

SCIENCE

TEXTBOOK FOR CLASS VI



0652



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

ISBN 81-7450-512-1

First Edition

March 2006 Phalgun 1927

Reprinted

December 2006 Pausa 1928
February 2008 Magha 1929
January 2009 Pausa 1930
November 2009 Agrahayana 1931
November 2010 Kartika 1932
January 2012 Magha 1933
October 2013 Kartika 1935
December 2014 Pausa 1936
December 2015 Agrahayana 1937
January 2017 Magha 1938
December 2017 Agrahayana 1939
December 2018 Agrahayana 1940
August 2019 Bhadrapada 1941

PD 900T RPS

© National Council of Educational
Research and Training, 2006

₹ 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 Esskay
Press Pvt. Ltd. 220, Patparganj Industrial
Area, Delhi - 110 092

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 : M. Siraj Anwar
Division
Chief Editor : Shweta Uppal
Chief Production : Arun Chitkara
Officer
Chief Business : Bibash Kumar Das
Manager
Editor : Bijan Sutar
Production Assistant : Om Prakash

Cover

Shweta Rao

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.

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, Dr. N. Rathnasree 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
December 2005*

*Director
National Council of Educational
Research and Training*

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)

TEXTBOOK DEVELOPMENT COMMITTEE

CHAIRPERSON, ADVISORY GROUP IN SCIENCE AND MATHEMATICS

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

CHIEF ADVISOR

N. Rathnasree, *Director*, Nehru Planetarium, Teen Murti House, New Delhi

MEMBERS

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

D. Lahiry, *Professor (Retd.)*, DESM, NCERT, BL-89, Sector 2, Salt Lake, Kolkata

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

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

J. S. Gill, *Professor*, Department of Education in Science and Mathematics, NCERT, Sri Aurobindo Marg, New Delhi

Jaishree Sikka, *Assistant Professor*, Department of Botany, P.M.B. Gujarati Science College, Indore

Kalyani Krishna, *Reader*, Department of Botany, Sri Venkateswara College, University of Delhi, Dhaula Kuan, New Delhi

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

Neeraja Raghavan, *Writer*, Girl's Education Plus, 302, East Mansion, 2 Hutchins Road, Cooke Town, Bangalore

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

R. K. Parashar, *Lecturer*, Department of Education in Science and Mathematics, NCERT, Sri Aurobindo Marg, New Delhi

Rachna Garg, *Lecturer*, 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

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

Sunita Malhotra, *Professor of Chemistry*, School of Science, Indira Gandhi National Open University (IGNOU), Maidan Garhi, New Delhi

V. P. Srivastava, *Reader*, Department of Education in Science and Mathematics, NCERT, Sri Aurobindo Marg, New Delhi

MEMBER-COORDINATOR

R. Joshi, *Lecturer (Selection Grade)*, DESM, NCERT, 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 Science Textbook for Class VI. 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; Neelam Monga, *TGT (Science)*, Kendriya Vidyalaya, Janakpuri, New Delhi; Renuka Madan, *TGT (Physics)*, Air Force Golden Jubilee Institute, Subroto Park, Delhi Cantt; P.K. Bhattacharya, *Professor (Retd) Consultant*, DESM, NCERT, New Delhi and Shukhvir Singh, *Reader*, DESM, NCERT, New Delhi.

The Council gratefully acknowledges the valuable contribution of the following academics for the editing and finalisation of this book: Vinod Raina, *Member National Monitoring Committee*, Bharat Gyan Vigyan Samiti, Basement of YWA Building, Hostel No. 2, G. Block, Saket, New Delhi; Professor Amitabha Mukherjee, *Director*, Centre for Science Education and Communication (CSEC), 10 Cavalry Lane, University of Delhi, Delhi; Savithri Singh, *Principal*, AND College, University of Delhi, Govindpuri, New Delhi; M. M. Kapoor, *Professor*, CSEC, 10 Cavalry Lane, University of Delhi, Delhi; R. M. Hallen, CSEC, 10 Cavalry Lane, University of Delhi, Delhi; D. A. Misra, *Principal (Retd)*, (As Nominee of CSEC) Directorate of Education, B 203, Saraswati Vihar, New Delhi; Charu Varma, *Lecturer*, (As Nominee of CSEC), DIET, FU Block, Pitampura, Delhi. The contributions of Ruchi Verma, Associate Professor, Pushplata Verma, Pramila Tanwar and Ashish K. Srivastava, *Assistant Professors*, are acknowledged for being a part of the review of this textbook.

The Council gratefully acknowledges the valuable feedback and suggestions received from Professor Arvind Kumar, *Director*, Homi Bhabha Centre for Science Education (HBCSE), TIFR, V. N. Purve Marg, Mankhurd, Mumbai and the academics at HBCSE and CSEC at various stages of development of the manuscript of this textbook.

The dynamic leadership of Professor M. Chandra, Head, DESM, for providing guidance in final editing of the manuscript and extending infrastructure facilities is highly acknowledged. Special thanks are due to Shveta Uppal, *Chief Editor*; and Vandana Singh, *Consultant Editor* for going through the manuscript and suggesting relevant changes.

The Council also acknowledges the efforts of Deepak Kapoor, Computer Station *Incharge*, Muhammad Aiyub Raza Misbahi, *DTP Operator*; Rajesh Kumar 'Manjhi', *Copy Editor*; Satish Kumar Mishra and Seema Yadav, *Proof Readers*.

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

A NOTE FOR 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 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 answer 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!

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

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

FOREWORD	iii
A NOTE FOR STUDENTS	vii
CHAPTER 1	
FOOD: WHERE DOES IT COME FROM?	1
CHAPTER 2	
COMPONENTS OF FOOD	8
CHAPTER 3	
FIBRE TO FABRIC	18
CHAPTER 4	
SORTING MATERIALS INTO GROUPS	26
CHAPTER 5	
SEPARATION OF SUBSTANCES	35
CHAPTER 6	
CHANGES AROUND US	46
CHAPTER 7	
GETTING TO KNOW PLANTS	52
CHAPTER 8	
BODY MOVEMENTS	66
CHAPTER 9	
THE LIVING ORGANISMS — CHARACTERISTICS AND HABITATS	79
CHAPTER 10	
MOTION AND MEASUREMENT OF DISTANCES	95
CHAPTER 11	
LIGHT, SHADOWS AND REFLECTIONS	107
CHAPTER 12	
ELECTRICITY AND CIRCUITS	116
CHAPTER 13	
FUN WITH MAGNETS	125

C H A P T E R 14	
WATER	136
C H A P T E R 15	
AIR AROUND US	147
C H A P T E R 16	
GARBAGE IN, GARBAGE OUT	155