

Expressing quantities in related place-value terms

CURRICULUM ALIGNMENT

NUM.FRC.4a

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

NUM.PVT.4

investigate how decimals and percentages (and fractions) can be compared, ordered and expressed in related terms.

INTERACTIVES Phone Battery · challenge, display, explore

WHAT THIS LESSON TEACHES

A fraction, a decimal and a percentage can all describe the exact same amount - they are three ways of writing one amount.

→ $\frac{3}{4}$, 0.75 and 75% all mean the same slice of the whole.

→ $\frac{1}{2}$ fills 50 parts of 100, so it is 50%.

MODEL THIS ON THE BOARD

WRITING $\frac{1}{2}$ THREE WAYS

- 1 Start with the fraction $\frac{1}{2}$.
- 2 Divide 1 by 2 to get the decimal 0.5.
- 3 Multiply 0.5 by 100 to get the percentage 50%.

LESSON ARC

Open with three shelf labels — $\frac{3}{4}$, 0.75, 75% — and let pupils argue whether they mean one amount or three. Then work the phone-battery slider on the IWB, reading each fill as fraction, decimal and percentage in one breath, building from $\frac{1}{2}$ up to the tricky $\frac{1}{8}$. Pupils rule three columns in their copy and record $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{10}$, $\frac{1}{8}$ three ways each. The Class Challenge matches slider targets given in one form and checks the other two line up.

TEACHING MOVES

1. **Getting Started.** Put $\frac{3}{4}$, 0.75 and 75% side by side and take three hands-up answers only — don't settle it. The pupils who doubt the percentage matches are giving you the whole lesson's tension, so let the disagreement hang.
2. **Watch and Notice.** Walk each battery aloud, pointing at fraction, then decimal, then percentage in turn. Before revealing $\frac{1}{4}$, ask 'if a half is 50%, what's a quarter?' and draw out the halving. Slow right down at $\frac{1}{8}$: say clearly the true value is 12.5% even though the panel rounds to 13% — the three-place decimal is where pupils fall off.
3. **Try It Together.** Set $\frac{1}{5}$ yourself as the warm-up anchor, then hand the slider to pupils for $\frac{2}{5}$, $\frac{3}{5}$ and $\frac{3}{4}$. Before each reveal ask the class to predict the percentage, and revoice the pupil who spots $\frac{2}{5}$ is twice $\frac{1}{5}$ so 40% is twice 20%. Insist every pupil reads all three forms — catch the ones who read the fraction and skip the decimal.
4. **Build the Equivalence Table in Your Copy.** Leave the $\frac{1}{8}$ anchor ($0.125 = 12.5\%$) on the board so a pupil who missed the reveal can copy it correctly. Walk the room glancing for three columns lined up and the $\frac{1}{8}$ row written as 0.125 and 12.5% — this is copybook practice, not marking.

5. **Class Challenge.** Keep it brisk — each target names one form, so before Check have the class call the other two. When $\frac{1}{8}$ comes up, remind the class 12.5% is correct even though the panel rounds to 13%, then confirm and move on rather than re-explaining.
6. **What Did We Notice?.** Push for the answer that the amount stays the same and only the way of writing it changes. Revoice a strong one: 'the fill on the battery never moved — we just read three labels off the same spot.'

COMMON MISCONCEPTIONS

⚠ Pupils say 0.125 is bigger than 0.5 because it has more digits — 'point one two five is longer, so it's more'.

Set the slider to $\frac{1}{8}$ then to $\frac{1}{2}$ back to back so the class sees the shorter decimal fills far more of the battery. The number of digits doesn't tell you the size; the fill does.

⚠ Pupils give $\frac{1}{8}$ as 13% because that's what the battery panel shows.

Accept it as an honest read of the rounded panel, then rebuild the reasoning: an eighth is half of a quarter, and half of 25% is 12.5%. State that the true value is 12.5% and the panel is just rounding to a whole number.

⚠ Pupils write the percentage but stall on the matching decimal — they treat the three forms as separate facts to memorise rather than one amount.

At the slider, cover the fraction and decimal panels and ask a pupil to work the percentage back to a decimal by dividing by 100. Reveal the panel to confirm — same spot, three labels.

DIFFERENTIATION

EMERGING

- Stay on the tidy amounts — $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{10}$ — and let others move to $\frac{1}{8}$. In the copy, give the pre-filled $\frac{1}{2} = 0.5 = 50\%$ anchor row to copy the layout from before filling their own.
- Have these pupils read the three forms off the slider aloud with the class rather than predicting the percentage cold — success first, prediction later.

DEVELOPING

- After the copy table, ask for $\frac{3}{8}$ three ways — if $\frac{1}{8}$ is 12.5%, what's three of them? A justification, not just an answer.
- Pose a missing-form line: $0.6 = \frac{?}{5} = ?\%$ and ask them to fill both blanks and say which they worked out first.

PROFICIENT

- At the IWB, narrate a stretch: 'the panel rounds $\frac{1}{8}$ to 13% — find another fraction whose true percentage the panel would round the same way, and explain how you know.'
- Pull fast finishers ahead into the activity-book page and ask them to write one sentence for a younger pupil explaining why 0.125 is smaller than 0.5 despite having more digits.

✓ **Cross-curricular:** Tie to Geography — pupils read a battery or fuel gauge and a shop sale sign, writing each fill as a fraction, decimal and percentage.

ANSWER KEY

Scaffold: visual check on the page

Q1: 0.5, 50%

Q2: 0.25, 25%

Q3: $\frac{1}{5}$, 20%

Q4: 0.75, 75%

Q5: $\frac{3}{5}$, 0.6

a) Always : They are equivalent forms of the same quantity.

b) Always : Any percentage equals a fraction and decimal of the same value.

c) Never : 0.75 equals both $\frac{3}{4}$ and 75%.

d) Always : These are all equal representations.

EXTENSION SHEET · STRETCH ANSWERS

S1: 747.6

S2: 2387