

Joyful MATHEMATICS

Textbook for Class II



NCERT

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FOREWORD

India has a rich tradition of nurturing the holistic development of children during their most formative years. These traditions provide for complementary roles for the immediate family, the extended family, the community, and formal institutions of care and learning. In addressing the first eight years of a child's life, this holistic approach — which includes the cultivation of *sanskars* which are passed on from generation to generation — has a critical and positive lifelong influence on every aspect of a child's growth, health, behaviour, and cognitive capabilities in the later years.

Considering the importance of the early years in a child's lifelong development, the National Education Policy 2020 (NEP 2020) envisioned a 5+3+3+4 curricular and pedagogical structure as providing a much needed focus on formal education and childcare in the country during the first five years corresponding to ages 3-8, naming it the Foundational Stage. Classes 1 and 2 form an integral part of this Foundational Stage, continuing from the ages of 3-6 years, in which a child's holistic growth is taken care of in *Balvatika*. An individual's lifelong learning, social and emotional behaviour, and overall health depend deeply upon the experiences gained during this critical Foundational Stage.

The Policy thus recommended developing a National Curriculum Framework specifically for this Stage, which would comprehensively guide the whole education system toward providing high-quality education in children's early years, thereby carrying this momentum forward to the other later stages of school education. Based on the principles and objectives enunciated under NEP 2020 — as well as on research from a range of disciplines (including neuroscience and early childhood education), on experiences and accumulated knowledge from the ground, and on the aspirations and goals of our Nation — the National Curriculum Framework for Foundational Stage (NCF-FS) was developed and released on 22 October 2022. Subsequently, textbooks have been developed to bring to life the curricular approach of the NCF-FS. The textbooks attempt to connect to the children's real life by recognising their learning in the classroom and the significant learning resources in the family and the community.

The approach in the NCF-FS is also resonant with the *Panchkoshiya Vikas* (the development of the five sheaths of human personality) as elucidated in the *Taittiriya Upanishad*. The NCF-FS enunciates the five domains of learning, i.e., physical and motor; socio-emotional; cognitive; language and literacy; and cultural and aesthetic, which map to the

Indian tradition of *Panchkosh* consisting of five *kosh* viz. *Annamaya*, *Pranmaya*, *Manomaya*, *Vijnanmaya* and *Anandmaya*. Besides, it also focuses on integrating a child's experiences at home with the knowledge, skills, and attitudes that would be developed within the school's precinct.

The NCF-FS, which covers Classes 1 and 2, also articulates a play-based approach to learning. According to this approach, books form an essential part of the learning process; however, it is also important to understand that books are only one among many pedagogical tools and methods, including activities, toys, games, conversation, discussion, and more. This marks a departure from the prevailing system of merely learning from books to a more congenial play-way and competency-based learning system, where children's engagement with what they do and learn becomes critical. Thus, the book in hand must be seen as an instrument to promote a play-based pedagogical approach in its entirety for this age group of children.

The present textbook attempts to provide competency-based content in a simple, interesting, and engaging manner. The endeavour has been to make it inclusive and progressive by breaking several stereotypes through the presentation of text and illustrations. The child's local context, which includes traditions, culture, language usage, and rootedness in India and is central to students' holistic development, has been reflected in the books. An effort has been made to make it engaging and joyful for the child. The book integrates art and craft to help children appreciate the aesthetic sense inherent in such activities. The textbook provides children with situational awareness to understand the underlying concepts relating to them in their own contexts. Though light in terms of content, this textbook is rich in substance, providing varied experiences and integrating play-way methods of learning through toys, games, and a variety of other activities. It includes questions that will help children develop critical thinking and problem-solving abilities. Besides, the textbook has rich subject matter and activities to help children develop the necessary sensitivity towards our environment. It also provides ample scope for our States/UTs to add/adapt content with local perspectives in the versions that they may develop as per the recommendations of NEP 2020.

