

What is New in the New Mathematics Textbooks?

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The National Curriculum Framework 2020 recognized the importance of developing a strong foundation of learning during the early developmental phase (3 to 8 years). Keeping in mind the holistic development of children, the National Curriculum Framework – Foundational Stage, 2022 (NCF-FS, 2022) recommends curricular goals, competencies and learning outcomes associated with developmental domains such as physical, social, emotional, ethical, cognitive, language, aesthetic, cultural values and positive learning habits. Along with this, emphasis has been laid on the integration of all the domains while developing learning material including textbooks for mathematics.

“Textbooks help the teacher by providing an organized, sequential, consistent, and meaningful learning experience in order to achieve expected curricular goals, competencies, and learning outcomes. Textbooks also guide children and provide reliable reference points. Among the teaching materials used in the classroom, the textbook is one of the materials that plays an important role in planning classroom procedures, pedagogy and assessment.”

The National Curriculum Framework - Foundational Stage, 2022 has given the following suggestions regarding mathematics teaching methods:

1. Experience → Spoken Language → Pictures → Symbolic Language.
2. Linking mathematics learning to a child’s real life and prior knowledge.

3. Seeing mathematics as a means of problem solving
4. Engaging in mathematical communication using discussion and reasoning.
5. Developing a positive attitude towards learning mathematics.

In the light of the new policies, NCERT has developed new textbooks (Joyful Mathematics) for classes 1 and 2 in the year 2023. These books contain a number of activities that encourage organized work and learning within and outside the classroom with a focus on experiential learning for the all-round development of children. An attempt has also been made to integrate language and age-appropriate physical and mental development into the book through the context around the child as mathematics education cannot be separated from these. The book functions both as text-book and work-book and provides appropriate opportunities for children to learn, draw, colour and write through play.

