

# SCIENCE

TEXTBOOK FOR CLASS VII



0758

विद्यया ऽ मृतमश्नुते



एन सी ई आर टी  
NCERT

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

## 758 – SCIENCE

Textbook for Class 7

ISBN 81-7450-654-3

### First Edition

January 2007 Magha 1928

### Reprinted

November 2007 Kartika 1929

January 2009 Pausa 1930

January 2010 Magha 1931

January 2011 Magha 1932

January 2012 Magha 1933

December 2012 Agrahayana 1934

October 2013 Asvina 1935

December 2014 Pausa 1936

December 2015 Agrahayana 1937

February 2017 Phalguna 1938

December 2017 Agrahayana 1939

December 2018 Agrahayana 1940

September 2019 Bhadrapada 1941

January 2021 Pausa 1942

August 2021 Shrivana 1943

November 2021 Agrahayana 1943

PD 730T RSP

© National Council of Educational  
Research and Training, 2007

₹ 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 Ankur Offset  
Pvt. Ltd., A-54, Sector-63, Noida - 201 301  
(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  
Bengaluru 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 Editor : Shveta Uppal

Chief Production Officer : Arun Chitkara

Chief Business Manager : Vipin Dewan

Editor : Bijan Sutar

Production Assistant : Rajesh Pippal

### 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, Prof. 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, the NCERT welcomes comments and suggestions which will enable us to undertake further revision and refinement.

New Delhi  
20 November 2006

*Director*  
National Council of Educational  
Research and Training

© 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 VI 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 every-day 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 blue, 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 red, 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 kind 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. If you 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

D. Lahiry, *Professor, Retd.*, DESM, NCERT, Sri Aurobindo Marg, New Delhi

G.P. Pande, Uttarakhand Seva Nidhi, Paryavaran Shiksha Sansthan, Jakhan Devi, Almora, Uttaranchal

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

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

Kamal Deep Peter, *TGT (Science)*, Kendriya Vidyalaya, Bengaluru

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

Mohd. Iftikhar Alam, *TGT (Science)*, Sarvodaya Bal Vidyalaya (No.1), Jama Masjid, Delhi

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

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

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

Ranjana Agrawal, *Principal Scientist and Head*, Division of Forecasting Techniques, Indian Agricultural Statistics Research Institute, IARI Campus, Pusa, New Delhi

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

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

Sarita Kumar, *Reader (Zoology)*, Acharya Narendra Dev College, Delhi University, Delhi

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

V.K. Gupta, *Reader (Chemistry)*, Hans Raj College, Delhi University, Delhi

### MEMBER-COORDINATOR

R.K. Parashar, *Lecturer*, DESM, NCERT, Sri Aurobindo Marg, New Delhi



# THE CONSTITUTION OF INDIA

## PREAMBLE

**WE, THE PEOPLE OF INDIA**, having solemnly resolved to constitute India into a <sup>1</sup>**[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 <sup>2</sup>[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)



## ACKNOWLEDGEMENTS

The National Council of Educational Research and Training (NCERT) acknowledges the valuable contribution of the individuals and organisations involved in the development of Science textbook for Class VII. The Council acknowledges the valuable contribution of the following academics for reviewing and refining the manuscripts of this book: Sushma Kiran Setia, *Principal*, Sarvodaya Kanya Vidyalaya, Hari Nagar (Clock Tower), New Delhi; Mohini Bindra, *Principal*, Ramjas School, Pusa Road, New Delhi; D.K. Bedi, *Principal*, Apeejay Senior Secondary School, Pitampura, Road No. 42, Sainik Vihar, New Delhi; Chand Vir Singh, *Lecturer (Biology)*, GBSS School, Rajouri Garden (Main), New Delhi; Renuka Madan, *TGT (Physics)*, Air Force Golden Jubilee Institute, Subroto Park, Delhi Cantt; Reena Jhani, *TGT (Science)*, Darbari Lal DAV Model School, Pitampura, New Delhi; Geeta Bajaj, *TGT (Science)*, K. V. No. 3, Delhi Cantt., New Delhi; Gagandeep Bajaj, *Lecturer*, Department of Education, S.P.M. College, Delhi University, Delhi; Shashi Prabha, *Lecturer*, DESM, NCERT, New Delhi; A.K. Bakhshi, *Professor*, Department of Chemistry, University of Delhi, Delhi; N. Rathnasree, *Director*, Nehru Planetarium, Teen Murti Bhavan, New Delhi; S.B. Singh, *TGT (Science)*, J.N.V. Sonikpur, P.O. Trivediganj, Distt. Barabanki, Uttar Pradesh; Madhur Mohan Ranga, *Lecturer (Selection Scale)*, (*Zoology*), Govt. College, Ajmer, Rajasthan; K.G. Ojha, *Associate Professor*, Department of Chemistry, M.D.S. University, Ajmer, Rajasthan; Puneeta Sharma, *TGT (Science)*, L.D. Jain Girls Senior Secondary School, Pahari Dhiraj, Delhi; Manohar Lal Patel, *Teacher*, Govt. R.N.A. Exc. H.S.S. Pipariya, Distt. Hoshangabad, Madhya Pradesh; Bharat Bhushan Gupta, *PGT (Biology)*, Sarvodaya Vidyalaya, No.1, Shakurpur, Delhi; Sushma Jairath, *Reader*, Department of Women Studies (DWS), NCERT, New Delhi; Mina Yadav, *Lecturer*, DWS, NCERT, New Delhi; Swadesh Taneja, *Ex-Reader (Life Sciences)*, IGNOU, New Delhi and M.M. Kapur, *Professor, Retd. (Chemistry)*, Delhi University, Delhi. The contributions of Pramila Tanwar, R.R. Koirang and Ashish K. Srivastava, *Assistant Professors*, are acknowledged for being a part of the review of this textbook.

