

Creating simple scale drawings

CURRICULUM ALIGNMENT

SHA.SAL.4b

interpret scale maps and create simple scale drawings.

NUM.FRC.4b

investigate proportionality and ratios of quantities (sets).

WHAT THIS LESSON TEACHES

A scale shows how a length on paper stands for a real length, like $1 \text{ cm} = 1 \text{ m}$.

→ On a plan at $1 \text{ cm} = 1 \text{ m}$, a 6 m wall is drawn as 6 cm.

→ A 5 m wall is drawn as a 5 cm line.

MODEL THIS ON THE BOARD

DRAWING A 6 M WALL TO SCALE

- 1 Read the scale: $1 \text{ cm on paper} = 1 \text{ m in real life}$.
- 2 The real wall is 6 m long.
- 3 Draw a line 6 cm long on the paper.

LESSON ARC

Open with the real classroom — 6 m by 4 m — and ask how you shrink a whole room onto one page. Show three worked plans on the board, anchoring on $1 \text{ cm} = 1 \text{ m}$ (numbers stay the same) before the $1 \text{ cm} = 2 \text{ m}$ divide-by-the-scale step. Measure one wall live with the metre stick, agree a scale, then pupils draw the classroom to scale in their copy. The Student Activity Book page carries the independent scale-drawing practice.

TEACHING MOVES

1. **Getting Started.** Take two or three hands-up answers, not open call-outs, and steer toward 'shrink every length by the same amount'. Hold back the words 'scale' and 'scale drawing' — they land in the next step.
2. **Watch and Notice.** Read the first scale aloud: 'one centimetre on the page stands for one metre in the room.' Point at the 6 m wall then the 6 cm line and ask what stayed the same. On the $1 \text{ cm} = 2 \text{ m}$ plans, run the divide-by-the-scale step twice — $8 \div 2$, then $6 \div 2$ — because this is where pupils expect the number to stay the same again.
3. **Try It Together.** Stay at the front — one pupil measures the long wall with the metre stick, a second marks the line, the class follows each calculation aloud. Name the real lengths as found ('the long wall is about 6 m, so 6 cm at $1 \text{ cm} = 1 \text{ m}$ '), then rerun the same wall at $1 \text{ cm} = 2 \text{ m}$ so the class rehearses dividing before the challenge.
4. **Draw It to Scale in Your Copy.** Pupils reuse the class lengths — no fresh measuring, so the three minutes is drawing and labelling only. Walk the room glancing for the scale written at the top and for two labels on each line: drawn length in cm and real length in m.
5. **Class Challenge.** Brisk practice round — pupils take turns at the board, the class checks each answer before moving on. Before revealing the final $1 \text{ cm} = 2 \text{ m}$ hall, ask the class to predict its new size, then show $8 \div 2 = 4 \text{ cm}$ and $4 \div 2 = 2 \text{ cm}$ as division on the board, not just the answer.
6. **What Did We Notice?.** Listen for pupils linking the size of the real object to the scale chosen. Revoice a strong answer: 'so we choose the scale to make the whole thing fit, not the other way round.' Head off the idea that a scale is fixed — it's a choice the drawer makes.

COMMON MISCONCEPTIONS

⚠ At 1 cm = 2 m a pupil draws an 8 m wall as an 8 cm line — they carry over 'the number stays the same' from the 1 cm = 1 m case.

Stop and put the two plans side by side on the board. Point at the scale line and ask 'how many metres is one centimetre standing for now?' Then run $8 \div 2$ out loud so the halving is visible, and have the pupil redraw at 4 cm.

⚠ A pupil thinks the scale is fixed and given to them — 'you have to use 1 cm = 1 m'.

In the maths-talk, put a 10 m wall at 1 cm = 1 m against the page edge so it barely fits, then swap to 1 cm = 2 m and watch it shrink to 5 cm. Name it: the drawer picks the scale to fit the object.

⚠ Pupils label only the drawn length in cm and leave off the real length it stands for.

While walking the copybook step, point to a bare line and ask 'six centimetres of what in the real room?' Prompt the second label — 6 cm (6 m) — on every line before they move on.

DIFFERENTIATION

EMERGING

- Keep these pupils on 1 cm = 1 m only for the copybook drawing while the class moves to 1 cm = 2 m — the number stays the same, so the effort goes into drawing and labelling.
- Give the squared paper with the scale line pre-written at the top so they start straight into measuring the drawn lengths against the squares.

DEVELOPING

- After the copybook classroom, ask them to add the width and doorway at 1 cm = 2 m as well and note which lines halved.
- Give a 1 cm = 2 m wall that lands on an odd number, e.g. 7 m, and ask what a 3.5 cm line looks like on squared paper.

PROFICIENT

- Pose: 'our school hall is about 20 m long — what scale would let it and its 12 m width fit one page? Justify your choice in a sentence in your copy, then check by drawing.'
- Pull them ahead into the Student Activity Book scale-drawing page and ask them to invent one scale that would NOT work for the classroom and explain why.

✂ **Cross-curricular:** Tie to Geography — pupils read the scale bar on an Ordnance Survey map of their county and say what 1 cm stands for in real distance.

ANSWER KEY

Scaffold: visual check on the page

Q1: 5 cm

a) Always : The scale multiplies every real metre by 1 cm.

b) Sometimes : True for a classroom plan at 1 cm = 1 m; false for a map at 1 cm = 2 km.

c) Always : The length on paper is the real length in metres.

d) Never : At that scale the wall is 10 cm long, so it fits a page.

EXTENSION SHEET · STRETCH ANSWERS

Investigation: Map your classroom — open-ended; scan pupils' working for valid solution paths rather than a single answer.