$ ☐ $37 \times 100 =$ ☐ $450 \times 10 =$ ☐

$6 \times 1{,}000 =$ ☐ $40 \times 300 =$ ☐ $25 \times 40 =$ ☐

5 IN PAIRS **Find the mistake.** Ivan: $6 \times 23 = 6 \times 20 + 3 = 123$. Mia: $40 \times 30 = 120$. What went wrong? Work them out correctly.

_____

_____

The Multiplication Rectangle app · otooly.com/multiplication-rectangle

Enter 7 rows and 6 columns and cut the rectangle by dragging along its edge. The calculation shows the distributive law. Make $7 \times 6 = 7 \times 5 + 7 \times 1$, then 9×14 with a cut at 10.

★ ON YOUR OWN **Exit card.** $9 \times 12 = 10 \times 12 - 12 =$ ☐ $25 \times 8 \times 4 =$ ☐