Number systems, sets and proof

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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

- Proof and number

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

A proof establishes a statement for every case in its stated domain. Examples can suggest a conjecture, but one counterexample disproves a universal statement.

Represent integers algebraically to reason about parity and divisibility. Direct proof, contradiction, contrapositive and induction each have a different logical structure.

Worked example

Prove the sum of two even integers is even.

State a, b are integers

their sum is an integer, so the expression is divisible by 2.

Answer: Let the numbers be 2 a and 2 b; their sum is 2(a+b), an even integer.

Try it yourself

Name: _____ Date: _____

1. Write the prime factorisation of 84, then find gcd(84, 30).

2. Convert recurring 0.272727... to a fraction.

Answers and explanations

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

1. $84=2^2\times3\times7$; gcd=6.

The common prime powers are 2 and 3.

2. 3/11.

Let x=0.2727...; 100 x-x=27; x=27/99=3/11.

Curriculum reference: Specialist Mathematics Units 1–2 — Proof and number

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