

## Lesson 17: Mental addition strategies – partitioning and compensating

### CURRICULUM ALIGNMENT

**NUM.OPS.4** build upon, select and make use of a range of operation strategies.

INTERACTIVES [Number Line Jumps · display, explore](#) [Fact Race · challenge](#)

### WHAT THIS LESSON TEACHES

Two strategies make mental addition fast: **partitioning** (split each number into tens and units) and **compensating** (round one number, then adjust).

→ Partition:  $47 + 36 \rightarrow (40+30) + (7+6) = 70 + 13 = 83$ .

→ Compensate:  $48 + 36 \rightarrow 50 + 36 = 86$ , then take 2 back:  $84$ .

## LESSON ARC

Open with  $47 + 38$  cold on the IWB — five seconds quiet think, then collect three different mental routes without judging. Walk four worked examples on the empty-number-line interactive, ending on  $235 + 198$  to land 'the numbers decide the strategy'. Pupils try  $38 + 27$  three ways at the board, then work  $47 + 38$  and  $235 + 198$  three ways each in their copy. Class Challenge runs the bonds-to-1000 fact-race bank.

## TEACHING MOVES

- 1. Getting Started.** Write  $47 + 38$  large on the IWB and freeze. Five silent seconds, no hands. Then ask 'how did you do it?' not 'what's the answer?' Park three or four different routes side by side without ranking them — pupils need to see the same answer arrive different ways.
- 2. Watch and Notice.** Two minutes each on Examples 1–3, three minutes on Example 4. Trace the back-jump under the line on Example 2 — that's where pupils slip. On Example 4 ( $235 + 198$ ), pause and ask: 'would partitioning be sensible here?' Let the class count the jumps — three for partition, two for compensate. That's the punchline.
- 3. Try It Together.** Three pupils up in turn, one per strategy. Between turns, five-second silent think for the watching class — 'whisper which strategy you'd reach for next, and why' — take one voice, then call the next pupil up. Stops the back two rows from drifting.
- 4. Work it three ways in your copy.** Six labelled mini-solutions in six minutes. Walk the row checking two things: the take-back jump in compensating matches the rounding-up amount, and the bridge jump lands on a round number. Nudge any pupil still on  $47 + 38$  at four minutes —  $235 + 198$  is the row that earns the lesson.
- 5. Class Challenge.** Keep it brisk — read, nominate, type, chorus on three, next. Don't re-teach the strategies here; pupils will see this same bank again tonight at home. On Round 4, listen for a pupil saying '400 needs 600 more to get to 1000' — re-voice that aloud so the rest of the class hears partitioning being used in the wild.
- 6. What Did We Notice?.** Two or three voices per question, no writing. Re-voice the heart of it: 'when one number sits just below a round hundred, compensating wins — one big jump, one tiny back-jump.' Listen for pupils who can say why the numbers decide — that's the objective, not the answer.

## COMMON MISCONCEPTIONS

⚠ Pupils compensate by jumping +40 to land on 87 but then forget the take-back, writing  $47 + 38 = 87$ . Catch it on the empty number line. Re-voice: 'you added two too many — show me where the two goes back.' Have the pupil draw the back-arc themselves and say the size of it aloud. The back-jump must equal the rounding-up amount; make pupils name both numbers out loud.

⚠ Pupils bridge by jumping +3 from 47 to land on 50, then add the full 38 again — getting 88 instead of 85. Stop and rebuild on the number line. 'You used 3 of the 38 to get to 50 — how much of the 38 is left?' Make the split visible:  $38 = 3 + 35$ . The bridge jump uses part of the second number, not all of it.

⚠ Pupils pick partitioning for  $235 + 198$  because it's their default, then grind through three jumps when compensating would take two. Don't ban partitioning — let the pupil finish, then put compensating beside it on the number line. Count jumps aloud: three versus two. Ask: 'which numbers are these strategies good for?' The point isn't that one strategy is right, it's that the numbers decide.

## DIFFERENTIATION

### EMERGING

- Stay with two-digit examples only in the copybook —  $47 + 38$  three ways is enough; don't push to  $235 + 198$  if the take-back jump in compensating isn't secure yet.
- Pre-draw the empty number line in their copy with the start number already marked, so pupils only need to draw the jump arcs, not invent the structure.

### DEVELOPING

- After  $235 + 198$  in the copy, ask: which strategy would you reach for if it were  $235 + 202$ ? Why does shifting one number across the hundred change the cleanest choice?
- Pose  $47 + 38 + 25$  and ask pupils to mentally chain the strategies — partition the first two, then bridge through the next ten.

### PROFICIENT

- Direct fast finishers to the extension bank on their device while you circulate the room.
- Pose: invent a two-digit-plus-two-digit sum where compensating is clearly the worst choice. Explain to the pupil beside you why.

- **Cross-curricular:** Tie to PE — pupils mentally add lap distances (e.g.  $235 \text{ m} + 198 \text{ m}$  around the yard) and explain which strategy they reached for.

### ANSWER KEY

a)  $47 + 38 = 85$  ( $47 \rightarrow 77 \rightarrow 85$ ).

b)  $48 + 36 = 84$  ( $48 \rightarrow 88$  via  $+40$ ;  $88 \rightarrow 84$  via  $-4$  — careful, this should be  $48 + 40 = 88$  then take 4 back not 2. Better:  $48 + 36 \rightarrow$  round 36 up to 40, gives 88; take 4 back = 84).

c)  $67 + 25 = 92$  ( $67 + 3 = 70$ ;  $70 + 22 = 92$ ).

Q1: 1043

Q2: 819

Q3: 11914

Q4: 10296

### EXTENSION SHEET · STRETCH ANSWERS

S1: 14024

S2: 1662

S3: 1398