Combinatorics and counting proofs

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A sample from this topic. The complete topic collection contains three different resources and worked solutions.

Read the worked example, then show each step in the practice questions. Attempt the reasoning and exact calculations by hand. Technology may check a result but cannot replace the written argument.

What you will practise

- Combinatorics

Useful starting skills: Year 10 and relevant Year 10A algebra, functions and trigonometry; concurrent Methods supports these topics.

Use permutations for ordered arrangements and combinations for unordered selections. Repeated identical objects reduce the number of distinct arrangements.

The pigeonhole principle forces a repeated category when there are more objects than available categories. Inclusion-exclusion corrects over counting when sets overlap.

Worked example

How many distinct arrangements of the letters in LEVEL are possible?

There are 5 letters with L repeated twice and E repeated twice; 5!/(2!2!)=30.

Answer: 30.

Try it yourself

Name: _____ Date: _____

1. Arrange 4 of 7 distinct people in a line. How many ways?

2. Choose 4 people from 9. How many committees?

Answers and explanations

Check the method as well as the final answer. An alternative correct method is also valid.

1. 840.

$P(7,4)=7\times6\times5\times4$.

2. 126.

$C(9,4)$.

Curriculum reference: Specialist Mathematics Units 1–2 — Combinatorics

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