

Curiosity

Textbook of Science for Grade 7



077



विद्या स मतमनुते
एन सी ई आर टी
NCERT

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

First Edition

April 2025 Chaitra 1947

PD 1500T GS

**© National Council of Educational
Research and Training, 2025**

₹ 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
110016 and printed at Krown Printers,
B-20/1, Okhla Industrial Area, Phase
II, New Delhi-110020

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 : *M.V. Srinivasan*

Chief Editor : *Bijnan Sutar*

Chief Production Officer : *Jahan Lal*
(In charge)

Chief Business Manager : *Amitabh Kumar*

Assistant Editor : *Garima Syal*

Production Officer : *Sunil Sharma*

Cover, Layout and Illustrations

*Fajruddin
Junaid Digital Arts*

Foreword



The National Education Policy 2020 envisages a system of education in the country that is rooted in an Indian ethos and its civilisational accomplishments in all fields of knowledge and human endeavour. At the same time, it aims to prepare students to engage constructively with the opportunities and challenges of the twenty-first century. The basis for this aspirational vision has been well laid out by the National Curriculum Framework for School Education (NCF-SE) 2023 across curricular areas at all stages. By nurturing students' inherent abilities across all five planes of human existence (*pañchakoshas*), the Foundational and Preparatory Stages set the Stage for further learning at Middle Stage. Spanning Grades 6 to 8, the Middle Stage serves as a critical three-year bridge between the Preparatory and Secondary Stages.

The NCF-SE 2023, at the Middle Stage, aims to equip students with the skills that are needed to grow, as they advance in their lives. It endeavours to enhance their analytical, descriptive, and narrative capabilities, and to prepare them for the challenges and opportunities that await them. A diverse curriculum, covering nine subjects ranging from three languages—including at least two languages native to India—to Science, Mathematics, Social Sciences, Art Education, Physical Education and Well-being, and Vocational Education promotes their holistic development.

Such a transformative learning culture requires certain essential conditions. One of them is to have appropriate textbooks in different curricular areas, as these textbooks will play a central role in mediating between content and pedagogy—a role that will strike a judicious balance between direct instruction and opportunities for exploration and inquiry. Among the other conditions, classroom arrangement and teacher preparation are crucial to establish conceptual connections both within and across curricular areas.

The National Council of Educational Research and Training, on its part, is committed to providing students with such high-quality textbooks. Various Curricular Area Groups, which have been constituted for this purpose, comprising notable subject-experts, pedagogues, and practising teachers as their members, have made all possible efforts to develop such textbooks. *Curiosity*, Textbook of Science for Grade 7 aligns with NEP 2020 and NCF-SE 2023, fostering experiential learning through real-world examples. It encourages curiosity, exploration, questioning, and critical thinking.

The content attempts to integrate science subjects such as physics, chemistry, biology, and earth science with cross-cutting themes like environmental education, value education, inclusive education, and Indian Knowledge Systems (IKS). By incorporating hands-on activities, the textbook engages students in an integrated approach, promoting reflection and group discussions. The textbook emphasises creativity and innovation, positioning students as active learners. Additionally, the adopted pedagogy encourages critical thinking, reasoning, and decision-making. The textbook provides ample opportunities for peer learning, which enhances the overall learning experience for both teachers and students. The focus is on collaboration and active engagement through student-centred approach to education.

However, in addition to this textbook, students at this stage should also be encouraged to explore various other learning resources. School libraries play a crucial role in making such resources available. Besides, the role of parents and teachers will also be invaluable in guiding and encouraging students to do so.

With this, I express my gratitude to all those who have been involved in the development of this textbook and hope that it will meet the expectations of all stakeholders. At the same time, I also invite suggestions and feedback from all its users for further improvement in the coming years.

New Delhi
March 2025

DINESH PRASAD SAKLANI
Director
National Council of Educational
Research and Training

About this Book



We hope you enjoyed exploring the wonderful world of science in Grade 6, guided by the textbook *Curiosity*. You might still have more questions in science that you wish to explore! The Grade 7 textbook, the second in the *Curiosity* series picks up where we left off in Grade 6, continuing this exciting journey and helping you explore even more questions that you may wonder about.

