

Long multiplication strategies and estimation

CURRICULUM ALIGNMENT

NUM.OPS.4

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

INTERACTIVES Estimation Game · challenge, explore

WHAT THIS LESSON TEACHES

Round each factor to a friendly number then multiply the rounded numbers to get a rough idea of how big the answer should be.

→ 412×23 rounds to $400 \times 20 = 8,000$ so the real answer should land near eight thousand.

→ For 412×23 you work 412×3 then 412×20 then add the two rows for the total.

MODEL THIS ON THE BOARD

ESTIMATE THEN MULTIPLY ON SQUARED PAPER

- 1 Round 412 to 400 and 23 to 20 then multiply 400×20 to get the estimate of 8,000.
- 2 Write $412 \times 3 = 1,236$ as the first row.
- 3 Write $412 \times 20 = 8,240$ as the second row shifted one place left.
- 4 Add the rows to get the exact total and compare it with the estimate.

LESSON ARC

Open with the wrong scoreboard product $384 \times 27 = 1,363$ and take three quiet estimates so the class feels how small it is. Model three long multiplications on the board—estimate first, then units row, tens row with its placeholder zero, and add—checking each total against the estimate. Pupils run one copybook product the same way, then take turns at the board through Try It Together and Class Challenge. Student Activity Book practice follows the estimate-first habit.

TEACHING MOVES

1. **Getting Started.** Write $384 \times 27 = 1,363$ as a settled 'scoreboard' answer. Give five seconds of silent think-time, then take three hands-up estimates only—do not confirm yet. Push for ballpark size ('about twelve thousand'), not a full working.
2. **Watch and Notice.** Write each example live. For 384×27 , round to $400 \times 30 = 12,000$, then work 384×7 and 384×20 with the placeholder zero held in the units column before adding to 10,368. On 506×48 pause on the zero in 506 and ask whether 24,288 sits above or below 25,000. Run 729×35 fast with the class calling partials; close by noticing all three totals landed just below their estimates.
3. **Estimate Then Work It in Your Copy.** One product only: 412×23 . Pupils write the rounded estimate first, then the full layout underneath, then one line comparing the two. Walk the room watching for the tens-row zero and for estimate-before-working; if a total is wild, point at the estimate and let the pupil find the slip.
4. **Try It Together.** Hold the rule: estimate out loud before anyone writes a digit. Long multiplication stays on the board; the screen only checks estimate versus actual. Revoice a strong catch: 'estimate said about fifteen thousand, so one thousand three hundred would mean a whole row slipped a column.' Watch for the missing placeholder zero on every tens row.

5. **Class Challenge.** Brisk board turns—estimate first, work, class confirms, move on. Do not re-teach each product. Keep 926×47 as the stretch; if time is short, drop any scoring and just match each total to its estimate.
6. **What Did We Notice?.** Ask what a good estimate helps you catch, and what to look for first if the answer is ten times too small. Listen for ‘missing placeholder zero’ and revoice: the estimate is a size-check, not an exact match—it only needs the same ballpark.

COMMON MISCONCEPTIONS

⚠ Pupils skip the placeholder zero on the tens row, so 384×20 is written as 768 lined under the units and the total collapses to something near 1,363.

Freeze the board on the slipped row. Point at the 2 in 27: ‘that digit is two tens, so a zero holds the units column.’ Rewrite the row one place left and re-add so the class sees the total jump near the estimate.

⚠ Pupils treat the estimate as a target that must match exactly, so they ‘fix’ a correct 10,368 because it isn’t 12,000.

Ask: ‘is ten thousand near twelve thousand, or ten times out?’ Revoice that the estimate only flags wild place-value slips—same ballpark is enough.

⚠ When rounding, pupils round only one factor (400×27) and then distrust the estimate because it still feels hard to multiply.

Reset both factors to friendly numbers before any working— 400×30 —so the estimate is a mental product they can say in one breath.

DIFFERENTIATION

EMERGING

- Stay with a 2-digit $\times$ 1-digit warm-up layout on the board first so the placeholder-zero habit is visible before the second factor grows to tens.
- Pre-write the empty long-multiplication grid and the estimate line in the copybook so the pupil only fills digits, not the structure.

DEVELOPING

- After 412×23 , ask them to circle which row the estimate most closely matches and say why that row carries most of the size.
- Change 23 to 29 on the same 412 and ask whether the estimate and the total both shift the way they expect.

PROFICIENT

- On the Class Challenge stretch 926×47 , ask them to name, before adding, which partial will sit closer to the 45,000 estimate and justify from the factors alone.
- Fast finishers move into the Student Activity Book page while the class finishes the board bank; still estimate-first on every item.

➤ **Cross-curricular:** Keep the GAA club fixture frame—tickets, programmes, season points—so products feel like real match-day totals.

ANSWER KEY

a) est. $400 \times 30 = 12000$; 2688 / 7680 / 10368

b) est. $500 \times 40 = 20000$; 2868 / 14340 / 17208

c) est. $900 \times 50 = 45000$; 6482 / 37040 / 43522

Q1: 14,337

Q2: 8,760

Q3: 33,264

a) **Never** : $50 \times 30 = 1,500$ is an estimate; the exact product is 1,488.

b) **Always** : The estimate warns when the working is far smaller than expected.

c) **Sometimes** : True for 48×29 , which rounds to 50×30 ; false for 52×29 , where 52 rounds down to 50.

d) **Always** : The estimate only gives a rough guide.

EXTENSION SHEET · STRETCH ANSWERS

S1: 3475

S2: 7479