

Properties of operations and the distributive law

MODULE 10 · ALGEBRA — PATTERNS, EXPRESSIONS AND EQUATIONS

ALGEBRA

Operations obey **properties**: order doesn't matter for + and \times (commutative), and the **distributive law** splits a product over a sum.

$$\rightarrow 6 \times 23 = 6 \times 20 + 6 \times 3 = 120 + 18 = 138.$$

	$\times 20$	$\times 3$
6	120	18

$$\text{Total: } 120 + 18 =$$

HOW TO ANSWER TODAY

- **Property names.** Order swaps ($a + b = b + a$) \rightarrow commutative. Brackets move ($(a+b)+c = a+(b+c)$) \rightarrow associative. One spreads over two ($a(b+c) = ab+ac$) \rightarrow distributive.

$$5 + 3 = 3 + 5 \rightarrow \text{commutative} \cdot 2 \times (4 + 5) = 2 \times 4 + 2 \times 5 \rightarrow \text{distributive}$$

WARM-UP

- At a sleepover, Aoife sets out the biscuits in 5 rows of 3 on one tray, and Cian sets out his in 3 rows of 5 on another tray. They notice that $5 \times 3 = 3 \times 5$ gives the same total. Which property of operations does this equation show: commutative, associative, or distributive?
Which property of operations does this equation show: $5 \times 3 = 3 \times 5$? (Choose: commutative, associative, or distributive.)
- Saoirse is tidying the class library log for the week. She sees that $29 + 8 = 8 + 29$ gives the same total of books, whether she counts returns first or borrows first. Which property of operations does this equation show: commutative, associative, or distributive?
Which property of operations does this equation show: $29 + 8 = 8 + 29$? (Choose: commutative, associative, or distributive.)

PRACTICE

- On the 5th class nature walk through the local park, Oisín spots groups of leaves on the ground. He writes $(7 \times 4) \times 4 = 7 \times (4 \times 4)$ in his nature copy to show two ways of counting the leaves. Which property of operations does his equation show: commutative, associative, or distributive?
Which property of operations does this equation show: $(7 \times 4) \times 4 = 7 \times (4 \times 4)$? (Choose: commutative, associative, or distributive.)
- At Camogie training under the floodlights, Aoife sets up 5 rows of 3 cones for a passing drill. Saoirse sets up 3 rows of 5 cones for the same drill, and notices both layouts have the same number of cones, so $5 \times 3 = 3 \times 5$. Which property of operations does this equation show: commutative, associative, or distributive?

CHALLENGE

- On the school tour to the Cliffs of Moher, 5th class buy tickets for 9 pupils and snack packs for 2 pupils, with each ticket and each snack pack costing €7. Niamh writes the total cost as $7 \times (9 + 2) = 7 \times 9 + 7 \times 2$. Which property of operations does her equation show: commutative, associative, or distributive?
- Saoirse watches the classroom bird-feeder for 9 days. Each day she counts 9 finches and 14 sparrows visiting the feeder. To work out the total visits, she writes $9 \times (9 + 14) = 9 \times 9 + 9 \times 14$ in her maths copy. Which property of operations does this equation show: commutative, associative, or distributive?