Lesson 58 MEASURES

Measurement investigation with precision

CURRICULUM ALIGNMENT

MEA.MSR.4b find, interpret and deduce measures experimentally with increasing precision.

MEA.MSR.4a determine and calculate units of measurement in fractional and/or decimal form to solve practical problems.

INTERACTIVES Measurement Rulers · display

WHAT THIS LESSON TEACHES

A measurement recorded to the nearest millimetre is more precise than one to the nearest centimetre.

→ A carpenter reads the skirting board as 2450 mm so the corner joins cleanly.

→ On the jug each small mark is 100 ml between 0 and 500 ml.

MODEL THIS ON THE BOARD

READING TO THE NEAREST MILLIMETRE

1. Look at the big marks for centimetres and the small marks for millimetres.
2. Count the small marks between two centimetre lines to see what each is worth.
3. The edge lands on 14 cm plus 5 small marks so the length is **145 mm**.

LESSON ARC

Open with three stopped pointers on the IWB — ruler, jug, scale — and hold pupils on the tricky question: how do you read an unmarked mark? Model the ruler reading (14.5 cm) on the board, then hold up a real jug and scale to show working out one division first. Pupils measure their own pencil, then take turns on shared group scales and jugs, recording estimate, measurement and difference in their copies. The Class Challenge ranks three real edges by length.

TEACHING MOVES

1. **Getting Started.** Take three hands-up answers, not call-outs. Push hard on the third question — 'how did you read the marks with no number?' — and deliberately leave it hanging. That unanswered question is the whole lesson.
2. **Watch and Notice.** Point to two numbered marks and make the class count the small gaps between them BEFORE reading the pointer — this is the load-bearing move. Say the rule aloud: work out one division first, then read. Then read a real ruler square-on, then from the side, so the class sees the reading shift — name it parallax.
3. **Try It Together.** Stagger the start so some groups begin with mass and others with capacity — both shared instruments in use at once, no queue. Circulate listening for the value-of-one-division step being skipped; revoice a good one: 'five gaps to 500 ml, so each mark is 100 ml.'
4. **Record Your Three Readings in Your Copy.** Walk the room checking two things only: is the unit written on every value, and is the difference column subtracting the right way round? Glance, don't mark.
5. **Class Challenge.** Keep the rhythm brisk — only two pupils per group up measuring at once, the rest recording. Pick a notice board at standing height, not a window. Prompt slips with 'read it square-on — what is one small mark worth?' and confirm each ranking aloud at the end.

6. **Write One Thing in Your Journal.** Hold it to one honest sentence on paper. Steer pupils past 'I made a mistake' toward a real cause — reading from the side, a bent tape, an estimate rounded too hard.
7. **What Did We Notice?.** Listen for the idea that a 2 mm slip is a big fraction of a short pencil but tiny against a long wall. Revoice: 'so the same size of error matters more the smaller the thing you are measuring.'

COMMON MISCONCEPTIONS

⚠ A pupil reads the jug with five gaps from 0 to 500 and calls a mark '1' — they count the marks like a whole-number line instead of working out each gap is worth 100 ml.

Stop them and point to the two numbered marks: '0 here, 500 here, count the gaps between.' Five gaps, so 500 ÷ 5 = 100 ml per mark. Make them say the value of one division out loud before giving the reading.

⚠ Pupils read the pencil edge as 'about 15 cm' — rounding to the nearest whole centimetre when the edge clearly sits at a millimetre mark part-way along.

Ask 'which small mark did the edge land on?' and have them count millimetres from 14. Contrast on the board with the modelled 14.5 cm — the whole point of the ruler is reading finer than the numbered marks.

⚠ In the difference column a pupil subtracts measurement from estimate the wrong way round, or writes a bare number with no unit.

At the copybook walk-around, point at the row and ask 'estimate take away measurement, or the other way?' Agree the order as a class and insist every number in all three columns carries its unit.

DIFFERENTIATION

EMERGING

- Give the ruler task only at the desk to start — one instrument, read to the nearest whole cm first, then nearest mm once that's secure.
- In the Class Challenge, let these pupils focus on ranking the three edges by length; ordering holds even if one reading is a millimetre out, so they still succeed at the task.

DEVELOPING

- After the three copybook rows, ask them to convert one reading to a different unit — 14.5 cm as 145 mm, or 300 ml as 0.3 litres.
- Set a target error: measure the desk edge twice, once quickly and once carefully, and report how many millimetres the two readings differ.

PROFICIENT

- Pose: 'if two pupils measured the same wall and got readings 4 mm apart, which reading do you trust and how would you settle it?' Pair this with a copybook line justifying the answer.
- Ask them to work backwards on the jug: if one mark is worth 100 ml and the level sits two-and-a-half marks up, what's the reading — and what would each mark be worth if the jug ran 0 to 1000 in the same five gaps?

↗ **Cross-curricular:** Tie to the science strand — pupils measure and record the growth of a classroom seedling to the nearest millimetre over a week.

ANSWER KEY

a) 14.5 cm

b) 95 mm

c) 12 cm, 125 mm, 130 mm

Q1: 23.4 cm

Q2: 300 ml

Q3: 2.3 kg

Q4: 852 mm

a) Always — Millimetres are smaller units so they record finer differences.

b) Sometimes — The angle can make the edge appear to land on a different mark.

c) Never — Jug scales vary and marks can be worth 50 ml or 100 ml.

d) Always — Smaller units allow better ordering when lengths are close.

EXTENSION SHEET · STRETCH ANSWERS

S1: 2.5 cm

S2: 8.7 cm

S3: 5.9 cm

S4: 16 cm

S5: 11 cm

Investigation: How accurately can you measure? — open-ended; scan pupils' working for valid solution paths rather than a single answer.