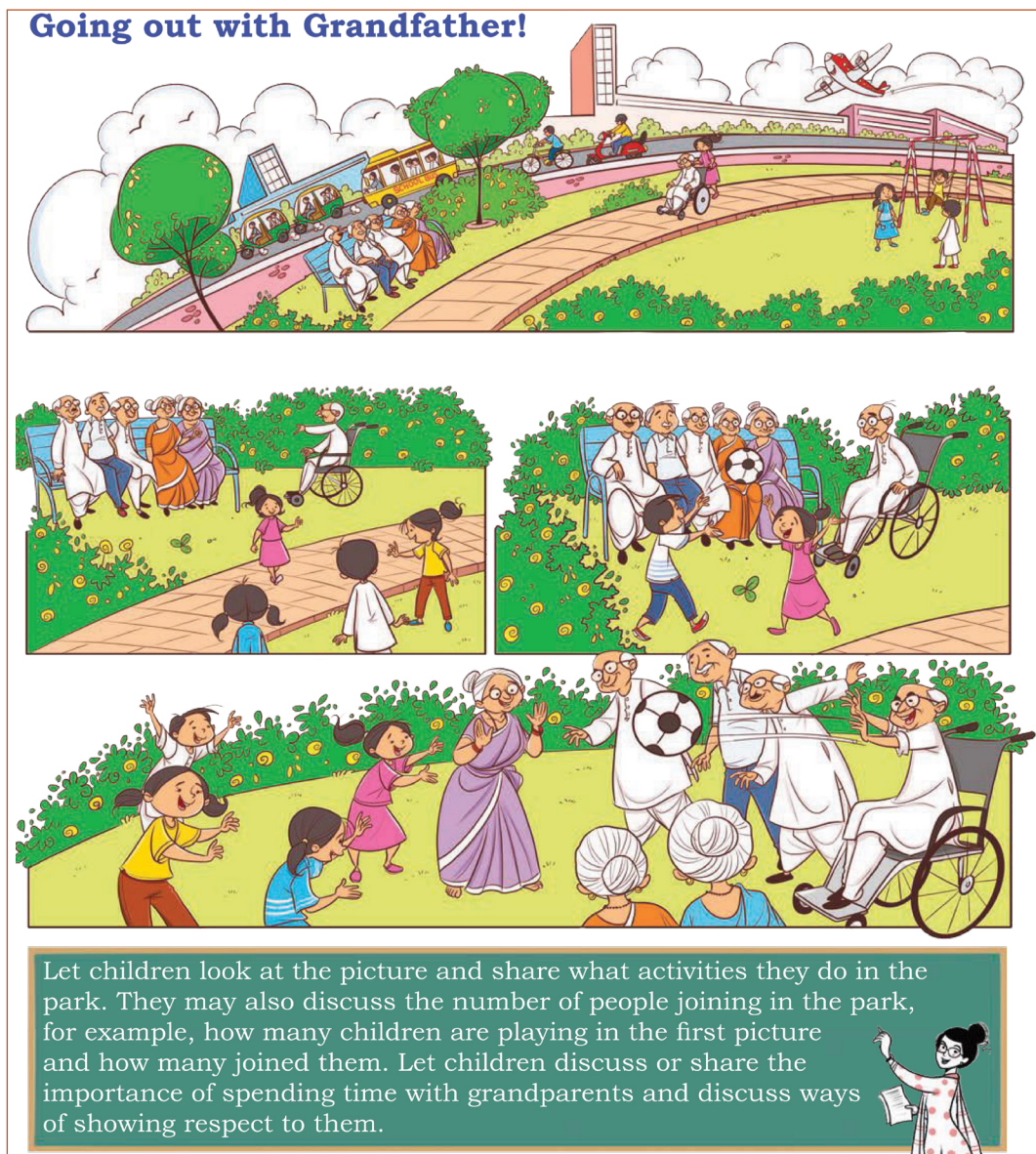


Figure 1. NCERT Textbook Class 1 Chapter 5 page 48

This beautiful sequence of pictures (Figure 1) subtly messages inclusion and relevance of the older generation and the importance of caring for them. At the same time, it provides counting practice for young ones.

Activity should be conducted in a manner so that all the children are engaged, irrespective of their differential abilities. For example, a *ghungroo* can be attached to the ball, and surface of the basket can be made different from the surface outside in order to get specific sound when the ball is in or out of the basket.



Figure 2. NCERT Textbook Class 1 Chapter 1 page 4. Suggestions for inclusion have been given in this and other chapters



Let us Talk

- A. Observe and discuss what is happening in the picture.
- B. What are the different things which you see in the given picture?
- C. How many houses are there?
- D. How many people are there in the picture?
- E. Guess how many lines are used to draw the leaves of a tree.
- F. Do you know the special name for this type of painting?
- G. Which part of India is famous for 'Warli' painting?

Figure 3. NCERT Textbook Class 1 Chapter 8 page 96.

Notice how art and culture are incorporated in this simple activity (Figure 3) which develops students' skills of observation, communication and reasoning and at the same time increases their general knowledge.



Project Work

- A. Collect pebbles, flowers, leaves, glasses, bowls, sticks, bangles, coins, caps, etc., and arrange them in a pattern. Create different patterns of jewellery, floral pot arrangements, art showpieces, etc.
- B. Observe and find the patterns in nature like leaves, butterfly, animal skins (cat, dog, zebra, tiger), curtains, *sarees*, *dupattas*, tiles, beehive, etc.
- C. Collect different objects seen around and make a collage.
- D. Create patterns using different actions like clapping, snapping your fingers, stamping your feet, etc.

The world around us is full of shapes. Encourage children to appreciate the rich heritage of India through exploring beautiful patterns in temples, mosque, church, gurudwara and monuments around them. Also ask them to share their observations of patterns in different art forms, movement patterns in dance forms, etc.




Figure 4. NCERT Textbook Class 1 Chapter 9 page 104. Children see math in the world around them while embracing diversity

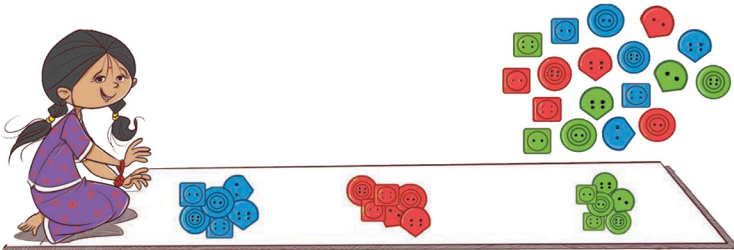
Many teachers had commented that the previous books were too wordy and that there were practical constraints in carrying out the given tasks in the classroom. Teachers have also been highlighting the lack of practice exercises in the old books. An attempt has been made to address these opinions. Most lessons begin with a poem, game, short story or activity related to the world around the child. For example, in the beginning of the Class 1 book, the cat hides here and there and sometimes it is seen above the window, sometimes under the bed, sometimes above the car, sometimes under the carpet. Similarly, to make sense of numerical concepts, the use of easily available materials such as pebbles, leaves, buttons, etc. have been suggested. Low-cost Teaching Learning Materials (TLMs) using locally available materials (cards, pieces of wood, fingers, buttons, ...) as well as the ginladi (number chain), dotted cards and number strips are also highlighted. There is a slant towards developing the skills of logical thinking, analysis and mathematical communication through activities, open-ended questions, explorations and discussion.



Figure 5. NCERT Textbook Class 2 Chapter 2 page 19. Building their understanding of shapes

 **Let us Do**


Suwali has placed all the buttons in three groups.



Why did Suwali make such groups?
Help Suwali to sort these buttons in other ways by drawing them.

Figure 6. NCERT Textbook Class 1 Chapter 1 page 9.

Such play-based activities (Figure 5 and Figure 6) allow students to develop a confident approach to mathematics.

 **Project Work**

Take ten cards 0 to 9.
Arrange the cards in such a manner that their sum must be 9.
There are many ways to do it. In how many ways can you do it?

