

Title: Pólya's Problem Solving Process

This strategy has been used in the following ABLE lesson(s):

[Cooking with Numbers](#)

[Deficiencies and Megadoses](#)

[House Transformations](#)

[Mathin" Around the House](#)

Purpose: A step-by-step process to help students when solving mathematical problems, especially word problems. The steps can serve as a reminder or checklist for students to make sure they have completely solved a problem. It also helps them remember to look over their work and think about how they can apply their learning to future problems.

Materials: While, technically, there are no materials necessary, instructors often find it beneficial to have the steps listed somewhere the students can quickly refer to. This may be a handout with the steps listed or having them posted in the room.

Procedure: The process consists of the following four steps:

1. *Understand the Problem*
 - What do the terms mean?
 - What is known or unknown?
 - Rephrase the problem in your own words.
 - Is there enough information to solve the problem or is more information needed?
2. *Devise a Plan*
 - What strategy do you want to use to solve the problem?
 - Possible strategies to choose from:
 - Draw a picture/diagram
 - Make a chart/table/list
 - Use variables to write an equation
 - Guess and check
 - Look for a pattern
 - Work backwards
 - The first strategy you choose may not always work. That's okay and is part of the learning process, so do not be afraid to try multiple strategies.
 - There isn't necessarily one right strategy for each problem. Appropriate choices will differ based on problem type and the problem solver. Oftentimes problem solvers have a few go-to strategies that they are most comfortable with. This does not make those strategies right for everyone.
3. *Execute the Plan*
 - This is the step where the problem is actually solved.

- If the first strategy you choose does not solve the problem, don't give up! What did you learn from your first attempt? Based on your new-found knowledge, what strategy may work?

4. *Reflect*

- Once you have a solution, check to make sure it makes sense for the problem:
 - Did you answer all parts of the question?
 - Is the answer reasonable given the context of the problem?
 - Does your solution satisfy all of the given conditions in the problem?
 - Recheck any computations made while finding the answer for errors.
- Once you have a reasonable solution, reflect upon the process as a whole:
 - How efficient was the strategy you chose?
 - Now that you have a solution, does another strategy seem like it may have worked better for this problem?
 - Can you make generalizations about this problem so that you can solve similar problems in the future?

The Pólya Process can be used for any math problem, but is especially useful for multi-step and word problems. Getting students used to the steps will give them a structure to help make sure they solve all parts of the problem and will get them used to checking their work. In addition, reflecting on the problem solving process and possible strategies to solve problems will make them better problem solvers in the future. The reflection step allows them to build a tool kit of strategies and to recognize which strategies work best with certain problem types.

Adapted from:

G. Pólya. *How to Solve It*. Princeton University Press, Princeton. 1945.