The Grade 7 textbook has been carefully crafted in alignment with the recommendations of the National Education Policy (NEP) 2020 and the National Curriculum Framework for School Education (NCF-SE) 2023. The textbook has been designed to meet curricular goals, covering key scientific concepts like matter, the physical and living world, health, hygiene, and the connection between science, technology and society. Like the Grade 6 textbook, this textbook also focuses on the nature of science and its processes. Each chapter includes creative activities, thought-provoking questions, and helpful illustrations. The textbook combines concepts from biology, chemistry, physics, and earth science, while weaving in cross-cutting themes like value education, inclusive education, environmental education, and the Indian Knowledge Systems (IKS). The goal is to encourage hands-on learning rather than rote memorisation. Through this approach, the *Curiosity* series aims to help learners think critically and become responsible members of society.

Curiosity, Textbook of Science for Grade 7, has twelve chapters. Chapter 1, titled 'The Ever-Evolving World of Science', gives an overview of the ideas covered in the book and aims to get the readers excited about learning more about science. It develops a thread connecting all other chapters, showing how they are all linked together. It also highlights that science is primarily a way of thinking, observing, asking questions, and discovering by doing. It is a process rather than a compilation of facts. This fun introductory chapter is meant to excite the students and is non-evaluative.

The chapters start with real-life situations to grab the students' attention and to help them relate with their previous knowledge. The activities in the book are designed to give learners hands-on and minds-on experiences. These activities are inclusive and encourage working together to promote collaborative learning. After each activity, there are questions to help learners check their understanding and see how much they have learnt. We hope the questions make the students think deeply, reflect, and analyse ideas critically to arrive at a conclusion.

To sustain the readers' interest, some challenging ideas, additional information, interesting facts, and other engaging materials are presented in various boxes.



FASCINATING FACTS

The box 'Fascinating Facts', highlights fun facts, interesting observations, and curiosity-driven questions.

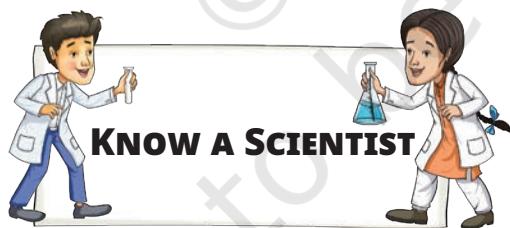
The 'Dive Deeper' boxes contain advanced concepts that lead to questions for in-depth exploration of a topic.



HOLISTIC LENS

The 'Holistic Lens' offers horizontal connections to a concept from multiple perspectives.

'Science and Society' links with real-life applications showing how science has contributed to societal development.



KNOW A SCIENTIST

Some chapters also feature sections called 'Know a Scientist,' where students can learn about the contributions of Indian and international scientists related to the relevant topics.

This section includes brief biographies and shows how scientists have made a difference. Each chapter includes highlighted words that emphasise key concepts explained in the chapter. Some highlighted words outline the procedures in scientific activities. An interesting non-evaluative element that has been incorporated in some of the chapters is the introduction of certain verses from various Indian texts to promote rootedness in the learners as envisaged in NEP 2020.

In a Nutshell



'In a Nutshell' presents the summary of a chapter, offering an overview of the key ideas discussed.

Let Us Enhance Our Learning



'Let Us Enhance Our Learning' includes a range of exercises, from pictorial questions and puzzles to multiple-choice questions, offering a challenging and engaging experience.

These questions not only help in self-evaluation but also evaluate the competencies developed in each chapter. We recommend that questions for evaluation be similar to the ones in this section.



Exploratory Projects

A unique feature of the book is 'Exploratory Projects', which involves activities designed to encourage the interaction of learners with their peers, parents, teachers, experts, and the community.

Learners are encouraged to gather diverse information and draw their own conclusions. Some projects may require prior preparation and collaboration.

The textbook is just one way to learn. Learners should also explore and observe their surroundings. Information and Communication Technology (ICT) can further enhance learning when used appropriately. The QR codes across the textbook provide access to interactive resources like audio and video clips, puzzles, games, quizzes, and additional content, allowing learners to explore at their own pace and convenience.

The journey of each learner through this science textbook is expected to be filled with joy. We hope that the curiosity sparked by this book will continue in the higher grades! We express our gratitude to all the members of the Textbook Development Committee for their contributions in shaping this textbook. We look forward to the feedback of the readers.