NCERT appreciates the hard work done by the committee set up to develop the syllabus and learning-teaching material for the foundational stage. I thank the Chairperson of this committee, Professor Shashikala Wanjari, and all other members for completing this task in time and in such an admirable way. I am also thankful to all the institutions and organisations which have generously extended their help and assistance in making this possible. I am especially thankful to Dr. K. Kasturirangan, Chairperson of the National Steering Committee, and its other members, including those of the Mandate Group, its Chairperson Professor Manjul Bhargava, and members of the Review Committee, for their timely and valuable suggestions.

As an organisation committed to reforming school education in Bharat and continuously improving the quality of all learning and teaching material that it develops, NCERT looks forward to critical comments and suggestions from all its stakeholders to further improve upon this textbook.

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New Delhi

PROFESSOR DINESH PRASAD SAKLANI
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ABOUT THE BOOK

The National Policy on Education 2020 has recognised the importance of developing a strong foundation of learning during the early developmental age (3–8 years) of children emphasising on foundational literacy and numeracy. In view of policy's perspective of holistic development of children, the *National Curriculum Framework for Foundational Stage 2022 (NCF-FS 2022)* has recommended curricular goals, competencies and learning outcomes aligned to developmental domains such as physical, socio-emotional-ethical, cognitive, language and literacy, aesthetic and cultural and positive learning habits. As a follow-up of this, syllabus for foundational stage developed by the NCERT includes mathematics and numeracy under the cognitive domain, also emphasising upon integration of all other domains while developing learning-teaching materials for mathematics including textbooks.

The present textbook of Mathematics for Class 2 named as *Joyful Mathematics* has been designed keeping in view the recommendations of *NEP 2020*, *NCF-FS 2022* and Syllabus for the Foundational Stage. Though it may be assumed that a child entering Class 2 has intervention in the form of Balvatika 1 to 3 and Class 1 (age 3–8 years), yet in view of the diversity in our country, there may be children who have got exposure of numeracy in the institutional setup in Class 1 only. This textbook takes care of such situations.

Children at this stage enjoy free play, toys and games. Therefore, plenty of opportunities are included for play and games within activities while developing various mathematical ideas like spatial understanding, handling numbers, mathematical and computational thinking, etc. This helps the child in smooth transition from concrete to pictorial and to abstract reasoning for every new concept or competence being introduced.

The *Joyful Mathematics* for Class 2, has a lot of activities which are expected to be conducted within and outside the classroom, keeping in view the objective of experiential learning for holistic development. In all the chapters, mathematical understanding is built through play-based activities. The textbook tries to provide children a feeling that they are playing, and mathematics is being

learnt, rather than forcing them to learn mathematics without any joy.

The learning of languages and age-appropriate physical and mental development have been integrated with the book as learning of mathematics does not take place in isolation. The book provides suggestions to parents, teachers or other concerned like elder siblings on having a healthy discussion with children through thought provoking questions, stories, poems, etc.

Various mathematical ideas have been presented through self-explanatory and contextual illustrations keeping in view the differential abilities among children to read words at this stage. Moreover, such pictures and illustrations also help the children in enhancing their visual and reading comprehension.

The book is designed as text-cum-workbook that includes opportunities for children to draw pictures, colour them and write appropriately. The oral discussions with children have been included in all the chapters to help them to verbalise and express their thinking process. This will also help teachers to continuously assess the learning in a non-threatening manner. The thought provoking practice tasks in the form of questions and activities have been given in this textbook. It is also expected that the teachers and parents will develop similar questions for the children to have more targeted skill practice. The innovative use of the textbook lies with the parents and teachers and that will ensure the joyful learning of mathematics among children of Class 2.

This book emphasise on inculcating logical thinking, analytical skills, mathematical communication and 21st century skills through activities, open ended questions, exploration and discussion in the book. The chapters are framed as a beginning towards mathematical proficiency by adding conceptual understanding, procedural fluency, adaptive reasoning, and a positive attitude towards mathematics.

The content in *Joyful Mathematics* for Class 2 is based on the four blocks mentioned in the *NCF-FS 2022*. These are — Oral math talk, Skills teaching, Skill practice and Math games have been included in all the chapters. Most of them have been presented in an integrated manner. However, one can find the following chapters not only aligned to the curricular goal (CG-8) of developing mathematical understanding and abilities to recognise the world through quantities, shapes and measures but also to all other curricular goals as given in *NCF-FS 2022* and syllabus leading to holistic development:

Oral Math Talk: This includes discussion on mathematical concepts through poems, picture stories and activities as mentioned below:

- Maths poems like ‘Seasons’ and ‘East, West, North or South’ in Chapter 9.

