Lesson 116 MIXED

Big modelling project — how big is our school yard, really?

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.

WHAT THIS LESSON TEACHES

The spending cap is the total money you may use. Add each cost in turn and keep the running total at or below the cap so the plan stays on budget.

→ 28 pupils each put in €8 to make a cap of €224.
→ A €56 food bill shared by 28 pupils is €56 ÷ 28 = €2 each.

MODEL THIS ON THE BOARD

PLAN UNDER THE €224 CAP

1. Cap from 28 pupils × €8 = **€224**.
2. Food after 10% off a €60 order: €60 - €6 = **€54**. Running total **€54**.
3. Activity share: €56 ÷ 28 = **€2** each, so activity total **€56**. Running total **€110**.
4. Drinks €40 and decorations €30 bring the running total to **€180**, still under the cap.

LESSON ARC

Open with the aerial photo and its scale bar on the IWB and take three hands-up methods for measuring a space too big for metre sticks. Model the same 20-by-12-pace yard three ways — pace-and-scale, break-into-rectangles, read-the-scale — so the answers land close together. Then take the class outside to pace two sides live, record one estimate, and pupils copy the working into their maths copy. The Class Challenge sends groups to estimate one space two ways and judge which to trust.

TEACHING MOVES

1. **Getting Started.** Put the aerial photo up with the scale bar circled and take exactly three hands-up ideas — not open call-outs. Listen for pacing, splitting into rectangles, or using the scale, because you model all three next. Don't reveal which is best.
2. **Watch and Notice.** Run all three methods on the same 20×12-pace yard so answers stay comparable. For Way 1, write the two conversion lines (20 × 0.7 = 14 m; 12 × 0.7 = 8.4 m) on separate lines before multiplying, so the pace-to-metre change is visible, and stress 0.7 m is approximate so the answer is too. Pause after Way 1 and Way 2 for a quick higher-or-lower prediction and revoice one pupil's reasoning.
3. **Pace and Measure Two Sides Together.** Pace and measure two sides of the yard as a whole class, recording the figures and computing one estimate live so everyone sees the method before groups split. If the yard's unusable, run it along the longest stretch of the hall.
4. **Record Your Two Sides in Your Copy.** While pupils copy the two side lengths and the multiplication, walk the room glancing for two things only: the m^2 on the area line, and anyone who wrote paces where they needed metres. This is practice, not marking.

5. **Class Challenge.** Send groups to estimate one space two ways at their station, then circulate briskly catching the two slips: paces left unconverted, and adding instead of multiplying for area. Close by having each group confirm its finding aloud — don't re-teach the method.
6. **What Did We Notice?.** Ask which method drifted and why. Listen for pacing named as wobbliest because the pace length is only approximate. Revoice a strong answer: 'so the more we cross-check, the more confident we can be in the number we report.'

COMMON MISCONCEPTIONS

⚠ Pupils add the two sides to get area — '14 m and 8 m, so the yard is 22 m²' — confusing perimeter-style adding with area.

Catch it on the copybook line. Sketch the 14×8 rectangle on the board and chalk-grid one strip of metre squares: 'how many squares fit along the bottom, how many rows?' Counting forces the multiply. Box 112 m² beside their 22.

⚠ Pupils record the answer in paces, not metres — 'the side is 20', forgetting to multiply by 0.7.

Point to the unit they wrote. Ask 'twenty what — paces or metres?' Have them add the missing conversion line, 20 × 0.7 = 14 m, before the area line. Make the unit on every line non-negotiable.

⚠ Pupils treat the two estimates landing slightly apart (130 and 138) as one being wrong and needing a 'right' answer.

Reframe at the board: write both, show they agree to within about 6 per cent, and say a safe figure is the range 130–140 m². With a real space too big to measure exactly, close agreement IS the answer.

DIFFERENTIATION

EMERGING

- Give these pupils a plain rectangular space to pace, not the L-shape — one multiplication, no splitting.
- Pre-write the conversion line frame in their copy (____ paces × 0.7 = ____ m) so they fill the numbers rather than build the structure.

DEVELOPING

- After their two estimates, ask them to work out the percentage gap between the two and say whether that's close enough to trust.
- Hand them a second awkward shape to split into rectangles — see if they choose the dividing line that gives the easiest numbers.

PROFICIENT

- While faster groups wait, narrate a harder variant from the front: if one pace is actually 0.65 m, not 0.7, by how much does the yard area change? Pupils predict the direction before calculating.
- Pose: 'the principal wants one figure for a report — would you give the bigger estimate, the smaller, or the average, and how would you justify it?'

↗ **Cross-curricular:** Tie to Geography map-reading — pupils read the scale bar on an Ordnance Survey map of their locality and estimate the area of a local field or pitch.

ANSWER KEY

a) €182

b) €54

c) €3

Q1: €225

Q2: €63

Q3: €3

Q4: €114

Q5: €44

a) Always — The rule lets the running total reach the cap but not go over it.

b) Never — Any cost that breaks the cap makes the plan over budget.

c) Always — All costs come from the same fund so a euro saved is a euro free.

d) Never — The cap is fixed by the money collected; sharing only splits one cost.