

Decimal and fractional measures in problems

CURRICULUM ALIGNMENT

MEA.MSR.4a

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

NUM.FRC.4a

explore (model, compare and convert) the relationships between fractions, decimals and percentages.

INTERACTIVES Word Problem · challenge, display, explore

WHAT THIS LESSON TEACHES

A measurement written as a fraction of a whole unit can also be shown as a decimal, such as three quarters of a litre or 1.5 litres.

→ Three quarters of a 2 litre bottle is 1.5 litres.

→ A 2.4 m plank cut into 0.6 m pieces gives 4 pieces.

MODEL THIS ON THE BOARD

WORK OUT THREE QUARTERS OF 2 LITRES

- 1 Find one quarter of 2 litres by dividing 2 by 4 to get 0.5 litres.
- 2 Multiply by 3 to find three quarters: 0.5 times 3 equals 1.5 litres.

LESSON ARC

Hold a real metre stick against the desk edge so pupils feel how long 2.4 m is before any numbers go up. Model four board problems, giving most time to the two-step fraction move: $\frac{3}{4}$ of 2 litres means split into quarters ($2 \div 4 = 0.5$) then take three ($0.5 \times 3 = 1.5$). Pupils talk through the juice, ribbon and paint problems in Try It Together, then set out one decimal and one fraction problem in full in their copies with boxed, unit-labelled answers.

TEACHING MOVES

1. **Getting Started.** Lay the metre stick along a desk edge and mark off 0.6 m so pupils see the pieces before they count. Give five seconds of quiet think-time, then take three hands-up answers only — welcome both the divider and the pupil counting up in 0.6s, but hold the check until you model.
2. **Watch and Notice.** Draw out the operation and the unit before revealing each answer. Give piece three — $\frac{3}{4}$ of 2 litres — the most time: split into quarters ($2 \div 4 = 0.5$) out loud, then take three ($0.5 \times 3 = 1.5$), saying ' $\frac{3}{4}$ means three of the four equal parts'. On piece four, write 1.2 over 3 visibly so the leftover-as-fraction step is seen, not just stated.
3. **Try It Together.** Pupils take turns at the board and the class agrees or corrects out loud. Revoice every answer with its unit so shared numbers stay distinct — the juice gives 1.5 litres poured, the paint gives 1.5 litres per room. Ask: 'same number, so why aren't these the same answer?'
4. **Work It in Your Copy.** Hand out the problem sheet or use maths copies. Walk the room glancing for the unit on each answer and a boxed result — this is practice, not marking. On the flour problem, watch for pupils dividing 6 by 2 instead of finding two-thirds; point them back to the two-step board example.
5. **Class Challenge.** Brisk turns at the board — pupils check each answer and the class confirms before moving on. When the soup problem gives 0.3 l, flag that dividing can make the number shrink. On the final

compost problem, once 1.2 kg left is agreed, build 1.2 out of 3, then $1.2 \div 3 = \frac{2}{5}$ on the board — don't re-teach the earlier problems.

6. **What Did We Notice?** Listen for pupils spotting that fractions suit shares you can picture ($\frac{2}{3}$ of a bag) and decimals suit exact cut lengths (0.6 m). Revoice a strong answer: 'so a fraction tells you the share, and a decimal tells you the exact size.' Head off any claim that one form is always better.

COMMON MISCONCEPTIONS

⚠ Asked for $\frac{2}{3}$ of a 6 kg bag, pupils write $6 \div 2 = 3$ kg — they read the $\frac{2}{3}$ as 'divide by two' and ignore the top number.

Stop and rebuild it on the board as two steps: divide by the bottom number first ($6 \div 3 = 2$), then take two of those thirds ($2 \times 2 = 4$). Say 'the bottom tells us how many equal parts, the top tells us how many to take.'

⚠ Pupils give a bare number — 'eight' or 'one point five' — with no unit, so the ribbon lengths and the paint litres blur together.

Refuse the answer until the unit is attached: 'eight what?' Revoice with the measure every single time — eight lengths, 1.5 litres per room — and insist the boxed copybook answer carries its unit.

⚠ When dividing gives an answer smaller than one ($2.1 \text{ l soup} \div 7 = 0.3 \text{ l}$), pupils assume they've made a mistake because 'dividing should make it bigger... wait, smaller?'

Point to the metre stick or jug — sharing 2.1 litres between many portions gives a small portion each. That's expected; a division answer smaller than one is a real, correct measure.

DIFFERENTIATION

EMERGING

- Keep these pupils on the whole-number-of-pieces division problems (3.2 m into 0.8 m) and hold the fraction-of-a-whole problems for teacher-supported time, using the metre stick to count up in steps.
- Give them the two-step fraction as a fill-in frame in the copy: ' $\frac{\quad}{\quad} \div \text{bottom number} = \frac{\quad}{\quad}$ ', then ' $\times \text{top number} = \frac{\quad}{\quad}$ ' so they follow the structure without inventing it.

DEVELOPING

- After the copybook flour problem, ask them to write the answer both ways — 4 kg used, and as a decimal fraction of the bag — and say which reads more clearly.
- Pose a missing-number twist: $\frac{2}{3}$ of a bag is 4 kg, so how heavy was the whole bag? Working the fraction backwards.

PROFICIENT

- During the Class Challenge, narrate a harder variant of the compost problem: after 1.35 kg is used from a 3 kg bag, what fraction is left? Let them wrestle the untidy leftover before the class checks.
- Pull them into the Student Activity Book page early and ask them to invent one problem where a fraction is clearly the better form and one where a decimal is — then justify each choice aloud.

✓ **Cross-curricular:** Tie to home economics — pupils scale a recipe, working out $\frac{3}{4}$ of a 2 litre carton or $\frac{2}{3}$ of a 6 kg bag as the actual amount to weigh out.

ANSWER KEY

a) 1.5 litres

b) 4

c) $\frac{2}{5}$

Q1: 7.5 litres

Q2: 3.4 kg

Q3: 2.8 kg

Q4: 5

a) Always — Any fraction has an exact decimal form.

b) Never — Decimals can be clearer when the fraction is awkward.

c) Always — It is always 1.5 litres so the statement is true always.

d) Never — It always leaves a fraction amount.

EXTENSION SHEET · STRETCH ANSWERS

S1: 7.8 cm

S2: 12.4 cm