A Detailed Description of Polya's Four steps of Problem Solving

1. Understand the Problem (Define the Problem)

- *Carefully read* the problem *several times*.
- *Identify* what you are being asked to *find*.
- *Ensure* that you *understand all terminology*.
- *Highlight* all *given information*.
- *Identify* all the *information* that *is required* to solve the problem.
- *Identify* the *given information* that *is required* to solve the problem.
- *Identify* any *extraneous information* (information that is not needed).
- *Identify* any *missing information*.
- *Do research* to *find* or *estimate* any *missing information*.
- *Keep* an *open mind*.
- *Do not make* any *unnecessary* or *incorrect assumptions*.
- *Think logically* and *creatively!*
- *Consult colleagues, peers, experts,* etc.
- *Do not worry* about *possible strategies yet*.
- *Predict* what a *reasonable answer* or *range of answers* would be.

2. Choose a Strategy

- *Unleash your creative powers! Be imaginative!*
- *Do not be afraid to take risks!*
- *Do not dismiss any ideas* at this stage. Feel free to be *whacky!*
- *Avoid* feelings of *frustration* or *inadequacy*.
- *Do not give up quickly!*
- If you have the desire to quit, *take a break* and *try solving the problem later*.
- *Do not be afraid* to be *unconventional*. Perhaps you are correct and everyone else is wrong!
- *Draw* a *diagram* or *visualize*.
- *Compare* the problem to an *equivalent* or *similar problem* that you have already solved.
- *Compare* the problem to a *simpler* but *related problem*.
- *Solve* a *specific example* of the problem.
- *Look for patterns*.
- *Write* a list of *as many possible strategies* as you can.
- *Do research* to discover if *anyone else* has solved the problem.

3. Carry out the Strategy

- *Check* your list of strategies and *select one* that you think is likely to work.
- *Carry out* your strategy *logically* and *carefully*, paying close attention to *detail*.
- If your strategy *fails*, return to *steps 1* and *2*.

4. Check the Solution

- Is your answer *reasonable?*
- Does your *answer agree* with the *prediction* you made in *step 1*?
- Does your *answer agree* with the *answers obtained by others*?
- Is there a *better way* to solve the problem?
- Ask *peers, colleagues,* etc to check your solution.