

Probability as a fraction: out of total outcomes

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

Dice Roller · display, explore

WHAT THIS LESSON TEACHES

The probability of an event is the number of favourable outcomes written over the total number of possible outcomes. Write it as a fraction and simplify when you can.

→ $P(\text{even on a die}) = \frac{3}{6} = \frac{1}{2}$

→ $P(\text{one segment on a six-segment wheel}) = \frac{1}{6}$

MODEL THIS ON THE BOARD

TWO-DICE SUM OF 7

- 1 Two dice give $6 \times 6 = 36$ total outcomes.
- 2 Favourable pairs that sum to 7 are (1,6), (2,5), (3,4), (4,3), (5,2) and (6,1) so there are 6 favourable outcomes.
- 3 $P(\text{sum of 7}) = \frac{6}{36}$ which simplifies to $\frac{1}{6}$.

LESSON ARC

Open with the six-segment wheel interactive and pull the 'one in six' phrasing from the class without confirming it. In Watch and Notice, build the favourable-over-total idea live on wheels and dice, pausing on why 1 isn't prime and why the denominator is total outcomes, not the biggest face. Try It Together rolls two dice and counts pairs against the histogram. The copybook moment drills four fractions; Student Activity Book desk practice continues the fraction drill.

TEACHING MOVES

1. **Getting Started.** Spin the six-segment wheel interactive once, then take three hands-up answers only. Listen hard for 'one out of six' or 'one in six' — that's today's fraction in disguise. Don't confirm it; say 'hold that thought' and carry it into Watch and Notice.
2. **Watch and Notice.** Count every outcome live on the board — never read the count off the screen. On the prime event, stop and ask 'why isn't 1 prime?' and pull out 'it has only one factor'. On the two-dice sum of 7, make the class list all six pairs before you point to them, then write $\frac{6}{36} = \frac{1}{6}$ and stress the 36 is total outcomes, not the biggest face.
3. **Try It Together.** Let the two-dice histogram build over a run of rolls first so the class sees 7 tower and 2 and 12 stay tiny. Then stop rolling and count pairs on the board. Ask 'is the bar height the probability, or is it the count of pairs?' — steer them to the pairs. Pupils take turns at the board; the class agrees or corrects out loud.
4. **Work It as a Fraction in Your Copy.** Walk the room glancing for favourable-on-top, total-on-bottom. This is practice, not marking. The one to catch: anyone writing 6 as the total for the two-dice question instead of 36 — point at the pairs they listed earlier.

5. **Class Challenge.** Ask the class to predict each fraction before you spin — the spin doesn't decide the probability, counting the segments does. Keep it brisk: pupils take turns, check each answer, class confirms, move on. Save the closing surprise that primes and evens both give $1/2$ on the eight-segment wheel.
6. **What Did We Notice?.** Display-only talk. Push for 'a sum is more likely when there are more ways to make it' and revoice it as 'the fraction gets bigger on top'. Head off the idea that every total is equally likely just because every single face is.

COMMON MISCONCEPTIONS

⚠ For 'two dice adding to 7', pupils write $6/6$ or $6/12$ — they use the biggest face value or add the two 6s as the total instead of 36.

Point back at the pairs list on the board and ask 'how many outcomes are there when you roll two dice — count all the combinations, not the faces'. Rebuild $6 \times 6 = 36$ aloud so the denominator is the full grid of pairs.

⚠ Reading the two-dice answer off the histogram — 'sum of 7 is likely because its bar is tallest' — treating the bar height as the probability.

Stop rolling and separate the two ideas out loud: the histogram shows what happened over these rolls; the count of pairs gives the probability. Count the six pairs for 7 and write $6/36$ next to the bar.

⚠ Pupils count 1 as prime, so a prime on a six-sided die comes out as 1, 2, 3, 5 — four favourable.

Ask 'how many factors does 1 have?' and land on 'only one — a prime needs exactly two'. Re-list the primes as 2, 3, 5, giving $3/6 = 1/2$.

DIFFERENTIATION

EMERGING

- Stay on single-object events — wheels and one die — where total outcomes is just the segment or face count. Leave the two-dice 36 question as teacher-supported.
- Have pupils write the favourable outcomes as a list first (2, 4, 6) then count them, before writing the fraction, so counting and notation are separate steps.

DEVELOPING

- After the copybook page, ask for the probability of NOT landing on an even number and whether the two fractions add to one.
- Swap the eight-segment wheel for a ten-segment one and ask which events keep the same simplified fraction.

PROFICIENT

- Pose: on the two-dice histogram, which single sum is exactly half as likely as a sum of 7? Ask them to justify with the pair counts, not the bars.
- Ask them to invent a wheel where the chance of a prime is exactly $1/3$, and explain how they chose the number of segments — pair this with a copybook moment.

✓ **Cross-curricular:** Tie to the data strand — pupils tally 20 real rolls of two dice and compare their sum-of-7 count against the predicted $6/36$.

ANSWER KEY

- a) shade 1 of the 8 sectors ($1/8$)
- b) shade 4 of the 8 sectors ($4/8 = 1/2$)
- c) less than 4 is $3/6 = 4/8$, so 4 sectors (the page says 3)
- Q1: $1/2$
- Q2: $1/4$
- Q3: $1/36$
- a) **Always** : That is the definition used in this lesson.
- b) **Always** : One favourable face out of six possible faces.
- c) **Never** : A sum of 2 has only 1 way while a sum of 7 has 6 ways.
- d) **Never** : One favourable segment out of four gives $1/4$ not $1/2$.

EXTENSION SHEET · STRETCH ANSWERS

S1: 80%

S2: 60%

S3: 95%

S4: 0.5

S5: 0.75