Graph theory and structural proofs

Learn and practise | Free preview

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

• Graph theory

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

The handshaking lemma counts every undirected edge at both ends: the sum of degrees is 2 E. A loop contributes 2 to its vertex degree.

A simple connected planar graph satisfies V-E+F=2. Trees are connected and contain no cycles; complete and bipartite graphs have additional counting properties.

Worked example

How many edges does the complete graph K_6 have?

Choose an unordered pair of distinct vertices: 6×5/2.

Answer: 15.

Try it yourself

Name: _____ Date: _____

1. Find the number of edges in a 3-regular graph on 8 vertices.

2. A tree has 12 vertices. Find its edge count.

Answers and explanations

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

1. 12.

Degree sum 24 is twice the edge count.

2. 11.

Use E=V-1.

Curriculum reference: Specialist Mathematics Units 1–2 — Graph theory

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