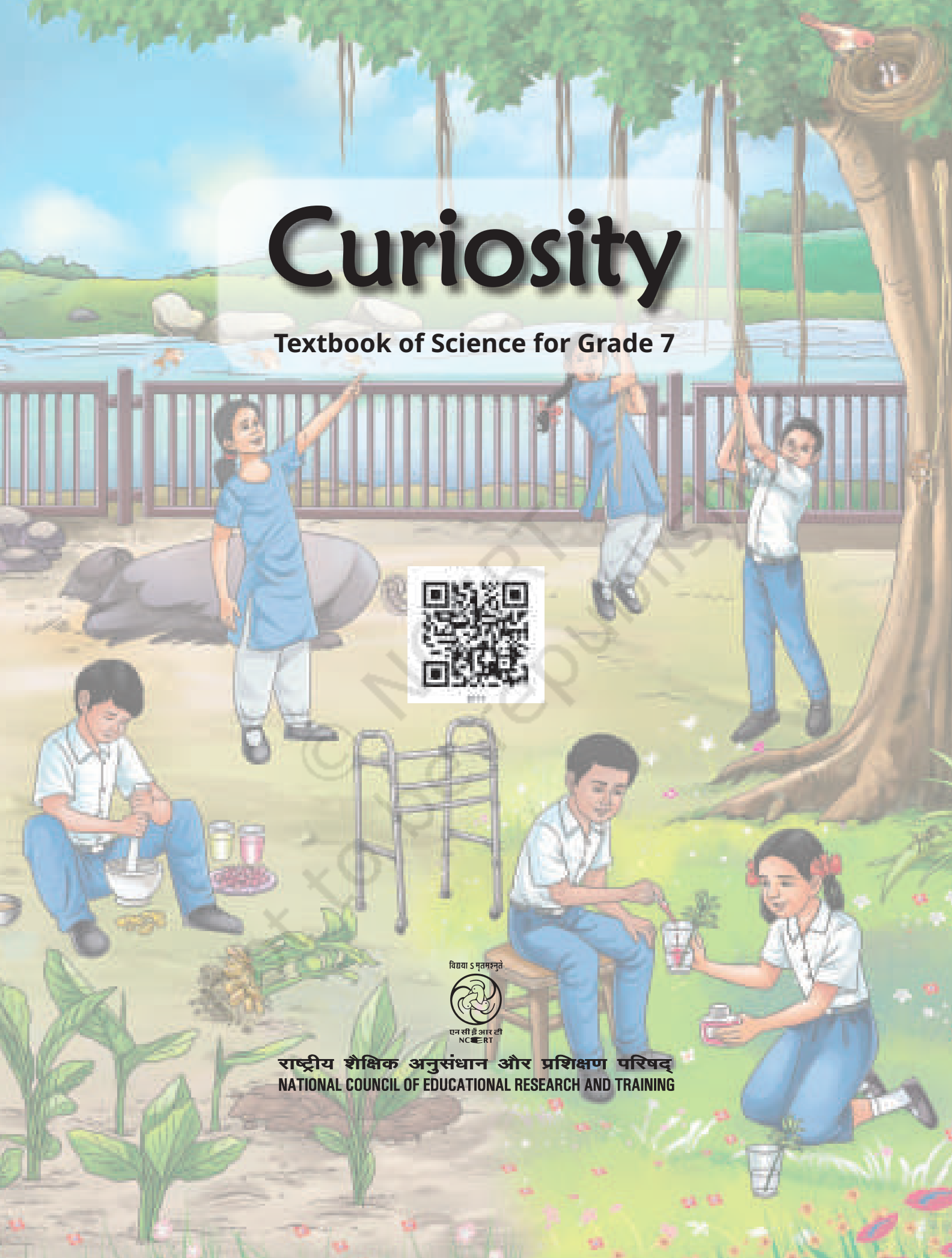
Curiosity

Textbook of Science for Grade 7



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एन सी ई आर टी
NCERT

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

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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 (*pañchakośhas*), 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.

Dinesh Prasad Saklani
Director
National Council of Educational
Research and Training

New Delhi
March 2025

About this Book

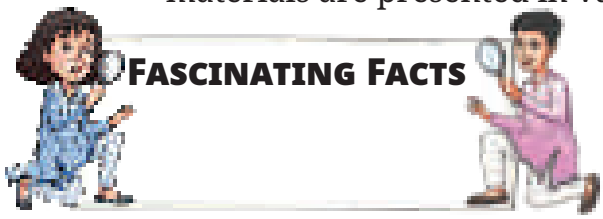
We hope you enjoyed exploring the wonderful world of science in Grade 6, guided by the textbook *Curiosity*. You might still have more questions in science that you wish to explore! The Grade 7 textbook, the second in the *Curiosity* series picks up where we left off in Grade 6, continuing this exciting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

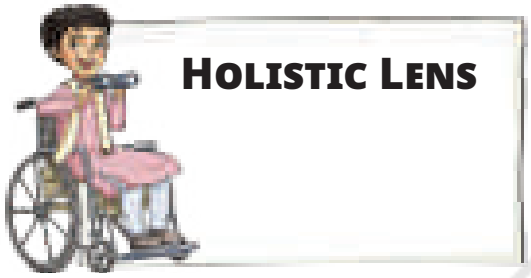
The chapters start with real-life situations to grab the students' attention and to help them relate with their previous knowledge. The activities in the book are designed to give learners hands-on and minds-on experiences. These activities are inclusive and encourage working together to promote collaborative 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.



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.



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.

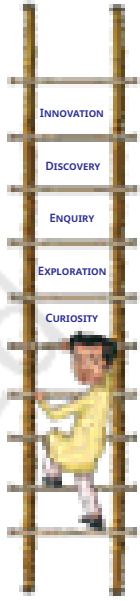
Some chapters also feature sections called 'Know a Scientist,' where students can learn about the contributions of Indian and international scientists related to the relevant topics.

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

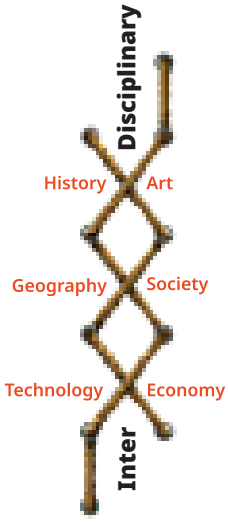


'Let Us Enhance Our Learning' includes a range of exercises, from pictorial questions and puzzles to multiple-choice questions, offering a challenging and engaging experience.

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.

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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.**

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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).

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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).

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Contents

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Studies and Exams


Personal Relationships


Career Concerns


Peer Pressure

Seek Support of Counsellors

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

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