

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

Open with a real metre stick against a desk edge so pupils see 2.4 m and how short a 0.6 m piece is before any division. Model four mixed measures problems on the board: plank divide, parcels multiply, $\frac{3}{4}$ of 2 litres in two visible steps, then leftover mass written as a fraction of the whole. Pupils talk juice, ribbon and paint problems through at the IWB, then set out one decimal and one fraction problem in their copybooks with units boxed. Class Challenge ends on the compost leftover rewritten as $\frac{2}{5}$. Student Activity Book is the follow-on practice.

TEACHING MOVES

1. **Getting Started.** Hold a real metre stick against a long strip or desk edge so the class sees 2.4 m and 0.6 m before numbers go up. Give five seconds of quiet think-time, then take three hands-up answers — some will divide, others will count up in 0.6s along the stick. Welcome both; hold the check for modelling.
2. **Watch and Notice.** Work all four problems slowly. Draw the operation and the unit from the class before revealing each answer. On the plank, hold out for 'divide' before the number 4. On the parcels, watch decimal-point lining in 3.75. Give $\frac{3}{4}$ of 2 litres the most time: $2 \div 4 = 0.5$, then $0.5 \times 3 = 1.5$ litres. On the leftover, subtract first (1.2 kg), then write 1.2 over 3 and divide to $\frac{2}{5}$.
3. **Try It Together.** Pupils take turns at the board; the class agrees or corrects out loud. Point back to the two-step board model if the juice stalls. Revoice every answer with its unit so the two 1.5s stay distinct: 1.5 litres poured out, eight lengths, 1.5 litres per room.
4. **Work It in Your Copy.** Pupils set out both copybook problems in full — facts, working, boxed answer with unit. Walk the room glancing for missing units and for flour answers that jump straight to $6 \div 2$. Point those pupils back to the board: divide by the bottom, multiply by the top.

5. **Class Challenge.** Keep board turns brisk — check each answer and move on. Flag that the soup answer (0.3 l) is smaller than one litre. On the compost stretch, once Check confirms 1.2 kg left, build 1.2 out of 3 → $\frac{2}{5}$ aloud as maths-talk; do not type that fraction step into the interactive.
6. **What Did We Notice?.** Ask when a fraction is clearer and when a decimal is. Listen for ‘parts of a whole you can picture’ versus ‘precise cut lengths’. Revoice: a fraction tells the share; a decimal tells the exact size. Head off any claim that one form is always better.

COMMON MISCONCEPTIONS

⚠ On ‘ $\frac{2}{3}$ of 6 kg’, pupils divide the two numbers once ($6 \div 2 = 3$, or $6 \div 3 = 2$) and stop — they never take two of the equal parts.

Point back to the board model of $\frac{3}{4}$ of 2 litres. Say: ‘bottom number splits the whole; top number counts how many of those parts.’ Rebuild: $6 \div 3 = 2$ kg in one third, then $2 \times 2 = 4$ kg.

⚠ Pupils treat $2.4 \div 0.6$ as $2.4 \div 6$ and get 0.4 pieces, sliding the decimal on only one number.

Return to the metre stick and count up 0.6, 1.2, 1.8, 2.4 — four hops. Then rewrite both measures in tenths (24 tenths $\div$ 6 tenths) so the division lands on 4.

⚠ After finding 1.2 kg left from a 3 kg bag, pupils write the used amount as the fraction (1.8/3) or leave 1.2/3 unsimplified and call it the answer.

Ask ‘which mass is still in the bag?’ before any fraction is written. Build 1.2 over 3 on the board, then divide both by 0.6 (or multiply by $\frac{5}{5}$) until $\frac{2}{5}$ appears. The leftover is the numerator.

DIFFERENTIATION

EMERGING

- Keep emerging pupils on the metre-stick count-up for any ‘how many pieces’ question so the hop count is the answer before formal division.
- Pre-write the two fraction-of-a-whole steps on their copybook page ($\div$ bottom, $\times$ top) so they only fill the numbers and the unit.

DEVELOPING

- After the copybook flour problem, swap to $\frac{3}{4}$ of 6 kg and ask whether the two-step rule still holds — same moves, new numbers.
- On a clean ‘how many pieces’ answer, ask them to check by multiplying pieces $\times$ length and matching the original measure.

PROFICIENT

- After Check on the compost item, ask: find a leftover between 1.2 kg and 1.5 kg that is still a tidy fraction of 3 kg — justify on the board.
- Fast finishers move ahead into the Student Activity Book measures page; keep units boxed on every answer.

➤ **Cross-curricular:** Tie to SPHE/home economics — a 1.5 litre bottle of water and $\frac{3}{4}$ drunk at break; write drunk and leftover as both a decimal and a fraction of the bottle.

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** : Every fraction has a matching decimal, which may recur.

b) **Never** : $\frac{1}{3}$ is 0.333..., which never stops, so 0.33 l is only close.

c) **Always** : Three quarters of 2 equals 1.5 litres.

d) **Never** : 1.2 kg is left, and half the bag is 1.5 kg.

EXTENSION SHEET · STRETCH ANSWERS

S1: 7.8 cm

S2: 12.4 cm