Problem solving in mathematics

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The effective solving of mathematical problems entails several aspects, including knowing how to think and reason in mathematical terms, how to solve mathematical problems, how to learn mathematics and how to deal with maths anxiety. In this article I will focus on these and other aspects.

1 Constantly communicate with yourself while studying

- Form a complete picture of the work you are doing. Look at the titles of chapters, subsections and paragraphs. Study the graphs, diagrams and tables.
- Read, think and do:
  - Theory: Carefully read and analyse symbols. Learn facts until you know them by heart. Remember to revise all work within 24 hours. Use coloured pens to highlight important principles.
  - Problems: **Do** examples (NEVER just look at or read them!), talk about what you are doing and give reasons for everything you do. Devise your own examples, but use different values.

  > Divide your page in half and explain your reasons for everything you do as follows:
  > 1. $2x + 6 \quad = \quad 12$
  > $2x \quad\quad = \quad 12 - 6 \quad$ Subtract 6 on both sides.
  > 2. Solve a variety of problems. See in how many ways you can solve the same problem.
  > 3. Do mixed examples and try to identify and name the different types of problems.

  - Summary or framework. Now draw a framework with a mind map.
    1. Use a single surface to obtain the full picture.
    2. Keep it as brief as possible.
    3. Use core words, pictures, colours, block letters (print hand) and diagrams.

  - Look at the following example of a possible framework:
    1. State the problem.
    2. Now describe the characteristics that enable you to recognise the problem.
    3. State what factual knowledge you will need to solve the problem.
    4. Now explain the method you will follow to solve it.
    5. Provide the worked out (model) solution.
    6. Answer a variety of questions obtained from old test and exam papers, class notes, worksheets and textbooks.
    7. Revision. Please keep the forget graph in mind! Learn and memorise all the definitions that you cannot yet repeat without referring to the textbook or notes.
    8. Develop a balance between solving examples and learning theory. Never neglect one of these tasks at the expense of the other.

*To summarise: Master mathematics actively. In mathematics you are advised to **actively** consider problems and examples before writing tests and exams, to work out examples repeatedly, to study the theory **thoroughly** until you really understand it and to **never** think that memorising facts can replace the **active** solving of problems.*