

# HOW TO SOLVE IT

by George Pólya

## UNDERSTANDING THE PROBLEM

**First.** *What is the unknown? What are the data? What is the condition?*

You have to understand  
the problem.

Is it possible to satisfy the condition? Is the condition sufficient to determine the unknown? Or is it insufficient? Or redundant? Or contradictory?

Draw a figure. Introduce suitable notation.

Separate the various parts of the condition. Can you write them down?

## DEVISING A PLAN

**Second.** Have you seen it before? Or have you seen the same problem in a slightly different form?

*Do you know a related problem?* Do you know a theorem that could be useful?

*Look at the unknown!* And try to think of a familiar problem having the same or similar unknown.

*Here is a problem similar to yours and solved before. Could you use it?*

Could you use its result? Could you use its method? Should you introduce some auxiliary element in order to make its use possible?

Could you restate the problem? Could you restate it still differently?

Go back to definitions.

If you cannot solve the proposed problem try to solve first some related problem.

Could you imagine a more accessible related problem? A more general problem? A

more special problem? An analogous problem? Could you solve a part of the

problem? Keep only a part of the condition, drop the other part: how far is the

unknown determined, how can it vary? Could you derive something useful from the

data? Could you think of other data appropriate to determine the unknown? Could

you change the unknown or the data, or both if necessary, so that the new unknown

and the new data are nearer to each other?

Did you use all the data? Did you use the whole condition? Have you taken into

account all essential notions involved in the problem?

## CARRYING OUT THE PLAN

**Third.** Carrying out the plan of your solution, *check each step*. Can you see clearly that the step is correct? Can you prove that it is correct?

Carry out your plan.

## LOOKING BACK

**Fourth.** Can you *check the result*? Can you check the argument? Can you derive the result differently? Can you see it at a glance?

Examine the solution  
obtained.

Can you use the result, or the method, for some other problem?