

Probability assumptions

Probability Assumptions

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Key idea



Counting outcomes assumes the device is **fair**, outcomes are **equally likely**, and the trial is **random**. If one fails, the method can fail too.

When it works



Fair die: $P(6) = \frac{1}{6}$ – 6 equally likely outcomes, 1 favourable.

When it fails



A spinner has 4 sectors, but one is twice as large. Outcomes are not equally likely.

Common mistake

A short run need not look balanced – a fair coin can still give 7 heads in 10 flips.

Probability assumptions

Sample Size and Independence

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Key idea

A short run varies a lot by chance – weak evidence. **Replacement** is a hidden assumption: it decides if the chance changes after each draw.

Sample size

6 in 10 flips is not shocking. 90 in 100 would be strong evidence of bias.

Replacement matters

3 red, 2 blue counters. **With replacement**, $P(\text{red}) = \frac{3}{5}$ every draw. **Without**, it changes.

Common mistake

Confusing “possible” with “likely”. A fair device can still give an unusual result.

