# Teacher's Notes

## Introduction

The National Curriculum Framework (2005) quotes from the Secondary Education Commission (1952), "Citizenship in a democracy involves many intellectual, social and moral qualities…a democratic citizen should have the understanding and the intellectual integrity to sift truth from falsehood, facts from propaganda and to reject the dangerous appeal of fanaticism and prejudice … should neither reject the old because it is old nor accept the new because it is new, but dispassionately examine both and courageously reject what arrests the forces of justice and progress….". The quote reaffirms the commitment of our education system to democracy and reiterates that citizens in a democracy should be able to think for themselves and be able to sift truth from falsehood. In other words, education should necessarily help learners develop independent and critical thinking, among many other capabilities.

Mathematics perhaps is one of the best ways to develop independence of thinking, ability to examine truth and to stand by it. In mathematics we try to understand the world through shapes, numbers, quantities and logical relationships. We always experience the world, even without mathematics. But when we start noticing symmetry of shapes, become sensitive to rhythm in music, start seeing more or less in objects, etc. we are becoming mathematically keen. The discipline of knowledge build on these things— spatial forms and relationships; quantitative concepts and relationships; and abstract logical relationships, is called mathematics. The study of mathematics is expected to result in the understanding of spatial and quantitative concepts and relationships, and is expected to enhance the ability to use language in more precise manner, to use notations, and to be able to use reason in a more effective manner. Thus, it directly helps future citizens in a democracy to become independent and critical thinkers.

Knowledge of the world that we live in makes up the larger part of the curriculum we pursue in order to achieve educational aims. Different subjects in the curriculum can be seen as different ways of understanding the world around us. Just as mathematics attempts to understand the world through spatial, quantitative and logical relationships, Natural Sciences could be seen as the body of knowledge about the natural world built in terms of material properties and methods through which that knowledge is created. Language can be seen as the primary ability to make sense of the world through symbols. And similarly, other curricular areas look at the world from their specific perspective. Thus, mathematics becomes one important strand in the total curricular knowledge that the child is to slowly build through experience, reflection and interaction with other people, including the teacher.

Child's experiences, ways of reflection and formation of concepts all are an integrated whole. Integrated in the psychological sense that it involves logical thinking, emotions and intentions, and physical activity, all simultaneously. Similarly it involves seeing the world in terms of spatial and quantitative relationships (mathematics), social reality as human relationships (Social Sciences), properties of substances and natural categories (Natural sciences) and its beauty, right and wrong, etc. all as a composite whole and simultaneously. All this seeing and thinking about the world becomes possible only through the use of language. Therefore, for the child all these curricular subjects are inter-related and development in one is effected as well as effects development in all others. In teaching of any subject we need not restrict the child's experiences and thinking to any one subject area. Teaching of mathematics will be better if the teacher talks to their peers about the mathematical relationships and ideas. If children are encouraged to ask questions and voice their disagreements and confusions, they will learn better. Let the physical or other aspects of the objects be examined and discussed, and not be too narrowly focused only on the numbers and mathematical aspects alone.

The best way to teach mathematics through these books would be to first give children relevant experience, then talk about it in ordinary language to make sense of the experience, and then proceed for more formal and abstract mathematical concepts and relationships. The definition should come at the end, if at all. You will repeatedly see in these books that the children encounter some new problem first, try to solve it and in process of solving it develop new ideas. These ideas then are consolidated and formalised and become learnt mathematical concepts.

To summarise what we have discussed in the last few paragraphs:

(a) Teaching of mathematics is directly related to achieving the important aim of helping children become independent and critical thinkers, among development of many other abilities,
(b) Mathematics is more of a way of thinking and understanding than just numbers and shapes,
(c) It is an integral part of the child's total experience and knowledge and therefore the relationship with the rest of the curriculum should always be kept in mind,
(d) Children's experiences, discussions and explorations form the basis for constructing mathematical knowledge, therefore there should be ample opportunities for such activities in the classroom,
(e) That the 'mistakes' children make are part of their individual learning curves and steps in acquiring knowledge. The mistakes should be used to understand the child's thinking and not seen as 'problems',
(f) In mathematics teaching the definition should come at the end (if at all), at the consolidation stage, and not in the beginning.

