

Lesson 22 **NUMBER****Order of operations with brackets**

CURRICULUM ALIGNMENT

NUM.OPS.4

build upon, select and make use of a range of operation strategies.

ALG.PRR.4a

identify, explain and apply generalisations, including properties of operations, mathematical models and patterns.

INTERACTIVES Order of Operations (BIDMAS) · challenge, display, explore

WHAT THIS LESSON TEACHES

Brackets first, then multiply or divide, then add or subtract.

→ $4 + 6 \times 2 = 16$ (multiply first)→ $(4 + 6) \times 2 = 20$ (brackets first)

MODEL THIS ON THE BOARD

WORK OUT $3 \times (8 - 2) + 5$

- 1 Do the brackets first: $8 - 2 = 6$
- 2 Multiply next: $3 \times 6 = 18$
- 3 Add last: $18 + 5 = 23$

DISCUSSION STARTER

REFLECT Why is it useful that everyone agrees on the same order of operations?

LESSON ARC

Open with $4 + 6 \times 2$ unsettled on the board and two candidate answers (20 and 16) beside it — take three hands-up votes but don't resolve. In Watch and Notice, settle it (16), rub out the 20, then walk three examples, pausing on $(4 + 3) \times 2$ to show brackets flip the answer. Pupils underline the order stage-by-stage in their copies. The Student Activity Book is the solo practice.

TEACHING MOVES

1. **Getting Started.** Write $4 + 6 \times 2$ and both candidate answers, 20 and 16, on the board. Take exactly three hands-up votes — no open call-outs — and deliberately leave it unresolved. The question 'who gets to decide which is correct?' is the hook; don't answer it yet.
2. **Watch and Notice.** Settle the hook on its own numbers first: $6 \times 2 = 12$, then $+ 4 = 16$, so rub out the 20. Then on $(4 + 3) \times 2$, stop before revealing and make the class predict — this bracket flip is the make-or-break idea. On $20 - 12 \div 4$, stress there's no bracket, so divide goes first even though it's written to the right of the subtract.
3. **Try It Together.** Pupils take turns at the board; before each tap, ask 'which operation glows next?' and have the class agree or correct. On $18 \div (1 + 2) \times 4$, hold the planned pause: divide and multiply are equal rank, so revoice 'same rank, so we read them left to right' — divide first because it's on the left.
4. **Underline the Order in Your Copy.** Pupils copy each expression and underline first-do, then-do, last-do before writing the answer. Walk the room glancing at the first line, $5 + 4 \times 3$ — watch for anyone underlining left-to-right and doing $5 + 4$ first instead of the multiply. Correct on the spot.
5. **Class Challenge.** Pupils take turns at the board, press Check each round, class confirms before moving on — keep it brisk. On the final place-the-bracket task (target 23), have pupils reason aloud which of the

three placements works before checking: only bracketing $8 + 4$ reaches 23. The reasoning matters more than a fast guess.

6. **What Did We Notice?** Point back at the opening puzzle — two careful people, two answers. Listen for pupils naming the rule as a shared agreement, not a trick. Revoice: 'the rule is a promise that a maths sentence means exactly one thing.' Press the idea that brackets override the default order on purpose.

COMMON MISCONCEPTIONS

⚠ Pupils read $4 + 6 \times 2$ straight across and answer 20 — they work left to right regardless of which operation it is.

Use the opening puzzle itself: show that $6 \times 2 = 12$ must go first, giving 16. On the board, glow the multiply before the add so pupils see rank beats reading order. Contrast with $20 - 8 - 3$, where left-to-right IS correct because both are the same rank.

⚠ Pupils treat brackets as decoration and get the same answer with or without them — e.g. $4 + 3 \times 2$ and $(4 + 3) \times 2$ both come out 10 for them.

Put the two expressions one above the other on the board and work both aloud: 10 versus 14. The only difference is the brackets, so the brackets must be doing the work — they move the addition to the front on purpose.

⚠ In $18 \div (1 + 2) \times 4$ pupils do the multiply before the divide because 'multiply comes first in the rule'. Stop and name the rank: divide and multiply are equal, so after the brackets we read left to right — divide first here because it's on the left. Revoice it as they tap so the class hears the reasoning, not just the answer.

DIFFERENTIATION

EMERGING

- In the copybook, give pupils only the two-operation lines ($5 + 4 \times 3$ and $24 \div 6 + 2$) and let them skip the bracketed and three-operation lines until the rank rule is secure.
- Let pupils write the intermediate step in words — 'multiply first: $4 \times 3 = 12$ ' — before the numbers-only line, so the order is visible on the page.

DEVELOPING

- After the copybook, ask pupils to write their own expression that gives a different answer with and without brackets, then work both.
- On $40 - 3 \times (2 + 4)$, ask what would change if the brackets moved to $(40 - 3)$ — predict the new answer before working it.

PROFICIENT

- Extend the final Class Challenge: give pupils 6, 2, 3 and a target, and ask them to find where a single pair of brackets makes it true, explaining why the other placements fail.
- Pull them ahead into the Student Activity Book and ask them to write a rule, in one sentence, that a younger pupil could follow to never get order-of-operations wrong.

✂ **Cross-curricular:** Tie to English — brackets in maths work like a comma in a sentence: 'let's eat, Granny' versus 'let's eat Granny' — punctuation changes the meaning, just as brackets change the answer.

ANSWER KEY

a) 17

b) 27

c) 22

Q1: 4 points

Q2: 28

Q3: 77

Q4: 17 tokens

a) **Sometimes** — They do only when they enclose an operation that would otherwise come later.

b) **Always** — Brackets are the highest priority in the order of operations.

c) **Never** — You still follow multiply or divide before add or subtract.

d) **Always** — Brackets must be done first regardless of the outer operations.

EXTENSION SHEET · STRETCH ANSWERS

S1: 45

S2: 48

S3: 45

S4: 116

S5: 143