

Lesson 24 **NUMBER**

Multiplying a multi-digit number by a single digit

CURRICULUM ALIGNMENT

NUM.OPS.4

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

NUM.PVT.4

investigate how decimals and percentages (and fractions) can be compared, ordered and expressed in related terms.

INTERACTIVES **Area Model · challenge, display, explore**

WHAT THIS LESSON TEACHES

To multiply a multi-digit number by a single digit, split the multi-digit number into its place-value parts, multiply each part by the single digit to get partial products, then add those partial products together.

→ 23×4 splits into $20 \times 4 = 80$ and $3 \times 4 = 12$; the partial products total 92.

→ 138×6 splits into $100 \times 6 = 600$, $30 \times 6 = 180$ and $8 \times 6 = 48$; the partial products total 828.

MODEL THIS ON THE BOARD

AREA BOXES FOR 138×6

- ① Split 138 into place values: 100, 30 and 8.
- ② Find each partial product: $100 \times 6 = 600$, $30 \times 6 = 180$, $8 \times 6 = 48$.
- ③ Add the three partial products: $600 + 180 = 780$, then $780 + 48 = 828$.
- ④ Check with the column method: the same regrouped amounts appear.

LESSON ARC

Open with the area-model interactive showing a 23-by-4 rectangle; pupils estimate the square count before you split the long side into 20 and 3. Model 23×4 , 47×6 and 235×7 , pointing from each box total to the matching column carry. Pupils take turns splitting 138×6 and 216×4 at the board, then sketch the boxes in their copies. The four-digit column case ($1,084 \times 9$) shows when the shorthand wins, and the Class Challenge banks 34×5 up to the zero-box 408×7 .

TEACHING MOVES

1. **Getting Started.** Take three hands-up estimates for the 23-by-4 rectangle — not open call-outs — and resist working it out. Plant the question: 'is counting 92 squares one at a time slow?' Hold the 20-and-3 split for the next step.
2. **Watch and Notice.** Point at each box and say the partial product aloud before adding. Put one question between each example: after 23×4 ask which box was bigger and why; before revealing 47×6 take two more-or-less-than-300 predictions; on 235×7 make the class find both column carries before you confirm 1,645.
3. **Try It Together.** Set factor1 to 138 and let a pupil drag the partition into 100, 30, 8; class says each partial product in unison (600, 180, 48 → 828). Keep the column-shorthand panel visible and point from each carried digit to its box total. This round is for talking through, not marking.
4. **Sketch the Boxes in Your Copy.** Walk the room glancing for correctly split boxes and neat totals lined up against the column check. No marking — this is whole-class copybook practice. Watch for pupils who total the boxes but forget to compare against the column.

5. **The Four-digit Column Case.** Narrate $1,084 \times 9$ column by column, naming the digit AND its place each time (the tens 8 meaning 80, the thousands 1 meaning 1,000). Slow right down at the hundreds: $0 \times 9 = 0$, then add the carried 7 — this is the skipped step. Point to the zero box on the area model; it's the picture pupils need for 408×7 .
6. **Class Challenge.** Brisk board turns — pupils solve, class confirms, move on. Don't re-explain each one. At 408×7 , ask pupils to predict how the empty tens box behaves before revealing, calling back to the zero in $1,084 \times 9$.
7. **What Did We Notice?.** Listen for pupils saying the boxes make place value visible for small numbers but get clumsy for big ones. Revoice a strong answer: 'the boxes show us WHY it works, the column is how we write it quickly once we trust it.'

COMMON MISCONCEPTIONS

⚠ Pupils forget the middle box when there's a zero — for 408×7 they skip the tens place entirely and write a three-digit answer, or they collapse 400 and 8 together.

Rebuild 408×7 on the area model so the empty tens box shows on screen with area 0. It adds nothing but still holds the tens place. Point from that empty box to the column: $0 \times 7 = 0$, plus any carry, keeps the place open.

⚠ Pupils split by digit not by value — for 235×7 they make boxes for 2, 3 and 5 instead of 200, 30 and 5.

Freeze on the partition step and read the sides aloud: 'the first box is two HUNDRED wide, not two.' Have the pupil relabel the box 200 and check that $200 + 30 + 5$ rebuilds 235 before finding any product.

⚠ Pupils forget to add a carry into the next column — on 47×6 they write the 2 units but drop the carried 4 tens.

Point from the box total 42 on the area model to the column: the 2 units stay, the 4 tens are carried up. Say 'where did the 4 come from and where does it go?' before confirming 282.

DIFFERENTIATION

EMERGING

- Stay on two-box products (like 23×4) on the IWB while the class moves to three boxes; pupils mirror the same two-box sketch in their copy.
- Pre-draw the partition lines in the copybook rectangle so pupils place the values and totals, not invent the split.

DEVELOPING

- After the copybook sketch, ask pupils to work one Class Challenge product using ONLY the column shorthand, then check it against a quick box sketch.
- Give a missing-box variant: ' $20 \times 4 = 80$ and the whole answer is 92 — what was the other box?'

PROFICIENT

- Narrate a harder variant at the board: a five-digit factor with two internal zeros, and ask which boxes will be empty before anyone multiplies.
- Pose: 'explain to a younger pupil why the zero box in 408×7 still matters even though it adds nothing' — pupils rehearse the place-value reason aloud.

✚ **Cross-curricular:** Tie to Geography — pupils multiply a single-digit number of buses by 47 seats each to work out how many pupils a school trip to Newgrange could carry.

ANSWER KEY

a) $30 \times 5 = 150$ and $4 \times 5 = 20$, so 170

b) $50 \times 4 = 200$ and $6 \times 4 = 24$, so 224

c) $20 \times 4 = 80$ and $3 \times 4 = 12$, so 92

Q1: 141

Q2: 216

Q3: 87

Q4: 9,756

Q5: 1,645

a) **Always** : That is exactly how the area-model and column methods work.

b) **Always** : $20 \times 4 = 80$ and $3 \times 4 = 12$.

c) **Sometimes** : Regrouping happens only when a partial product is 10 or more.

d) **Never** : Both methods must land on the same correct product.

EXTENSION SHEET · STRETCH ANSWERS

S1: 30474

S2: 29330

S3: 42375

S4: 20157

S5: 6600