Graphs, paths and minimum connectors

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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. Show the mathematical steps. A calculator, graphing tool or CAS may be used to check results where useful.

What you will practise

• Graphs and networks

Useful starting skills: Year 10 algebra, percentages, statistical displays, geometry and trigonometry.

Graphs represent objects as vertices and connections as edges. A path does not repeat vertices; a trail does not repeat edges.

For a connected planar graph, V-E+F=2, counting the outside face. A spanning tree connects all vertices without cycles and has V-1 edges.

Worked example

A connected planar graph has 6 vertices and 8 edges. Find faces.

6-8+F=2, so F=4.

Answer: 4.

Try it yourself

Name: _____ Date: _____

1. An undirected graph has edges AB, AC, BC, CD. List vertex degrees.

2. For that graph, find an adjacency matrix in order A, B, C, D.

Answers and explanations

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

1. A 2, B 2, C 3, D 1.

Count incident edges at each vertex.

2. [[0, 1, 1, 0], [1, 0, 1, 0], [1, 1, 0, 1], [0, 0, 1, 0]].

Entry 1 records an edge; undirected matrices are symmetric.

Curriculum reference: General Mathematics Units 1–2 — Graphs and networks

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