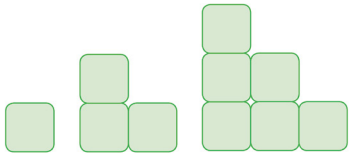
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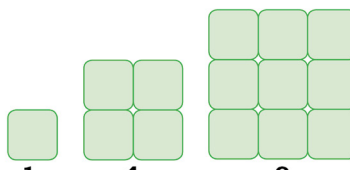
Figure 7. NCERT Textbook Class 1 Chapter 5 page 56.

The textbook has previously provided practice in writing the numerals and in the addition of single-digit numbers. In chapter 3, students have prepared their own number cards as a project, so materials are not a constraint for this project (Figure 7). Notice that it provides the opportunity to practise addition in a fun and open-ended manner. By comparing their answers, students get an opportunity to discuss and justify their strategies.

Exploring Patterns

Observe how the number of blocks are increasing in the following shapes and extend the pattern.

A.  _____

B.  _____

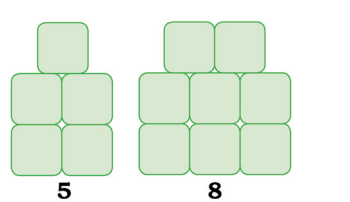
C.  _____

Figure 8. NCERT Textbook Class 2 Chapter 3 page 31.

Students with different learning styles will be able to absorb number patterns better by such visualisation (Figure 8) and it is hoped that teachers will also be able to provide hands-on learning using counters and building blocks inspired by such puzzles.

Play with Numbers

Who am I?

- A. I am the largest two-digit number.
- B. I am the largest two-digit number where no digit is repeated.
- C. I am the smallest two-digit number.
- D. I am the smallest two-digit number, my digits are repeated.
- E. I am the smallest two-digit number with 3 at the tens place.
- F. I am the largest two-digit number with 2 at the ones place.

Make your own such questions.

Figure 9. NCERT Textbook Class 2 Chapter 1 page 13.

Problem posing is an important indicator of conceptual understanding and the textbook showcases opportunities for this. See Figure 9 for an example.

The textbooks for both classes have puzzles at the end which give children the opportunity to apply their arguments and solve them. These riddles also hope that teachers can also make such puzzles and give children to solve. These textbooks prepared at the national level have tried to incorporate the diversity of the whole of India, but they also have their own limitations such as contexts which are familiar in one region may be alien to another. Therefore, instructions have also been given for teachers to include local games and toys and locally available material in classroom teaching. Naturally, it becomes necessary for the teachers to pre-plan the lessons thoroughly keeping in mind the teaching prompts given with them.

The previous set of textbooks was developed nearly sixteen years back with the same approach. However, it did not really translate these ideas into practical ideas that assisted in both pedagogy and assessment based on the concepts to be taught. While an approach similar to what is seen in the new textbooks was taken in the theme chapters, teachers did not really appreciate the point of these. Now that the goals of mathematics education have been distilled into the chapters of the textbooks for classes 1 and 2, it is hoped that teachers will be able to use this launching pad to enable *children to develop mathematical understanding and abilities to recognize the world through quantities, shapes, and measures* as described in the curricular goal in the NCF-FS.

Editor’s Note: All images from textbooks reproduced with permission from NCERT.

Reference:

1. National Council for Educational Research and Training (NCERT). (2023). *Joyful mathematics (Class 1 and Class 2)*. <https://ncert.nic.in/textbook.php?aejm1=11-13>



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Lights Off!

Let’s play a game! Picture a square-shaped house containing four square rooms, as illustrated in Figure 1.

Each room in the house is equipped with a light source. Each light can be controlled via a switchboard located outside the house. This house is designed so that if the light in room x is turned on or off, all rooms sharing a wall with room x will change their state: if they were originally on, they will turn off, and vice versa.

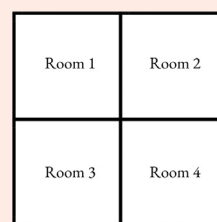
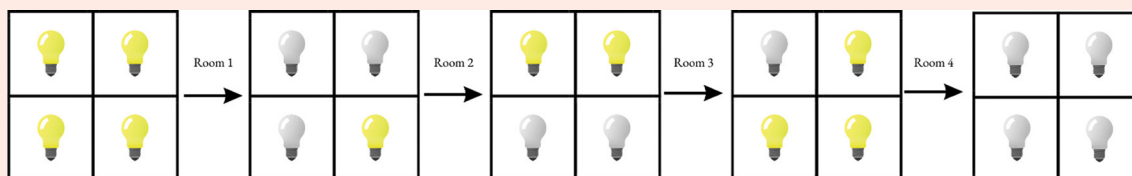


Figure 1

Upon your arrival at the house, assume that all the lights in all rooms are switched on. Then, you can proceed with the following steps to turn off all the lights.



Stop and Think! What problems can you pose based on this situation?

Look for our suggestions on Page 48

Filler contributed by Mohan. R