- Picture stories for the introduction of concepts, practice and assessment have been included like ‘Heena’ and ‘Aatif’ in Chapter 2, ‘Shadow Story’ and ‘Hide and Seek’ in Chapter 4, ‘Decorating with Garlands’ in Chapter 6, ‘Rani’s Gift’ and ‘Pumpkin’s Chaupal’ in Chapter 7, etc.
- Discussion with children through various daily life contexts like, ‘Vallam Kali’ on Chapter 1, ‘Garba Festival’ in Chapter 2, ‘Decoration for Festival’, ‘Let us Count Diyas’ in Chapter 6, ‘Fruits in the Park’ in Chapter 7, ‘Let us Share’ and ‘How many Groups’ in Chapter 8, ‘Gargi’s Day’ in Chapter 9, ‘Picnic Time’, and ‘Games we Play’ in Chapter 11.

Skill Teaching: All Chapters have activities that can be done by the child all alone, in groups, or with the help of elders (parents, teachers, and siblings). This helps the child in the development of various skills with the guided support of others.

Skill Practice: Opportunities for skill practice have been included in all the chapters in the form of Let us Do, Project Work, and practice questions. For example, ‘Origami Fun’, ‘Meandi’ and ‘Stamping’ in Chapter 4 and ‘Make your Own Balance’ in Chapter 7.

Math Games: Math games and activities have been interwoven in all the chapters throughout the book. For example, ‘Let us Make 100’, ‘Mark by Passing the Path’ and ‘Flash Card Game’ in Chapter 1; ‘Patterns in Number Chart’ in Chapter 3; ‘Yoga asanas’ and ‘Let us Play with Dots’ in Chapter 5; ‘Choose the Longest Path’ and ‘How Many Blocks?’ in Chapter 7; ‘How Old are We?’ in Chapter 9.

The above chapters have been developed keeping in view the need for developing sensitivity towards environment, values, positive habits, cultural rootedness, and inclusive perspectives in children. Multilingual perspective is also reflected in the textbook. Engaging activities also focusing on language development are included in the entire textbook which will trigger interest in children to learn joyfully.

Teachers need to understand the objective of each of the chapters and activities given, their alignment with the curricular goals and competencies as included in the syllabus for the foundational stage, and accordingly make a learning plan for children including a variety of activities addressing the diverse needs of children. In this learning plan, teachers need to be the active observants of learning outcomes achieved by the children and their flow towards the development of identified competencies under all the curricular goals. Mapping with learning outcomes and activities given in different chapters is required on the part of teachers if we want to make our education competency-based in true letter and spirit.

Activities given in this textbook are suggestive. Teachers can develop their own activities and supplement the same with local toys, games or toys created by them and other materials available

in the child's immediate environment for hands-on learning with concrete material. Teachers are free to adapt, adopt and modify the activities as per their contexts and circumstances without losing the sight and aim of the development of identified competencies in children at this stage.

Mental challenge and engagement in thought provoking tasks lead to better mathematical learning and criticality. Solving brain teasers, puzzles and riddles provide opportunities to children in addition to their routine learning. Many age appropriate puzzles have been given in the book. The child must be engaged for at least a week in finding the solutions of a puzzle. There may be more than one right answer for some of the problems. Also these puzzles are given to provide joyful experiences to a child. Thus, child should not be assessed on the basis of solving these puzzles.

The chapters of the book need to be supplemented by audio-video aids, e-content, material available in the QR codes embedded in the book and other learning-teaching material like educational kits developed by the NCERT.

This textbook is not the only source of learning. Children learn much more while observing the environment; talking to peers and elders including grandparents; making things of their interest; watching TV; playing with mobile; toys and games; listening stories and poems; doing projects; visiting places of cultural importance and traveling. Therefore, we as teachers or parents need to value this learning by going beyond the textbook and try to map it with the competencies and curricular goals identified for this stage. The education of our children is seen as our collective responsibility.

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