TEXTBOOK DEVELOPMENT TEAM

CONSTITUTION OF INDIA

Part III (Articles 12 – 35)

(Subject to certain conditions, some exceptions
and reasonable restrictions)

guarantees these

Fundamental Rights

Right to Equality

- before law and equal protection of laws;
- irrespective of religion, race, caste, sex or place of birth;
- of opportunity in public employment;
- by abolition of untouchability and titles.

Right to Freedom

- of expression, assembly, association, movement, residence and profession;
- of certain protections in respect of conviction for offences;
- of protection of life and personal liberty;
- of free and compulsory education for children between the age of six and fourteen years;
- of protection against arrest and detention in certain cases.

Right against Exploitation

- for prohibition of traffic in human beings and forced labour;
- for prohibition of employment of children in hazardous jobs.

Right to Freedom of Religion

- freedom of conscience and free profession, practice and propagation of religion;
- freedom to manage religious affairs;
- freedom as to payment of taxes for promotion of any particular religion;
- freedom as to attendance at religious instruction or religious worship in educational institutions wholly maintained by the State.

Cultural and Educational Rights

- for protection of interests of minorities to conserve their language, script and culture;
- for minorities to establish and administer educational institutions of their choice.

Right to Constitutional Remedies

- by issuance of directions or orders or writs by the Supreme Court and High Courts for enforcement of these Fundamental Rights.



National Syllabus and Teaching Learning Material Committee (NSTC)

1. M.C. Pant, *Chancellor*, National Institute of Educational Planning and Administration (NIEPA), **(Chairperson)**
2. Manjul Bhargava, *Professor*, Princeton University, **(Co-Chairperson)**
3. Sudha Murty, Acclaimed *Writer* and *Educationist*
4. Bibek Debroy, *Chairperson*, Economic Advisory Council to the Prime Minister (EAC – PM)
5. Shekhar Mande, Former *Director General*, CSIR; *Distinguished Professor*, Savitribai Phule Pune University, Pune
6. Sujatha Ramdorai, *Professor*, University of British Columbia, Canada
7. Shankar Mahadevan, Music Maestro, Mumbai
8. U. Vimal Kumar, *Director*, Prakash Padukone Badminton Academy, Bengaluru
9. Michel Danino, Visiting *Professor*, IIT – Gandhinagar
10. Surina Rajan, *IAS* (Retd.), Haryana, Former *Director General*, HIPA
11. Chamu Krishna Shastri, *Chairperson*, Bharatiya Bhasha Samiti, Ministry of Education
12. Sanjeev Sanyal, *Member*, Economic Advisory Council to the Prime Minister (EAC – PM)
13. M.D. Srinivas, *Chairperson*, Centre for Policy Studies, Chennai
14. Gajanan Londhe, *Head*, Programme Office
15. Rabin Chhetri, *Director*, SCERT, Sikkim
16. Pratyusha Kumar Mandal, *Professor*, Department of Education in Social Sciences, NCERT, New Delhi
17. Dinesh Kumar, *Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi
18. Kirti Kapur, *Professor*, Department of Education in Languages, NCERT, New Delhi
19. Ranjana Arora, *Professor* and *Head*, Department of Curriculum Studies and Development, NCERT, **(Member-Secretary)**

THE CONSTITUTION OF INDIA

PREAMBLE

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a **[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 **[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 Team

CONTRIBUTORS

Arnab Bhattacharya, *Centre Director*, Homi Bhabha Centre for Science Education (HBCSE), Tata Institute of Fundamental Research (TIFR), Mumbai; *Professor*, Department of Condensed Matter Physics and Material Science, TIFR, Mumbai (**Team Leader and Leader, Physics Sub-group**)

Saroj Ghaskadbi, *Former Senior Professor*, Savitribai Phule Pune University, Pune (**Leader, Biology Sub-group**)

Uday Maitra, *Honorary Professor* and *INSA Senior Scientist*, Indian Institute of Science, Bengaluru (**Leader, Chemistry Sub-group**)

R. Shankar, *Adviser*, International Geoscience Education Organisation, *Coordinator*, International Earth Science Olympiad and *Former Professor*, Mangalore University, Mangaluru (**Leader, Earth Science Sub-group**)

Abhay Kumar, *Assistant Professor*, Central Institute of Educational Technology, NCERT, New Delhi