The Council is highly thankful to the India Meteorological Department, New Delhi, for providing some illustrations for the Chapter 8: Winds, Storms and Cyclones. 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 in the final editing of the manuscript and extending infrastructure facilities is highly acknowledged. Special thanks are due to Shveta Uppal, *Chief Editor*; and Bijnan Sutar, *Assistant Editor*, for going through the manuscript and suggesting relevant changes.

The Council also acknowledges the efforts of Deepak Kapoor, *Incharge*, Computer Station; Purnendu Kumar Barik, Musarrat Parveen and Satish Kumar Mishra, *Copy Editors*; Neelam Walecha and Muhammad Aiyub, *DTP Operators*; and Randhir Thakur, *Proof Reader*.

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

© NCERT  
not to be republished

## 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 kind of questions come to their minds and they collect them in their sacks. Sometimes, they may share some of these 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 110 016

# CONSTITUTION OF INDIA

## Part IV A (Article 51 A)

### Fundamental Duties

Fundamental Duties – It shall be the duty of every citizen of India —

- (a) to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;
- (b) to cherish and follow the noble ideals which inspired our national struggle for freedom;
- (c) to uphold and protect the sovereignty, unity and integrity of India;
- (d) to defend the country and render national service when called upon to do so;
- (e) to promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women;
- (f) to value and preserve the rich heritage of our composite culture;
- (g) to protect and improve the natural environment including forests, lakes, rivers, wildlife and to have compassion for living creatures;
- (h) to develop the scientific temper, humanism and the spirit of inquiry and reform;
- (i) to safeguard public property and to abjure violence;
- (j) to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement;
- (k) who is a parent or guardian, to provide opportunities for education to his child or, as the case may be, ward between the age of six and fourteen years.

## CONTENTS

<b>FOREWORD</b>	<b>iii</b>
<b>PREFACE</b>	<b>v</b>
<b>Chapter 1</b>	
<b>Nutrition in Plants</b>	<b>1</b>
<b>Chapter 2</b>	
<b>Nutrition in Animals</b>	<b>11</b>
<b>Chapter 3</b>	
<b>Fibre to Fabric</b>	<b>24</b>
<b>Chapter 4</b>	
<b>Heat</b>	<b>35</b>
<b>Chapter 5</b>	
<b>Acids, Bases and Salts</b>	<b>49</b>
<b>Chapter 6</b>	
<b>Physical and Chemical Changes</b>	<b>58</b>
<b>Chapter 7</b>	
<b>Weather, Climate and Adaptations of Animals to Climate</b>	<b>68</b>
<b>Chapter 8</b>	
<b>Winds, Storms and Cyclones</b>	<b>80</b>
<b>Chapter 9</b>	
<b>Soil</b>	<b>96</b>
<b>Chapter 10</b>	
<b>Respiration in Organisms</b>	<b>108</b>
<b>Chapter 11</b>	
<b>Transportation in Animals and Plants</b>	<b>121</b>
<b>Chapter 12</b>	
<b>Reproduction in Plants</b>	<b>133</b>

<b>Chapter 13</b>	
<b>Motion and Time</b>	<b>143</b>
<b>Chapter 14</b>	
<b>Electric Current and its Effects</b>	<b>160</b>
<b>Chapter 15</b>	
<b>Light</b>	<b>174</b>
<b>Chapter 16</b>	
<b>Water: A Precious Resource</b>	<b>193</b>
<b>Chapter 17</b>	
<b>Forests: Our Lifeline</b>	<b>206</b>
<b>Chapter 18</b>	
<b>Wastewater Story</b>	<b>220</b>
<b>INDEX</b>	<b>231</b>