

SCIENCE

TEXTBOOK FOR CLASS VIII



0854

विद्यया ऽ मृतमश्नुते



एन सी ई आर टी
NCERT

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

0854 – SCIENCE
Textbook for Class VIII

ISBN 978-81-7450-812-6

First Edition

January 2008 Magha 1929

Reprint Edition

December 2008, January 2010,
November 2010, January 2012,
November 2012, October 2013,
December 2014, December 2015,
February 2017, December 2017,
December 2018, August 2019,
January 2021 and November 2021

Revised Edition

November 2022 Kartika 1944

PD 950T BS

© National Council of Educational
Research and Training, 2008, 2022

₹ 65.00

Printed on 80 GSM paper with NCERT
watermark

Published at the Publication Division,
by the Secretary, National Council of
Educational Research and Training,
Sri Aurobindo Marg, New Delhi 110 016 and
printed at Amit Printing Press, D-12 and 13,
Industrial Area, Site-A, Mathura- 281 001
(U.P.)

ALL RIGHTS RESERVED

- ❑ No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without the prior permission of the publisher.
- ❑ This book is sold subject to the condition that it shall not, by way of trade, be lent, re-sold, hired out or otherwise disposed of without the publisher's consent, in any form of binding or cover other than that in which it is published.
- ❑ The correct price of this publication is the price printed on this page. Any revised price indicated by a rubber stamp or by a sticker or by any other means is incorrect and should be unacceptable.

**OFFICES OF THE PUBLICATION
DIVISION, NCERT**

NCERT Campus
Sri Aurobindo Marg
New Delhi 110 016 Phone : 011-26562708

108, 100 Feet Road
Hosdakere Halli Extension
Banashankari III Stage
Bangaluru 560 085 Phone : 080-26725740

Navjivan Trust Building
P.O.Navjivan
Ahmedabad 380 014 Phone : 079-27541446

CWC Campus
Opp. Dhankal Bus Stop
Panihati
Kolkata 700 114 Phone : 033-25530454

CWC Complex
Maligaon
Guwahati 781 021 Phone : 0361-2674869

Publication Team

Head, Publication Division : Anup Kumar Rajput

Chief Production Officer : Arun Chitkara

Chief Business Manager : Vipin Dewan

Chief Editor (In charge) : Bijnan Sutar

Assistant Editor : Shashi Chadha

Assistant Production Officer : Deepak Jaiswal

Cover, Layout and Illustrations
Ashwani Tyagi

Foreword

The National Curriculum Framework (NCF), 2005, recommends that children's life at school must be linked to their life outside the school. This principle marks a departure from the legacy of bookish learning which continues to shape our system and causes a gap between the school, home and community. The syllabi and textbooks developed on the basis of NCF signify an attempt to implement this basic idea. They also attempt to discourage rote learning and the maintenance of sharp boundaries between different subject areas. We hope these measures will take us significantly further in the direction of a child-centred system of education outlined in the National Policy on Education (1986).

The success of this effort depends on the steps that school principals and teachers will take to encourage children to reflect on their own learning and to pursue imaginative activities and questions. We must recognise that, given space, time and freedom, children generate new knowledge by engaging with the information passed on to them by adults. Treating the prescribed textbook as the sole basis of examination is one of the key reasons why other resources and sites of learning are ignored. Inculcating creativity and initiative is possible if we perceive and treat children as participants in learning, not as receivers of a fixed body of knowledge.

These aims imply considerable change in school routines and mode of functioning. Flexibility in the daily time-table is as necessary as rigour in implementing the annual calendar so that the required number of teaching days are actually devoted to teaching. The methods used for teaching and evaluation will also determine how effective this textbook proves for making children's life at school a happy experience, rather than a source of stress or boredom. Syllabus designers have tried to address the problem of curricular burden by restructuring and reorienting knowledge at different stages with greater consideration for child psychology and the time available for teaching. The textbook attempts to enhance this endeavour by giving higher priority and space to opportunities for contemplation and wondering, discussion in small groups and activities requiring hands-on experience.

The National Council of Educational Research and Training (NCERT) appreciates the hard work done by the textbook development committee responsible for this book. We wish to thank the Chairperson of the advisory group in science and mathematics, Professor J.V. Narlikar and the Chief Advisor for this book, Professor V.B. Bhatia for guiding the work of this committee. Several teachers contributed to the development of this textbook. We are grateful to their principals for making this possible. We are indebted to the institutions and organisations which have generously permitted us to draw upon their resources, material and personnel. We are especially grateful to the members of the National Monitoring Committee, appointed by the Department of Secondary and Higher Education,

Ministry of Human Resource Development under the Chairpersonship of Professor Mrinal Miri and Professor G.P. Deshpande, for their valuable time and contribution.

