

Scale drawings and scale maps: small drawings of big things

CURRICULUM ALIGNMENT

SHA.SAL.4b

interpret scale maps and create simple scale drawings.

NUM.FRC.4b

investigate proportionality and ratios of quantities (sets).

MEA.MSR.4a

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

WHAT THIS LESSON TEACHES

A scale tells us how many real units one paper unit stands for. A scale of 1:100 means one cm on the page stands for 100 cm in real life.

→ On a 1:100 plan a 5 cm line stands for 500 cm or 5 m in real life.

→ A real 6 m wall at scale 1:100 is drawn as 6 cm on the page.

MODEL THIS ON THE BOARD

CORK CLASSROOM WALL TO PLAN

- 1 A real wall in a Cork school is 6 m long.
- 2 Change metres to cm: $6 \text{ m} = 600 \text{ cm}$.
- 3 The scale is 1:100 so divide real cm by 100: $600 \text{ divided by } 100 = 6$.
- 4 Draw the wall as 6 cm on the plan and label both lengths.

LESSON ARC

Open with the park-map image — point to the scale bar and ask how it tells real distance without walking it. Sketch a 1:100 classroom plan on the board, labelling paper-cm and real-m, pivoting on 'one cm on the page is one metre on the ground'. The class measures a $6 \text{ m} \times 5 \text{ m}$ room and divides aloud to find paper lengths. Pupils sketch the same 1:100 plan in their copy, then measure a real wall with the metre stick before the Student Activity Book.

TEACHING MOVES

1. **Getting Started.** Display the park map and give five seconds of silent think-time before any hands. Take two or three hands-up answers only — you want the idea that the scale bar links paper distance to real distance, nothing more. Don't resolve the maths yet.
2. **Watch and Notice.** Sketch each plan on the board with both lengths and the ratio labelled. On the 1:100 classroom, pose 'a wall is 4 cm on the plan — how long really?' and take two hands before revealing 4 m. Keep the place-value chat ($\times 100$ means two zeros) for the board, not the pupils' screens.
3. **Try It Together.** Work the $6 \text{ m} \times 5 \text{ m}$ room out loud, showing the division each time: $6 \text{ m} = 600 \text{ cm}$, $600 \div 100 = 6 \text{ cm}$. Watch for pupils dividing the metres straight away without changing to centimetres first — reconcile that slip aloud as it surfaces.
4. **Sketch a Scale Plan in Your Copy.** Walk the room glancing for two things only: the 1:100 written above the plan, and both units (cm and m) labelled on each side. No individual marking. Catch anyone dropping the real-unit label or skipping the centimetre conversion.

5. **Class Challenge.** Keep the measuring to one wall per group so the minutes hold — one metre stick per group of four or five. They convert real-to-paper and sketch, then read a labelled plan back the other way at their seats by multiplying by 100. Circulate; keep it brisk.
6. **What Did We Notice?.** Listen for the practical reason — a full-size map of Ireland would be the size of Ireland. Revoice a strong answer about keeping every distance in proportion, and head off the idea that scale changes the real distances; it only changes how we draw them.

COMMON MISCONCEPTIONS

⚠ Pupils take a 6 m wall at 1:100 and write ' $6 \div 100 = 0.06 \text{ cm}$ ' — they divide the metres without first changing to centimetres.

Stop and write the two lines side by side on the board: $6 \text{ m} = 600 \text{ cm}$, then $600 \div 100 = 6 \text{ cm}$. 'Match the units before you divide.' Have the pupil say the metres-to-centimetres step out loud before the division.

⚠ When asked for the real length from a 4 cm paper line at 1:25, pupils divide instead of multiply — they apply the same operation both directions.

Anchor the direction: 'paper is smaller, so going to real we make it bigger — multiply.' Walk $4 \times 25 = 100 \text{ cm} = 1 \text{ m}$, then contrast with a real-to-paper sum on the same board so the two directions sit next to each other.

DIFFERENTIATION

EMERGING

- Give these pupils a wall already stated in centimetres (e.g. 400 cm) so the only step is $\div 100$, removing the metres-to-cm conversion until the division is secure.
- Pre-draw the plan rectangle in their copy so they label paper-cm and real-m onto an existing shape rather than judging the sketch proportions too.

DEVELOPING

- After the Class Challenge, hand them the same wall at 1:50 and ask which paper length is bigger and why — same wall, halved scale number.
- Pose a missing-number version: a 7 cm paper line stands for a 7 m wall — what scale is this plan drawn at?

PROFICIENT

- Set the $4 \text{ cm} \times 3 \text{ cm}$ rectangle at 1:25 and ask for the real perimeter only — narrate that length scales by the ratio, and challenge them to predict (not calculate) what happens to area, banking it for later.
- Pull them ahead into the Student Activity Book page and ask them to write a one-line rule a younger pupil could follow for choosing divide or multiply.

✓ **Cross-curricular:** Tie to Geography — read the scale on an Ordnance Survey map of the local area and work out the real distance between two named places.

ANSWER KEY

Scaffold: visual check on the page

Q1: 400 cm

Q2: 7 cm

Q3: 100 cm

a) Always : That is exactly what the scale ratio 1:100 tells us.

b) Never : The real length is 3 times 100 which equals 300 cm.

c) Always : Dividing by the scale factor always gives the correct drawing size.

d) Never : A 1:1 map would be full size and far too large to print or carry.

EXTENSION SHEET · STRETCH ANSWERS

S1: 25 m

S2: 4 km

S3: 4.5 m

S4: 30 m

S5: 35 m