

Lesson 23 **NUMBER****Multiplying by 10, 100, 1000**

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 **Place Value Chart (Sliding Digits)** · challenge, display, explore

WHAT THIS LESSON TEACHES

Each digit moves one place-value column to the left for every zero in 10, 100 or 1000, making the number ten, a hundred or a thousand times bigger. The decimal point stays still and empty columns are filled with zeros.

$$\rightarrow 47 \times 10 = 470$$

$$\rightarrow 4.7 \times 10 = 47$$

MODEL THIS ON THE BOARD

CHECKING 47×10 ON THE CHART

- 1 Someone wrote 47.0 for 47×10 by adding a point and zero but leaving the digits still. That is wrong.
- 2 Watch the place-value chart: the **4** slides from the tens column into the hundreds column.
- 3 The **7** slides from the units column into the tens column and a zero fills the empty units place.
- 4 The answer is **470**. Say it aloud first (four hundred and seventy) then match it to the chart.

LESSON ARC

Open with the spot-the-mistake — 47×10 written as 47.0 — and leave both the trap and pupils' ideas on the board unresolved. Move to the place-value chart and slide the digits of 47 left, filling the empty units with a place-holder zero; the decimal-point-stays-put idea is the pivot, cleared by the 4.7×10 example. Pupils mirror four sums with column arrows in their copy, then work the Class Challenge routes at the board.

TEACHING MOVES

1. **Getting Started.** Give five seconds of silent think-time, then take three hands-up answers only — no open call-outs. Leave the wrong 47.0 and every pupil suggestion on the board unresolved; you'll cross out the 47.0 during Watch and Notice, so resist confirming the answer now.
2. **Watch and Notice.** Slide the digits on the place-value chart one at a time. On 47×10 , point at the empty units column and ask 'what has to fill this?' — draw out that the zero holds the place, it isn't a value added. On 4.7×10 , stop and say 'the point does not move; the digits do', then return to the hook and cross out 47.0.
3. **Try It Together.** Re-seed the starter between examples: type 6 for the first two, reset to 3.5 for the last three. Have a pupil pick the operation each time and get the class to predict the answer aloud before the chart slides. Listen for ' $3.5 \times 10 = 3.50$ ' and revoice: the 3 and 5 each step one column left, so we land on 35.

4. **Line Up the Columns in Your Copy.** Walk the room glancing at column alignment and arrow direction — this is copybook practice, not marking. The tell to catch is arrows drawn rightward; multiplying always slides digits left. On 5.6×1000 , check pupils fill two place-holder zeros.
5. **Class Challenge.** Keep board work brisk — pupils take turns, check each answer, class confirms before moving on. On the two chaining routes ($0.6 \rightarrow 600$ and $7 \rightarrow 7000$) ask the class to predict the two-button route before the pupil tries it. If a pupil reaches for an unlit button, remind them the aim is fewest moves within the lit set.
6. **What Did We Notice?.** Listen for a pupil who can point to the fixed dot on the chart and describe the digits sliding past it, then revoice: 'the point never moved — it just looked that way because every digit stepped left.' Head off the 'add a zero' shortcut by testing it on 4.7×10 .

COMMON MISCONCEPTIONS

⚠ Pupils multiply by 10 by 'adding a zero' — so 4.7×10 becomes 4.70 instead of 47.

Test the shortcut live on the chart: 4.70 is the same value as 4.7, so it can't be ten times bigger. Slide the 4 and the 7 each one column left and land on 35's neighbour, 47. Name the real rule: digits slide left, point stays put.

⚠ Pupils say the decimal point moves right, e.g. ' $3.5 \times 10 = 3.50$ ', treating the point as the thing that travels.

On the chart, hold a finger on the fixed dot and slide only the 3 and the 5 one column left, landing on 35. Revoice that the point held still while the digits stepped past it.

⚠ On 4.7×1000 pupils overshoot and land the 4 in ten-thousands instead of thousands.

Trace the 4 from the units column and count its three steps aloud — units to tens to hundreds to thousands. Because 4.7 starts one column further right than whole-number 47 would, the tenths gap absorbs one step.

DIFFERENTIATION

EMERGING

- Stay with whole numbers on the chart (47×10 , 47×100) while the class moves to decimals; the pupil counts the slide one digit at a time and names the place-holder zero.
- Pre-rule the copybook columns so the pupil places digits into ready-made columns rather than building the alignment themselves.

DEVELOPING

- After the copybook page, ask: 28×100 and 2.8×1000 give the same answer — why? Trace both on the chart to justify.
- Pose a missing-operation: 6 became 6000 — which buttons, in which order, and is there more than one route?

PROFICIENT

- Give $0.06 \rightarrow 600$ with $\times 1000$ switched off and ask for the shortest lit-button route, then explain in the copybook why $\times 10$ then $\times 100$ equals $\times 1000$.
- Ask them to write, in their own words, the one rule a younger pupil should remember — and one example that proves 'add a zero' fails.

✂ **Cross-curricular:** Tie to Geography — convert distances between Irish towns from km to m by $\times 1000$ (e.g. $4.7 \text{ km} = 4700 \text{ m}$).

ANSWER KEY

Scaffold: visual check on the page

Q1: 350 bags

Q2: 60 jars

Q3: 2,800 scones

Q4: 8,000 eggs

Spot: Sean moved the decimal point right but wrote zeros after it instead of moving the digits. $0.6 \times 100 = 60$ (the 6 moves to the tens place).

EXTENSION SHEET · STRETCH ANSWERS

S1: 761.73

S2: 1909.4

S3: 19422

S4: 952.2

S5: 747.6