Logic, Boolean algebra and algorithms

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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

- Logic and algorithms

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

Logical implication $p \Rightarrow q$ is false only when p is true and q is false. Boolean operations AND, OR and NOT can be represented by truth tables or logic circuits.

An algorithm uses a finite, precise sequence of steps, including selection and repetition as needed. Track variable updates in order and state when a loop stops.

Worked example

Simplify (p AND q) OR (p AND NOT q).

Factor p

q OR NOT q is always true, so p AND true equals p.

Answer: p.

Try it yourself

Name: _____ Date: _____

1. List truth values of p⇒q for (p, q)=(T, T), (T, F), (F, T), (F, F).

2. Convert binary 101101 to decimal.

Answers and explanations

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

1. T, F, T, T.

Only true⇒false is false.

2. 45.

$32+8+4+1$.

Curriculum reference: Specialist Mathematics Units 1–2 — Logic and algorithms

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