Krea - RAM - Maths Circle - Session 3

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1 Overview

An introduction to thinking about graph theory through historical puzzles and hands-on activities.

2 The Königsberg Bridge Problem (1736)

1. **Can you walk across each of the seven bridges of Königsberg exactly once?**
   - Draw different paths and test your solutions
   - Document which paths you tried and why they failed
2. **What patterns do you notice when attempting different routes?**
   - Do certain starting points work better than others?
   - Are there any land masses you get "stuck" on?
3. **If you could add, remove or move one bridge, where would it be to make the walk possible?**
   - Test your hypothesis
   - Can you explain why this change works?

3 Drawing Figures Without Lifting Your Pencil

A set of figures were given to the students and they were asked to try tracing them out on paper without overlapping lines. Students came up with various shapes that both could and could not be traced to get an idea of the underlying patterns. Following this, students came up with the observation that the figures were traceable if they had 0 or 2 vertices with odd edges. A discussion followed on why this might be the case and then a connection was made back to the Konigsberg problem. Students have been tasked with trying to come up with a reason why this works by analyzing the similarities in the problems.