

UNDERSTANDING AND “SOLVING” PROBLEMS - *How to Solve It* (G. Polya 1945)

1. Understand the problem

(What is “a problem”? what is different from a riddle, an exercise, or a “situation of interest”). Can you **isolate**, specifically, **the condition**? Can you **describe the problem clearly and completely**, in your own words, with appropriate images, and **in at least 2 different, equivalent ways**?

Is this a “known”, familiar problem? If so, are there any good solutions available?

If it is a “Word Problem”, do you understand each word, sentence and statement?

• POSSIBLE STRATEGIES FOR UNDERSTANDING (AND RESOLVING) SITUATIONS:

1. Draw a picture	11. Use cases
2. Draw a diagram	12. Work backward (INDUCTIVE, SYNTHETIC THINKING)
3. Look for a pattern	13. Do a simulation
4. Use a model	14. Use a variable
5. Use direct reasoning (DEDUCTIVE, ANALYTIC THINKING) any physical evidence to analyze?	15. Look for a formula
6. Solve an equivalent problem	16. Solve an equation
7. Solve a simpler problem	17. Use dimensional analysis
8. Identify sub-goals	18. Use indirect reasoning
9. Guess and test	19. Use the properties of numbers
10. Make a list	20. Use coordinates
	21. Use symmetry

2. Imagine and prepare an approach, strategy, plan or way for resolution

Consider a resolution that solves the problem (* see below) **the best possible**

3. Carry out the approach or plan. **Execute the planed actions** as imagined

4. Look back

5. Did the plan actions work? **IF NOT, need to go back and re-imagine and/or re-do any and all previous steps as needed, until acceptable resolution (or, if appropriate, abandonment)**

A politician's problem resolution flowchart

A new problem comes in
needing resolution

