

Converting fractions to decimals

CURRICULUM ALIGNMENT

NUM.FRC.4a

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

INTERACTIVES **Function Machine** · challenge, display, explore

WHAT THIS LESSON TEACHES

A fraction is a division waiting to happen: the top number divided by the bottom number. So $\frac{3}{4}$ means 3 divided by 4.

→ $\frac{3}{4} = 3$ divided by 4 = 0.75

→ $\frac{1}{8} = 0.125$ (stops after three places)

MODEL THIS ON THE BOARD

CONVERT $\frac{3}{4}$ TO A DECIMAL

- ① Divide the top number by the bottom number: 3 divided by 4.
- ② 00 divided by 4 gives 0.75 exactly.

LESSON ARC

Open by asking which two numbers hide inside $\frac{3}{4}$ as a division. On the function-machine interactive, work $3 \div 4$ by hand on the board first, then let the machine confirm 0.75. Build through $\frac{1}{8}$, $\frac{2}{5}$, $\frac{1}{3}$ — $\frac{1}{3}$ is the payoff where the remainder 1 keeps returning and the 3 repeats. Pupils set out four divisions in their copy, then the Class Challenge bank consolidates with $\frac{1}{6}$ as the recurring surprise.

TEACHING MOVES

1. **Getting Started.** Give five seconds of quiet think-time, then take three hands-up answers only — no open call-outs. Listen for 'divide 3 by 4'; if nobody offers it, park it rather than supplying it, because the next step reveals it.
2. **Watch and Notice.** Work each division on the board by hand first, then let the machine confirm — pupils need to see the working, not just the answer. On $\frac{1}{3}$, point at the remainder 1 coming back again and again, then hand-draw the dot over the 3 (0.3) so they see the exact mark they'll copy. Contrast $\frac{5}{8}$ stopping against $\frac{1}{3}$ running on.
3. **Try It Together.** Before each reveal, ask the whole class to predict 'stops or runs on?' Reset the machine for each fraction — rule to the bottom number, top number through. Save $\frac{1}{6} = 0.1666...$ for last as the planned pause, and re-voice a strong answer: 'so we always divide the top by the bottom.'
4. **Set It Out in Your Copy.** Walk the room glancing at the division layout and the aligned decimal point — this is practice, not marking. Watch specifically for pupils dividing bottom by top, and check that $\frac{1}{3}$ is the one underlined as running on.
5. **Class Challenge.** Keep it brisk — pupils take turns at the board, state the division aloud ('seven divided by ten'), predict stops-or-runs-on, then Check confirms. Don't re-explain each one; the class confirms and you move on. Catch the divide-bottom-by-top slip fast.
6. **What Did We Notice?.** With the factors on the board, re-voice the pattern in pupils' words: 'when the bottom is made of 2s and 5s, the decimal stops.' Head off the idea that a bigger bottom number means a longer decimal — $\frac{1}{8}$ stops but $\frac{1}{3}$ runs on.

COMMON MISCONCEPTIONS

⚠ Pupils divide the bottom by the top — for $3/4$ they set out $4 \div 3$ and get 1.33... instead of 0.75. Catch it at the board the moment a pupil states the division backwards. Chant the rule as they set it out — 'top first, always' — and rebuild $3 \div 4$ alongside their $4 \div 3$ so they see the two answers are different amounts.

⚠ Pupils assume a bigger bottom number always makes a longer or messier decimal, so they expect $1/8$ to run on and $1/3$ to stop.

Put $1/8 = 0.125$ (stops) and $1/3 = 0.333...$ (runs on) side by side on the board. It's not the size of the bottom number — it's whether it's built only from 2s and 5s. Break 8 and 3 into factors to show why.

⚠ Pupils stop a recurring division early and write $1/3 = 0.333$ as if it terminates.

Point at the remainder 1 returning at each step on the board — 'the same leftover keeps coming back, so the 3 never stops.' Model the dotted notation by hand so they mark it as recurring rather than truncating.

DIFFERENTIATION

EMERGING

- Stay with one-place stoppers on the machine ($7/10$, $3/5$) while the class moves to $1/8$ — pupils see one division digit, not a long chain.
- In the copybook set, pre-write the division layout ($3 \div 4 =$) so pupils only carry out the dividing, not build the structure.

DEVELOPING

- After the copybook set, ask pupils to sort $1/2$, $1/5$, $1/9$, $3/8$ into 'stops' or 'runs on' by looking at the bottom number's factors before dividing to check.
- Give a missing-decimal chain: if $1/4 = 0.25$, what is $3/4$ without dividing again?

PROFICIENT

- Pose at the board: 'find a fraction whose decimal runs on, then a different one that stops, both with a bottom number bigger than 10 — and say how you knew before dividing.' Narrate the harder variant for fast finishers rather than routing them off-screen.
- Ask them to explain to a younger pupil, in one sentence, why $1/3$ never stops but $1/4$ does.

✂ **Cross-curricular:** Tie to the science strand — pupils record a fraction of a class survey (e.g. $3/8$ chose apples) and convert it to a decimal to compare shares.

ANSWER KEY

Scaffold: visual check on the page

Q1: 0.5

Q2: 0.375

Q3: 0.7

Q4: 0.8

Q5: 0.333...

Q6: 0.625

a) Always : Three divided by four equals 0.75 exactly.

b) Always : 1 divided by 3 is 0.333... with 3 repeating.

c) Never : 1 divided by 8 is 0.125, which stops.

d) Never : 2 divided by 5 is 0.4, only one place.

EXTENSION SHEET · STRETCH ANSWERS

S1: $75\% = 3/4 = 0.75$

S4: $75\% = 3/4 = 0.75$

S2: $0.75 = 3/4 = 75\%$

S5: $20\% = 1/5 = 0.2$

S3: $3/5 = 0.6 = 60\%$