

Polya's Four Steps of Problem Solving

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Introduction

Mathematical thinking is not just about memorisation but about reasoning, resilience, and creative problem solving. A professional mathematics educator guides students not only to answer correct questions, but also to ask meaningful ones and analyse their solution paths. In my teaching, I centre instruction around the principles of Polya's Four Steps—a timeless model for problem solving that supports deeper insight, critical reflection, and student ownership of learning [1].

Polya's Four-Step Framework

Step 1. *Understand the Problem*

Carefully read and deconstruct the task.

- Clarify language and context.
- Identify all given and needed information.
- Restate in your own words and recall similar problems.

Step 2. *Devise a Plan*

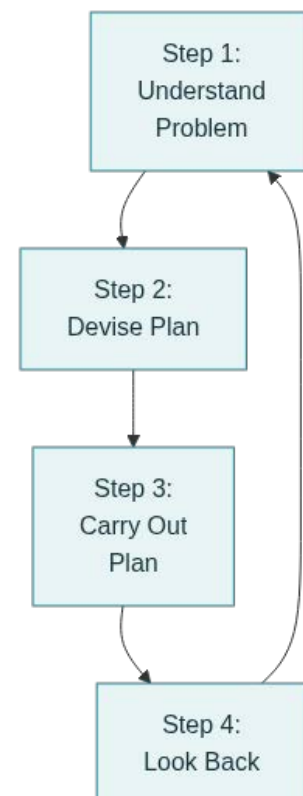
Strategically organise your approach.

- Draw diagrams, make tables, or search for patterns.
- Choose relevant formulas or steps.
- Decide if estimation or precision is needed.

Step 3. *Carry out the Plan*

Practically implement your chosen method.

- Estimate and then calculate.
- Record steps and solution process.



- Persist through trial, error, and revision.

Step 4. Look Back

Reflect critically and verify results.

- Check answers for reasonableness and validity.
- Compare approaches and consider alternatives.
- Extract lessons for future problems.

Professional Reflection

“Mathematics is not a subject of recall. It is a process of exploration, reasoning, and adaptation, where solving a problem is more valuable than simply knowing the answer.”

Repeated exposure to challenging problems—puzzles, games, estimations—empowers learners to build resilience and fluency. Integrating Polya’s model enables students to see themselves as mathematicians, cultivating confidence and lifelong curiosity [2].

References

References

- [1] Polya, G. (1945). *How to Solve It*. Princeton University Press. Adapted summary: Mathpower Seven, McGraw-Hill Ryerson Ltd, Canada. ISBN 0-07-552647-6.
- [2] Dewey, J. (1987). My Pedagogic Creed. *School Journal* 54 (Jan), 77–80.