A.K. Mohapatra, *Former Professor*, Department of Education in Science and Mathematics, RIE, Bhubaneswar

Anand Arya, *Associate Professor*, Regional Institute of Education, NCERT, Ajmer

Arun Pratap Sikarwar, *Associate Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

Ashish Kumar Srivastava, *Assistant Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

B.K. Tripathi, *Former Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

Charu Maini, *Principal*, DAV Public School, Sector 7, Gurugram, Haryana

C.V. Shimray, *Associate Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

Dinesh Kumar, *Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

Fanindra Sharma, *Educator and Consultant*, Programme Office, NSTC, NCERT, New Delhi

Gagan Gupta, *Associate Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

Gauri Roy, *PGT* (Physics), Demonstration Multipurpose School, Regional Institute of Education, Mysuru

Indrani Das Sen, *Scientific Officer*, Homi Bhabha Centre for Science Education, TIFR, Mumbai

Jaya P. Swaminathan, *Teacher Developer*, Royal Society of Chemistry, Bengaluru

Karthick Balasubramanian, *Scientist F*, Agharkar Research Institute, Pune

Lalminthang Kipgen, *Assistant Professor*, Division of Educational Kits, NCERT, New Delhi

Linto Alappat, *Assistant Professor*, Christ College Autonomous, Irinjalakuda, Thrissur, Kerala

L.K. Tiwary, *Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

Manasi Goswami, *Professor*, Regional Institute of Education, NCERT, Bhubaneswar

Manjushree Chaudhuri, Former *PGT* (Physics), St. Columba's School, New Delhi and La Grande Boissière Campus of International School of Geneva, Switzerland

Meher Wan, *Scientist*, CSIR-National Institute of Science Communication and Policy Research, New Delhi

Munindra Ruwali, *Associate Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

Neeraja Dashaputre, *Assistant Professor*, Indian Institute of Science Education and Research, Pune

Nicole Ann Fae Sequeira, *Assistant Professor*, Goa University, Goa

Poonam Katyal, Former *TGT*, Zeenat Mahal Sarvodaya Kanya Vidyalaya, Jafrabad, Delhi

Pramila Tanwar, *Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

Praveen Pathak, *Scientific Officer*, Homi Bhabha Centre for Science Education, TIFR, Mumbai

Preeti Khanna, *Rehabilitation Professional* (Visual Impairment), National Association for the Blind, New Delhi

Puneet Sharma, *Associate Professor*, Division of Educational Kits, NCERT, New Delhi

Pushp Lata Verma, *Associate Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

P.V. Raghavendra, *Associate Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

Ravijot Sandhu, *PGT* (Chemistry), Navyug School, Laxmibai Nagar, New Delhi

Ravindra Kumar Parashar, *Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

Ravi S. Nanjundiah, *Professor*, Centre for Atmospheric and Oceanic Sciences (CAOS), Indian Institute of Science, Bengaluru

Reena Mohapatra, Former *PGT* (Biology), DAV School, Bhubaneswar

Ritika Anand, *Principal*, St. Mark's Senior Secondary Public School, Meera Bagh, New Delhi

Ruchi Verma, *Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

Sarat Phukan, *Professor*, Department of Geological Sciences, Gauhati University, Guwahati

Sarita Kumar, *Professor*, Acharya Narendra Dev College, University of Delhi, Delhi

Sarita Vig, *Professor*, Indian Institute of Space Science and Technology (IIST), Thiruvananthapuram

Smita Chaturvedi, *Assistant Professor*, Interdisciplinary School of Science, Savitribai Phule Pune University, Pune

Sudesh Kumar, *Associate Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

Surhud More, *Professor*, Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune

Tarun Choubisa, *Director*, Pedagogy, Seed2Sapling Education Foundation; and *Senior Consultant*, Programme Office, NSTC, NCERT, New Delhi

T.A. Viswanath, Former *Associate Professor*, Goa University, Goa

Sunita Farkya, *Professor* and *Head*, Department of Education in Science and Mathematics, NCERT, New Delhi (**Coordinator, Biology Sub-group**)

Rachna Garg, *Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi (**Coordinator, Physics Sub-group**)

R.R. Koireng, *Associate Professor*, Department of Curriculum Studies and Development, NCERT, New Delhi (**Coordinator, Earth Science Sub-group**)

Anjni Koul, *Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi (**Member-Coordinator and Coordinator, Chemistry Sub-group**)