As an organisation committed to systemic reform and continuous improvement in the quality of its products, NCERT welcomes comments and suggestions which will enable us to undertake further revision and refinement.

New Delhi
30 November 2007

Director
National Council of Educational
Research and Training

© NCERT
not to be republished

Rationalisation of Content in the Textbooks

In view of the COVID-19 pandemic, it is imperative to reduce content load on students. The National Education Policy 2020, also emphasises reducing the content load and providing opportunities for experiential learning with creative mindset. In this background, the NCERT has undertaken the exercise to rationalise the textbooks across all classes. Learning Outcomes already developed by the NCERT across classes have been taken into consideration in this exercise.

Contents of the textbooks have been rationalised in view of the following:

- Overlapping with similar content included in other subject areas in the same class
- Similar content included in the lower or higher class in the same subject
- Difficulty level
- Content, which is easily accessible to students without much interventions from teachers and can be learned by children through self-learning or peer-learning
- Content, which is irrelevant in the present context

This present edition, is a reformatted version after carrying out the changes given above.

© NCERT
not to be republished

Preface

This book is the outcome of the efforts of the textbook development committee appointed by the NCERT. The committee met a few times to interact with one another to improve the draft. Then there was a review meeting in which many experts and practicing school teachers were invited to review the draft and suggest improvements.

By and large we have stuck to the format of the Class VII book. By now famous characters, Boojho and Paheli, have been used to make the text interactive. Attempt has been made to recall children's own experiences and build concepts around them. This is designed to connect science that they study in the school with their everyday life.

Many activities have been suggested to clarify concepts. Some of these activities are so simple that children can perform them on their own. The requirement of the apparatus required for the activities is minimal. We performed all the activities ourselves to ensure that there was no difficulty in performing them in the school situation. The activities should also help children in developing skills such as presentation of data in tabular and graphical forms, reasoning and drawing inference from the given data.

The language of the book has been kept as simple as possible. A large number of photographs, illustrations, cartoons, etc. have been included to make the book attractive. To help teachers evaluate children effectively, a large number of exercises have been given at the end of each chapter. The teachers are encouraged to frame additional exercises to test children's understanding. Some challenging exercises have also been devised for those children who would like to appear for the National Talent Search Examination conducted by the NCERT.

We are conscious of the fact that there is a paucity of additional reading material for children. We have tried to address this problem by providing **non-evaluative boxes**. These boxes, in light orange, contain additional information, anecdotes, stories, strange facts and other such interesting materials.

We all know that children are mischievous and playful by nature. Therefore, in order to prevent any untoward incident during the performance of the activities in the school or outside, necessary cautions, in magenta, have been inserted at various places in the book.

To prepare children to assume their roles as responsible citizens of tomorrow, attempt has been made to sensitise them to the issues concerning gender, religion, environment, health and hygiene, water scarcity and energy conservation. We have sought to weave into the text the value of cooperation and the importance of peer learning.

An important feature of the book is what we call **Extended Learning**. These are totally **non-evaluative**, and purely voluntary activities and projects. Some of the projects in this section have been designed to enhance children's interaction with the experts, teachers, even parents, and society at large. The children are required to collect information of various kinds and draw conclusions of their own.

My request to teachers and parents is to use the book in the spirit in which it has been written. Encourage children to perform activities and learn by doing, rather than by rote. You can supplement, or even replace, the activities given here. If you

feel that you have better alternatives, especially with your local/regional flavour, please write to us so that these activities could be used in the future editions of the book.

We have been able to include only a small subset of children's experiences. You have a better knowledge of their experiences because you are in touch with them. Use them to illustrate the concepts being taught. Above all, please do not stifle children's natural curiosity. Encourage them to ask questions, even if sometimes you feel uncomfortable. If you do not know the answer to a question on the spot, do not feel embarrassed. You can promise them to find the answer and deal with it later. Make a genuine attempt to get the answer from whatever resources are within your reach, such as senior school or college teachers, experts, libraries, internet etc. If, in spite of your efforts, you cannot get the answer to some question, you could write to NCERT.

I must thank the NCERT for enabling us to talk to children through the medium of this book. Every member of the NCERT has been courteous and helpful to us.

In the end, I must express my gratitude to the members of the Editing Team, who worked tirelessly to help me bring the book to the present form. If you and your students find this book useful and enjoy teaching/learning science through this book, the Editing Team and I shall consider ourselves well-rewarded.

