

Exercise walk-through

5.1.3

Sample Spaces

AQA · GCSE · Mathematics

14. Experimental probability, fairness and expected outcomes · Foundation

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Record each trial consistently and total the counts. Relative frequency estimates probability as outcome frequency/trials. For a stated probability p , expected count in n future trials is np ; it is a long-run average, not a guarantee. Unbiased trials with larger samples usually give more stable estimates, but cannot force exact agreement with theory. Probabilities lie from 0 to 1 and a mutually exclusive exhaustive list sums to 1.

29. Venn diagrams, unions and two-way counts · Foundation

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In a class of 30, 18 cycle, 12 swim and 7 do both. Cycling only is 11 and swimming only 5; at least one is $11+7+5=23$, leaving 7 neither. A random student has probability $7/30$ of both and $23/30$ of at least one. The two-way table has cycle-and-swim 7, cycle-not-swim 11, not-cycle-swim 5 and neither 7. The cycle row totals 18, swim column totals 12 and grand total 30. The outcomes both, cycling only, swimming only and neither are mutually exclusive and exhaustive, so their probabilities sum to 1.

36. Conditional probability with tables and expected frequencies · Higher

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Using a class of 30 with 18 cyclists, 12 swimmers and 7 doing both, $P(\text{swim given cycle})=7/18$, while $P(\text{cycle given swim})=7/12$. The unconditional swim probability is $12/30=0.4$. For an expected cohort of 1000, suppose 20% have a condition; a test is positive for 90% with it and 10% without it. Expected positive counts are 180 from 200 with the condition and 80 from 800 without it. Of 260 positive tests, the conditional proportion with the condition is $180/260=9/13\approx 0.6923$, not 90%. These are stated illustrative model rates, not claims about a real diagnostic test.

Exercises 2.1·2.3

2.1 (Foundation) How many ordered outcomes do two fair dice have?

2.2 (Foundation) How many ordered pairs total seven?

2.3 (Foundation) Find probability of heads and an even result for coin and die.

3 Exam-style questions

Exercises 2.1·2.3

2.1 (Foundation) How many ordered outcomes do two fair dice have?

2.1 6 choices for the first and 6 for the second: 36.

2.2 (Foundation) How many ordered pairs total seven?

2.2 List (1,6) through (6,1).

2.3 (Foundation) Find probability of heads and an even result for coin and die.

3 Exam-style questions

2.3 3 favourable outcomes out of 12.

Exercise 3.1

3.1 Decide whether this claim is true. Justify with a concrete calculation or counterexample: All possible totals of two fair dice are equally likely.

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3.1 False. Total 2 has one ordered outcome (1,1), while total 7 has six. Their probabilities are $1/36$ and $6/36$.

Local review guidance: show the chosen method; give the checked result; explain the condition or failed shortcut. This is authored classroom guidance.