

# Probability as a decimal and percentage

## CURRICULUM ALIGNMENT

DAT.CHN.4b

represent and express probability in different forms.

NUM.FRC.4a

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

## INTERACTIVES

Probability Spinner · display, explore

Phone Battery · challenge

## WHAT THIS LESSON TEACHES

Probability is favourable outcomes over total outcomes as a fraction. Convert the fraction to a decimal by dividing, then to a percentage by multiplying the decimal by 100.

$$\rightarrow 1/10 = 0.1 = 10\%$$

$$\rightarrow 3/8 = 0.375 = 37.5\%$$

## MODEL THIS ON THE BOARD

### SCHOOL-FAIR PRIZE WHEEL

- 1 The wheel has 8 equal segments and 3 win a prize, so favourable is **3** and total is **8**.
- 2 Write the probability as the fraction **3/8**.
- 3 Divide to get the decimal:  $3 \div 8 = \mathbf{0.375}$ .
- 4 Multiply by 100 for the percentage:  $0.375 \times 100 = \mathbf{37.5\%}$ .

## LESSON ARC

Open with the ten-segment prize-wheel interactive and ask for  $1/10$  as decimal and percentage before confirming anything. In Watch and Notice, name four wheels' chances three ways, then slow right down to work  $1/8$  and  $3/5$  line by line on the board. Pupils write four probabilities three-column in their copies. Try It Together spins the wheel for primes ( $4/10$ ); the Class Challenge converts on the battery slider. Maths-talk settles which form compares fastest.

## TEACHING MOVES

1. **Getting Started.** Sketch the ten-segment wheel and pose  $1/10$  as decimal and percentage. Give quiet think-time, take two or three hands-up (not call-outs), and hold out for the percentage as well as 0.1. Don't confirm — the four-wheel panel is about to show all three side by side.
2. **Watch and Notice.** Read the four wheels briskly, then slow right down on the two written conversions. Work  $1/8$  aloud: 'divide the top by the bottom' — and point out that  $1 \div 8$  needs three decimal places before it stops exactly at 0.125. Work  $3/5$  the same way; it returns in the Class Challenge, so leave the working on screen.
3. **Write It Three Ways in Your Copy.** Walk the room glancing for the three-column line-up and the divide-then- $\times 100$  working — this is copybook practice, not marking. The  $1/8$  row is where to look: the decimal should carry three places (0.125), and 12.5% has the half a percent.
4. **Try It Together.** Before the first spin, hold out for all three forms of  $4/10$  — 0.4, 40%. Keep the hit/miss tally on the board yourself while pupils take turns spinning. When the run of spins doesn't land on exactly 40%, name that wobble aloud — it seeds the maths-talk. Revoice: 'so four out of ten is the same as forty out of a hundred.'

5. **Class Challenge.** Brisk practice on the battery slider — pupils take turns, the class confirms each answer before moving on. Before each Check, ask the class to predict the percentage.  $\frac{3}{8}$  is the sticky one: revoice '3 divided by 8 is 0.375, and 0.375 times a hundred is 37 and a half per cent.'
6. **What Did We Notice?.** Steer the talk toward the percentage as the fast comparer: 37.5% beside 25% is instantly bigger, where  $\frac{3}{8}$  beside  $\frac{1}{4}$  needs a common denominator. Revoice: 'so writing them both out of a hundred lets us line them up straight away.'

### COMMON MISCONCEPTIONS

⚠ For  $\frac{3}{8}$  a pupil says the decimal is 0.38 — they've written the digits of the fraction rather than dividing 3 by 8.

Do  $3 \div 8$  aloud on the board, digit by digit, and land on 0.375. Then contrast with 0.38 on the battery slider — set both and show the fill heights are different chances, so the shortcut can't be right.

⚠ A pupil says  $\frac{3}{8}$  is smaller than  $\frac{1}{4}$  because eighths are smaller than quarters — the bigger bottom number must mean a smaller fraction.

Convert both to percentages on the board: 37.5% and 25%. The comparison flips the intuition. Note that the 'bigger bottom means smaller' rule only holds when the top numbers match, e.g.  $\frac{1}{8}$  versus  $\frac{1}{4}$ .

⚠ A pupil expects the run of spins in Try It Together to land on exactly 40% and thinks the wheel or the maths is wrong when it doesn't.

Name the gap between the calculated chance (40%) and what the spins actually did. A short run wobbles around the true chance rather than hitting it exactly — this is worth saying aloud, not correcting away.

### DIFFERENTIATION

#### EMERGING

- Stay on the friendly wheels —  $\frac{1}{10}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$  — in the copybook rows, and leave  $\frac{1}{8}$  as a teacher-supported line rather than expecting the three-place decimal solo.
- For each conversion, write the division as a labelled line first (top  $\div$  bottom = decimal, decimal  $\times 100$  = percent) so pupils fill in numbers rather than recall the whole procedure.

#### DEVELOPING

- After the copybook rows, swap in  $\frac{3}{4}$  and ask for all three forms — does the  $\times 100$  step give a whole-number percentage or a decimal one, and why?
- Pose  $\frac{7}{10}$  versus  $\frac{3}{4}$ : convert both and say which is the bigger chance, showing the working that settled it.

#### PROFICIENT

- During the Class Challenge, narrate a harder variant for fast finishers: which fractions with a bottom number under ten give a percentage that never stops exactly? Have them test  $\frac{1}{3}$  and  $\frac{1}{6}$  in their copies and explain what they notice.
- Ask them to write a rule, in their own words, for spotting from the fraction alone whether the percentage will be a whole number — then pull them ahead into the Student Activity Book page.

✓ **Cross-curricular:** Tie to a school fair — pupils design a ten-segment prize wheel and label each winning chance as a fraction, decimal and percentage on the poster.

### ANSWER KEY

**Scaffold:** visual check on the page

**Q1:** 0.25, 25%

**Q2:** 0.5, 50%

**Q3:** 0.375, 37.5%

**a)** Always : 1 divided by 10 is 0.1 and 0.1 times 100 is 10%.

**b)** Always : 3 divided by 8 is 0.375 and 0.375 times 100 is 37.5%.

**c)** Sometimes : True for  $\frac{1}{2} = 50\%$ . False for  $\frac{3}{8} = 37.5\%$ .

**d)** Sometimes : Percentages often help comparison but decimals can be just as clear.

### EXTENSION SHEET · STRETCH ANSWERS

**S1:** 62.5%

**S2:** 0.75