REVIEWERS

Shekhar C. Mande, FNA, FASc, FNASc, Former *Director General*, CSIR, *Distinguished Professor*, Bioinformatics Centre, Savitribai Phule Pune University, *Honorary Distinguished Scientist*, National Centre for Cell Science, Pune (**Chairperson, Curricular Area Group: Science**)

Manjul Bhargava, *Professor*, Princeton University and *Co-Chairperson*, NSTC

Anurag Behar, *CEO*, Azim Premji Foundation, Member, National Curriculum Framework Oversight Committee

Gajanan Londhe, *Director*, Samvit Research Foundation, Bengaluru

Adithi Muralidhar, *Scientific Officer*, Homi Bhabha Centre for Science Education, TIFR, Mumbai

Ankush Gupta, *Associate Professor*, Homi Bhabha Centre for Science Education, TIFR, Mumbai

B.K. Sharma, Former *Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

K.K. Arora, Former *Professor*, Zakir Husain Delhi College, University of Delhi, Delhi

K.V. Sridevi, *Associate Professor*, Regional Institute of Education, NCERT, Ajmer

Lakshmy Ravishankar, Former *Professor*, KET's V.G. Vaze College of Arts, Science and Commerce, Mumbai

Manoj Yadav, *Professor*, Government College, Ajmer

Mayuri Rege, *Reader*, Homi Bhabha Centre for Science Education, TIFR, Mumbai

Monika Koul, *Professor*, Hansraj College, University of Delhi, Delhi

Mridula Arora, *Principal*, Navyug School, Sarojini Nagar, New Delhi

M.S. Sriram, Former *Professor and Head*, Department of Theoretical Physics, University of Madras, Chennai and *President*, K.V. Sarma Research Foundation, Chennai

Parmananad Burman, *Scientist and Associate Editor*, NISCPR, CSIR, New Delhi

Pooja Gokhle, *Assistant Professor*, Sri Venkateshwara College, University of Delhi, New Delhi

Pushpanjali Bhagat, *Principal*, Sarvodaya Kanya Vidyalaya, Pushp Vihar, New Delhi

Pushpa Tyagi, Former *Head of Department* (Physics), Sanskriti School, Chanakyapuri, New Delhi and Former *PGT* (Physics), Kendriya Vidyalaya, Delhi

Saket Bahuguna, *Assistant Professor* (Linguistics), Central Institute of Hindi, Delhi Centre, Ministry of Education, Government of India

Sanjay P. Sane, *Professor*, National Centre for Biological Sciences, TIFR, Bengaluru

Sanjeev Kumar, *Professor*, School of Sciences, Indira Gandhi National Open University, New Delhi

Santosh Gharpure, *Professor*, IIT Bombay, Mumbai

Satyajit Rath, *Visiting Professor*, Indian Institute of Science Education and Research, Pune

Savita Ladage, *Professor*, Homi Bhabha Centre for Science Education, TIFR, Mumbai

Sujata Bhargava, Former *Professor*, Savitribai Phule Pune University, Pune

Surendra Ghaskadbi, Former *Scientist G*, Agharkar Research Institute, Pune

Vijay Sarda, Former *Associate Professor*, Zakir Husain Delhi College, University of Delhi, Delhi

V.P. Srivastava, Former *Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

V.B. Bhatia, Former *Professor*, Department of Physics and Astrophysics, University of Delhi, Delhi

Yukti Sharma, *Professor*, Department of Education (CIE), University of Delhi, Delhi

Constitution of India

Part IV A (Article 51 A)

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.

Note: The Article 51A containing Fundamental Duties was inserted by the Constitution (42nd Amendment) Act, 1976 (with effect from 3 January 1977).

*(k) was inserted by the Constitution (86th Amendment) Act, 2002 (with effect from 1 April 2010).

Acknowledgements

The National Council of Educational Research and Training (NCERT) acknowledges the guidance and support of the esteemed Chairperson and members of the National Curriculum Framework Oversight Committee for their invaluable contributions in overseeing the translation of NCF-SE 2023 perspectives into the textbook. NCERT is also deeply grateful to the Chairperson, Co-Chairperson, and members of the National Syllabus and Teaching-Learning Material Development Committee for their continuous guidance and thorough review of the textbook. Furthermore, NCERT extends its heartfelt thanks to the Chairperson and members of the Sub-Group: Science, as well as other relevant CAGs, for their support and guidelines on the cross-cutting themes.

