# MATHEMATICS
# EXEMPLAR PROBLEMS
## *Class VIII*

राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्
NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

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# Foreword

The National Curriculum Framework (NCF) – 2005 initiated a new phase of development of syllabi and textbooks for all stages of school education. Conscious effort has been made to discourage rote learning and to diffuse sharp boundaries between different subject areas. This is well in tune with NPE – 1986 and *Learning Without Burden* 1993 that recommend child-centred system of education. The textbooks for Classes VI, VII and VIII were released respectively in 2006, 2007 and 2008. Overall the books have been well received by students and teachers.

NCF – 2005 notes that treating the prescribed textbooks as the sole basis of examination is one of the key reasons why other resources and sites of learning are ignored. It further reiterates that the methods used for teaching and evaluation will also determine how effective these textbooks prove in making children's life at school a happy experience, rather than a source of stress or boredom.

Learning Mathematics is not about remembering solutions or methods but knowing how to solve problems. We hope that teachers will give their students a lot of opportunities to create and formulate problems themselves. We believe it would be a good idea to ask them to formulate as many new problems as they can. This would help children in developing an understanding of the concepts and principles of Mathematics. The nature of the problems set up by them becomes varied and more complex as they become confident with the ideas they are dealing in.

Problem-solving strategies give learners opportunities to think rationally, enabling them to understand and create methods and processes; they become active participants in the construction of new knowledge rather than being passive receivers. Learners need to identify and define a problem, select or design possible solutions and revise or redesign the steps, if required. Thus the role of a teacher gets modified to that of a guide and facilitator. On being presented a problem, children first need to decode it. They need to identify the knowledge required for attempting it and build model for it.

In order to address such issues, the Department of Education in Science and Mathematics (DESM) has made an attempt to provide this additional learning material at upper primary stage. This resource book contains different types of questions of varying difficulty levels. These problems are not meant to serve merely as question bank for examinations but are primarily meant to improve the quality of teaching/learning process in

schools. It is expected that these problems would encourage teachers to design quality questions on their own. Students and teachers should always keep in mind that examination and assessment are meant to test comprehension, information recall, analytical thinking and problem-solving ability, creativity and speculative ability.

A team of experts and practising teachers with an understanding of the subject worked hard to accomplish this task. The material was thoroughly discussed and edited.

NCERT will welcome suggestions from students, teachers and parents which would help us to further improve the quality of material in subsequent editions.

Professor Yash Pal
*Chairperson*
National Steering Committee
National Council of Educational Research
and Training

New Delhi

# Preface

The Department of Education in Science and Mathematics (DESM), National Council of Educational Research and Training (NCERT), initiated the development of 'Exemplar Problems' in Science and Mathematics for upper primary stage after completing the preparation of textbooks based on National Curriculum Framework – 2005.

The main objective of the book on 'Exemplar Problems in Mathematics' is to provide the teachers and students a large number of quality problems with varying cognitive levels to facilitate teaching – learning of concepts in Mathematics that are presented through the textbook for Class VIII. It is envisaged that the problems included in this volume would help the teachers to design tasks to assess effectiveness of their teaching and to know about the achievement of their students besides facilitating preparation of balanced question papers for unit and terminal tests. The feedback based on the analysis of students' responses may help the teachers in further improving the quality of classroom instructions. In addition, the problems given in this book are also expected to help the teachers to perceive the basic characteristics of good quality questions and motivate them to frame similar questions on their own. Students can benefit themselves by attempting the exercises given in the book for self-assessment and also in mastering the basic techniques of problem-solving. Some of the questions given in the book are expected to challenge the understanding of the concepts of Mathematics of the students and their ability in applying them to novel situations.

The problems included in this book were developed and refined through a series of workshops organised by DESM, that involved practising teachers, subject experts from universities and institutes of higher learning and the members of the Mathematics group of DESM. We gratefully acknowledge their efforts and thank them for their valuable contribution in our endeavour to provide good quality instructional material for the school system.

I express my gratitude to Professor G.Ravindra, Director, NCERT for his valuable motivation and guidance from time to time. Special thanks are also due to Dr. P. K. Chaurasia, Assistant Professor in Mathematics, DESM for coordinating the programme, taking pains in editing and refinement of problems and for making the manuscript praiseworthy.

We look forward for the feedback from students, teachers and parents for the further improvement of the contents of this book.

Hukum Singh
*Professor and Head*

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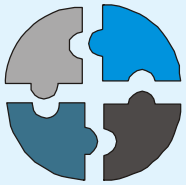
# Contents

## Problem Solving Strategy



**In Mathematics, a four-step plan can be followed to solve the problems.**

**Understand and explore the problem**

- **What has been asked to find?**
- **What information is given and what is needed?**

- Rewrite the question in your own words and analyse the information given in the problem.
- Check which information is needed to answer the question.

**Plan a strategy**

- **Check the previous experience with similar problem**
- **Planning to proceed**

- Think of the other similar problems that you have successfully solved.
- Select a strategy for solving the problem. There may be several strategies to solve the given problem.

**Solve**

- **Follow the plan**

- Follow the strategy that you have framed.
- Show all the steps in your solution.
- Write your final answer as a complete solution.
- Make sure your solution contains appropriate units.

**Revise (look back)**

- **Check whether the question has been answered or not?**
- **Is the answer reasonable?**
- **Is there other strategy that could be used?**

- Make sure that you have answered whatever was asked and it makes sense in the context of the problem.
- Solving the given problem using another strategy is a good way to check your work.
- Check if your answer is reasonable as per the information given in the problem.