V.B. BHATIA

Chief Advisor

Textbook Development Committee

Textbook Development Committee

CHAIRPERSON, ADVISORY GROUP FOR TEXTBOOKS IN SCIENCE AND MATHEMATICS

J.V. Narlikar, *Emeritus Professor*, Inter University Centre for Astronomy and Astrophysics (IUCCA), Ganeshkhind, Pune University, Pune

CHIEF ADVISOR

V.B. Bhatia, *Professor (Retd.) (Physics)*, Delhi University, Delhi

MEMBERS

Bharati Sarkar, *Reader (Retd.) (Zoology)*, Maitreyi College, Delhi University, Delhi

C. V. Shimray, *Lecturer*, Department of Education in Science and Mathematics, (DESM), NCERT, Sri Aurobindo Marg, New Delhi

Gagandeep Bajaj, *Lecturer*, Department of Education, SPM College, Delhi University, Delhi

H.C. Jain, *Principal, (Retd.)* Regional Institute of Education, Ajmer

Harsh Kumari, *Headmistress*, CIE Experimental Basic School, Department of Education, Delhi University, Delhi

J. S. Gill, *Professor (Retd.)*, DESM, NCERT, Sri Aurobindo Marg, New Delhi

Kanhiya Lal, *Principal (Retd.)*, Directorate of Education, Delhi

Lalita S. Kumar, *Reader (Chemistry)*, School of Sciences, Indira Gandhi National Open University (IGNOU), Maidan Garhi, New Delhi

P.C. Agarwal, *Reader*, Regional Institute of Education, Ajmer

P.S. Yadava, *Professor*, Department of Life Sciences, Manipur University, Imphal

Puranchand, *Professor and Joint Director (Retd.)*, Central Institute of Educational Technology (CIET), NCERT, Sri Aurobindo Marg, New Delhi

R. Joshi, *Lecturer (SG)*, DESM, NCERT, Sri Aurobindo Marg, New Delhi

Rachna Garg, *Lecturer*, Central Institute of Educational Technology (CIET), NCERT, Sri Aurobindo Marg, New Delhi

Rashmi Sharma, *Lecturer*, North-East Regional Institute of Education, Shillong

R.K. Parashar, *Reader*, Regional Institute of Education, Bhubaneswar

Ruchi Verma, *Lecturer*, DESM, NCERT, Sri Aurobindo Marg, New Delhi

Shashi Prabha, *Lecturer*, DESM, NCERT, Sri Aurobindo Marg, New Delhi

Sunila Masih, *Teacher*, Mitra GHS School, Suhagpur, P.O. Hoshangabad, Madhya Pradesh

MEMBER-COORDINATOR

R. S. Sindhu, *Professor*, DESM, NCERT, Sri Aurobindo Marg, New Delhi

Acknowledgements

The National Council of Educational Research and Training (NCERT) acknowledges the valuable contribution of the individuals and organisations involved in the development of this book. The Council acknowledges the valuable contribution of the following academics for reviewing and refining the manuscript of this book: K.C. Sharma, *Reader (Physics)*, Regional Institute of Education, Ajmer; Charu Verma, *Lecturer (Science)*, DIET, Pitampura, Delhi; Geeta Bajaj, *TGT (Science)*, K.V. No. 3, Delhi Cantt., New Delhi; K.D. Sharma, *TGT (Science)*, R.P.V.V. Civil Lines, Delhi; Manohar Lal Patel, *Teacher*, Govt. R.N.A. Higher Secondary School, Pipariya, Madhya Pradesh; Reeta Sharma, *Reader (Botany)*, Regional Institute of Education, Bhopal; Kamal Deep Peter, OEI, Oracle India, Bangalore; Puneeta Sharma, *TGT (Science)*, L.D. Jain Girls Senior Secondary School, Sadar Bazar, Delhi; M.C. Das, *Teacher (Science)*, Govt. Secondary School, Zoom, West Sikkim; Deepti Kohli, P.D. Public School, Shalimar Bagh, Delhi; Sulekha Chandra, *Reader (Chemistry)*, Zakir Husain College, Delhi University, Delhi; R.S. Tomar, *TGT (Science)*, J.N.V. Mothuka, Faridabad (Haryana); Anjali Khirwadkar, *Lecturer*, Department of Education, M.S. University, Baroda (Gujrat); Suresh Chand, *TGT (Science)*, J.N.V. Ghaziabad Uttar Pradesh; Satheesh H.L., *TGT (Science)*, Demonstration School, Regional Institute of Education, Mysore; Simminder Kaur Thukral, NIIT, Kalkaji, New Delhi; M.M. Kapoor, *Professor (Retd.) (Chemistry)*, Delhi University, Delhi; Sarita Kumar, *Reader (Zoology)*, Acharya Narendra Dev College, Delhi University, Delhi. The contributions of Pushplata Verma, R.R. Koireng, Pramila Tanvar and Ashish K. Srivastava, *Assistant Professors*, are acknowledged for being a part of the review of this textbook.