The Council is thankful to the Indian Institute of Astrophysics, Bengaluru; Aryabhatta Research Institute of Observational Sciences, Nainital; National Council of Science Museums, Kolkata and Priti Gupta, *Former Researcher*, TIFR for providing the photographs for Chapter 12 'Earth, Moon and the Sun'; and T.A. Viswanath, *Former Associate Professor*, Goa University, Goa for providing photographs for Chapter 5 'Changes Around Us: Physical and Chemical'.

The Council gratefully acknowledges the contribution of Jatinder Mohan Mishra, *Professor*, DEL, NCERT, New Delhi; Suparna Diwakar, *Educator and Development Sector Professional, Chief Consultant*, Programme Office, NSTC; M. Pramod Kumar, *Assistant Professor*, Amrita Vishwa Vidyapeetham, Coimbatore, and *Senior Consultant*, Programme Office, NSTC; Ankeeta Bezboruah, *Freelance Editor*, New Delhi; Vaishali Sukhija, *Consultant*, Programme Office, NSTC, NCERT, New Delhi; Ruchi Shukla, *Assistant Professor*, Department of Educational Psychology and Foundations of Education, NCERT, New Delhi; Stuti Dalal, *Designer and Founder*, Simmering, Ahmedabad.

Acknowledgements are due to Sridhar Srivastava, *Joint Director*, NCERT; Amarendra P. Behera, *Joint Director*, CIET, NCERT; Ranjana Arora, *Professor and Head*, DCS&D, NCERT; Sunita Farkya, *Professor and Head*, DESM, NCERT, New Delhi for providing academic, administrative and technical support.

The Council acknowledges the efforts of Archana, Divya Mittal, Dharmendra Kumar, Monika Lamoria, Nidhi Saini, *Senior Research Associates*, Nitika Rani, *Course Administrator*, and Amar Kumar, Monal, Neha, Shubham, *Junior Project Fellows*, Brijesh and Mansi Rastogi, *Graphic Designers*, DESM, NCERT, New Delhi. The Council

acknowledges the support provided by the APC office and administrative staff of DESM, NCERT, New Delhi.

The Council acknowledges the contribution of Pawan Kumar Barriar, *In-charge*, DTP Cell, Publication Division, NCERT; Sachin Tanwar, Manish Kumar, Naresh Kumar, Manoj Kumar, *DTP Operators* (Contractual); Ilma Nasir, *Editor* (Contractual), and Ariba Usman, Praveen Kumar, and Ambuj Mishra, *Proofreaders* (Contractual), Publication Division, NCERT, New Delhi for giving this manuscript a final shape.

Contents

<i>Foreword</i>	<i>iii</i>
<i>About this Book</i>	<i>v</i>
○ Chapter 1	
The Ever-Evolving World of Science	01
○ Chapter 2	
Exploring Substances: Acidic, Basic, and Neutral	07
○ Chapter 3	
Electricity: Circuits and their Components	23
○ Chapter 4	
The World of Metals and Non-metals	41
○ Chapter 5	
Changes Around Us: Physical and Chemical	57
○ Chapter 6	
Adolescence: A Stage of Growth and Change	73
○ Chapter 7	
Heat Transfer in Nature	89
○ Chapter 8	
Measurement of Time and Motion	105
○ Chapter 9	
Life Processes in Animals	121
○ Chapter 10	
Life Processes in Plants	137
○ Chapter 11	
Light: Shadows and Reflections	153
○ Chapter 12	
Earth, Moon, and the Sun	169



An Initiative of the Ministry of Education

If you are stressed, anxious, worried, sad or confused about



Studies and Exams



Personal Relationships



Career Concerns



Peer Pressure

Seek Support of Counsellors



**Call
8448440632**

**National Toll-free
Counselling Tele-Helpline
8am to 8pm
All days of the week**

MANODARPAR

Psychosocial Support for Mental Health & Well-being of Students
during the COVID-19 Outbreak and beyond

(An initiative by Ministry of Education, Government of India, as part
of Atma Nirbhar Bharat Abhiyan)



[www.https://manodarpan.education.gov.in](https://manodarpan.education.gov.in)