

Exercise walk-through

5.2.1

Event Sets

AQA · GCSE · Mathematics

21. Systematic possibilities and equally likely outcomes · Foundation

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List outcomes systematically using a grid, table or tree. For equally likely outcomes, probability is favourable outcomes/total outcomes. Keep ordered outcomes distinct when the experiments have labelled first and second stages. A grid shows completeness and prevents duplicate counting; unequal probabilities need weights rather than a simple count.

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.

43. Reasoning and check

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Both=15, art only=15, music only=10 and neither=10; their sum is 50.

$P(M | A) = 15/30 = 1/2$ while $P(A | M) = 15/25 = 3/5$. The intersection probability is $15/50 = 3/10$, equal to $(30/50)(25/50) = 3/10$, so these events are independent in this finite model. Their unequal conditional probabilities do not contradict independence, since independence compares each condition with the matching unconditional probability: $P(M) = 1/2$ and $P(A) = 3/5$.

Exercises 2.1·2.3

2.1 (Foundation) Find cycling only with 18 cycling and 7 doing both.

2.2 (Foundation) Find at least one sport for totals 18,12 and overlap 7.

2.3 (Foundation) Find neither in the class of 30.

3 Exam-style questions

Exercises 2.1·2.3

2.1 (Foundation) Find cycling only with 18 cycling and 7 doing both.

2.1 Subtract the overlap: $18-7$.

2.2 (Foundation) Find at least one sport for totals 18,12 and overlap 7.

2.2 $18+12-7=23$.

2.3 (Foundation) Find neither in the class of 30.

3 Exam-style questions

2.3 $30-23=7$.

Exercise 3.1

3.1 Decide whether this claim is true. Justify with a concrete calculation or counterexample: The union count is always the sum of the two set counts without adjustment.

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3.1 False. If 18 cycle, 12 swim and 7 do both, the union has $18+12-7=23$. Adding without subtracting counts the overlap twice.

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