The Council gratefully acknowledges the valuable suggestions received from the National Monitoring Committee in the development of the manuscript of this textbook.

The dynamic leadership of Professor Hukum Singh, Head, DESM, for providing guidance at different stages of development of the textbook and extending infrastructure facilities is highly acknowledged. Special thanks are due to Shveta Uppal, *Chief Editor* and Shashi Chadha, *Assistant Editor* for going through the manuscript and suggesting relevant changes.

The Council also acknowledges the efforts of Deepak Kapoor, *Incharge Computer Station*, Inder Kumar, *DTP Operator*; K.T. Chitralkha, *Copy Editor* and Ritu Jha, *Proof Reader*.

The contributions of APC-office, administration of DESM, Publication Department and Secretariat of NCERT is also acknowledged.

A Note for the Students

The team of Paheli and Boojho will be with you as you journey through this textbook. They love to ask questions. All kinds of questions come to their minds and they collect them in their sacks. Sometimes, they may share some of the questions with you, as you read through the chapters.

Paheli and Boojho are also on the lookout for answers to many questions — sometimes the questions seem answered after they discuss them with each other, sometimes through discussions with other classmates, teachers or their parents. Answers to some questions do not seem available even after all these. They might need to experiment on their own, read books in the library, send questions to scientists. Just dig and dig and dig into all possibilities and see if the questions can be answered. Perhaps, they would carry some of the unanswered questions in their sacks to higher classes.

What will really thrill them would be your adding questions to their sacks or answers to their questions. Sometimes, activities are suggested in the textbook, results or findings of these by different groups of students would be of interest to other students and teachers. You can complete the suggested activities and send your results or findings to Paheli and Boojho. Do keep in mind that activities that involve using blades, scissors or fire need to be done strictly under the care of your teachers. Stick to the precautions given and then enjoy doing all the suggested activities. Mind, the book will not be able to help you much, if the activities are not completed!

We would like to advise you that you must make observations yourself and record whatever results you get. Keen and true observations are necessary for exploring any subject of study. For some reason your results may turn out to be different from those of your classmates. Do not worry. Try to find out the reason for these results instead of disregarding them. Do not ever copy results from your classmate.

You can send your feedback for Paheli and Boojho at:



To

The Head
Department of Education in
Science and Mathematics,
NCERT, Sri Aurobindo Marg,
New Delhi 110016

THE CONSTITUTION OF INDIA

PREAMBLE

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a ¹**[SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC]** and to secure to all its citizens :

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity; and to promote among them all

FRATERNITY assuring the dignity of the individual and the ²[unity and integrity of the Nation];

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949 do **HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.**

1. Subs. by the Constitution (Forty-second Amendment) Act, 1976, Sec.2, for "Sovereign Democratic Republic" (w.e.f. 3.1.1977)
2. Subs. by the Constitution (Forty-second Amendment) Act, 1976, Sec.2, for "Unity of the Nation" (w.e.f. 3.1.1977)

CONTENTS

FOREWORD	iii
RATIONALISATION OF CONTENT IN THE TEXTBOOKS	v
PREFACE	vii
Chapter 1	
CROP PRODUCTION AND MANAGEMENT	1
Chapter 2	
MICROORGANISMS : FRIEND AND FOE	17
Chapter 3	
COAL AND PETROLEUM	32
Chapter 4	
COMBUSTION AND FLAME	40
Chapter 5	
CONSERVATION OF PLANTS AND ANIMALS	53
Chapter 6	
REPRODUCTION IN ANIMALS	66
Chapter 7	
REACHING THE AGE OF ADOLESCENCE	79
Chapter 8	
FORCE AND PRESSURE	93
Chapter 9	
FRICTION	112
Chapter 10	
SOUND	123

CONTENTS

Chapter 11	
CHEMICAL EFFECTS OF ELECTRIC CURRENT	138
Chapter 12	
SOME NATURAL PHENOMENA	150
Chapter 13	
LIGHT	165

© NCERT
not to be republished