Multiplying Expressions

An expression has terms; a variable is a letter standing for a number; a coefficient is its numerical factor. To simplify is to write an equivalent, tidy expression.

The rule

Multiply all numerical factors, then write each different variable factor once: $4a \times 6b = 24ab$.

A reliable process

1. Multiply coefficients. 2. Gather variables. 3. Use conventional order.

Worked example

$2a \times 3b \times 4 = 2 \times 3 \times 4 \times a \times b = 24ab$.

Check

$3a \times 4b$ is $12ab$, never $7ab$: multiplication, not addition.

Properties help

Multiplication is commutative and associative.

Reorder and regroup

$b \times 6 \times a \times 5 = (6 \times 5)ab = 30ab$. The order changes, not the product.

Signs and exact coefficients

$(-3)a \times 4b = -12ab$; $\frac{1}{2}x \times 8y = 4xy$; $2\pi x \times 3y = 6\pi xy$.

Area models

Area = length $\times$ width.

Rectangle
A $7x$ by $2y$ rectangle has area $14xy$.

Composite area
Split an L-shape into rectangles, find each product, then add their areas: $2x \times 6y + 3x \times 2y = 18xy$.

Boundary and common traps

This objective is products without powers.

Do not add coefficients
$4x \times 3y = 12xy$, not $7xy$.

Powers are next
$x \times x$ creates x^2. That index-law reasoning belongs to LO9; recognise the boundary and leave it there.