A suggested general sequence of activities to use this book most profitably:

(a) before children work on the pages of the book, introduce the relevant idea/concept through an activity/game/story/discussion;
(b) consolidate the idea/concept through exercises for the whole class on the blackboard;
(c) discuss the relevant page of the book, talk about pictures, what is needed to be done, about various symbols used on the page etc. then ask the children to work on the pages of the book independently;
(d) allow discussion among the children while working on the book;
(e) check children's work every day,
(f) if there are 'mistakes' rather than just marking wrong or writing the 'correct' answer try to guess the child's reasons behind a given answer,
(g) give her extra exercises/activities to start from her own understanding and to lead to the mathematical thinking you want her to achieve.

As per NCF 2005, Environmental Studies is not a curricular area at Classes I and II, however, it recognises the need of transacting the necessary skills and concerns related to it in an integrated manner through language and mathematics. In this direction, NCERT has published a teacher's handbook entitled 'EVS Skills through Language and Mathematics in Early Grades' which includes a number of activities that will help you integrate the environmental component with language and mathematics. If you go through it before initiating the teaching-learning process in mathematics, it will help enrich your understanding in this subject area.

For better understanding on assessment practices, NCERT has developed a 'Source Book on Assessment in Mathematics' for the primary stage. Please go through this document as well.

*Teacher's notes for Chapters 1-7, 9-10 and 12 have been given in detail. Since, Chapters 8, 11 and 13 do not need special instruction, teachers may use similar activities for instruction in the class as given for other chapters.*

# 1 Shapes and Space

The world we experience around us would be a huge blur of colour and sight if we do not automatically organise it into shapes and spatial relationships. It is because of this interpretation in shapes and spatial relationships that we see it as built by different objects and having distinguishable features. The ability to interpret the experience in this manner is called spatial understanding. Children who develop a strong sense of spatial relationships are better prepared to learn numbers and measurement data as well as for abstract mathematical thinking. Hence, development of these concepts to appropriate level should be paid adequate attention from the early stages. That is the aim of the first chapter in this book.

A good teacher can develop her/his own ways to use any book. That is true for this book as well. One way of using it effectively is outlined below. Many of the suggestions for this chapter are of general nature and would be equally applicable to other chapters as well. We shall not repeat those general suggestions in the notes for the subsequent chapters.

**Planning and preparation**

A little planning and preparation before going to the class will be of enormous help. The children and teacher will enjoy the class much more and it will also help children learn much better.

1. As part of planning, make a list of learning content of the relevant chapter. The term learning content here is being used for all the concepts, ideas, skills, principles, algorithms etc. that the chapter in question is supposed to contain. The learning content of Chapter One is given in the box below.
2. Before working on the book, organise small learning games and activities in the classroom or the playground where children can use the objects like the three dimensional shapes and get a chance to use words denoting the concepts listed in learning content of the chapter. The use of concepts could be in a request (pass me a ball bigger than this, please), in a question, or in general conversation. Once children start using these words confidently the book could be used.

**LEARNING CONTENT**

Concepts: inside-outside, bigger-smaller, biggest-smallest, top-bottom, nearer-farther, nearest-farthest, above, below, on, under.

3D shapes: visual recognition of a spherical, cylindrical, cuboids and conical shapes. Ideas of rolling and sliding.

2D-shapes: visual recognition of circle, square, rectangle and triangle.

3. Chapter One can start with reading the story of the Arab and his camel. When reading the story ask the children to look at the pictures and make an attempt that they follow you in reading. But remember that its you who are reading and children are just following or guessing; do not expect them to read independently. After reading, talk about inside-outside. Create more situations where these words are used.
4. For pages 3 to 7 create a context, do similar exercises on the blackboard, and then let children work on their books. Allow children to discuss with each other. Encourage talking.

5. Pages 8 and 9 are for conversation. Ask children to open, say, page 8 and then draw their attention to various things and people in the picture. How many children are on tables? How many under the table? Are there any children on the stool? And so on. Then let children ask such questions. It would be great fun to create a situation as shown in the picture on page 8 in your classroom with half the children and talk with the other half about them using all the relevant concepts.
6. When teaching about three dimensional shapes, collect locally available objects of different shapes like matchsticks, beads, marbles, bottles, caps, buttons, empty match boxes, funnel, bangles etc. The children must be encouraged to sort out the objects in any way they choose. Through careful discussion with them every child should be encouraged to explain what she or he has done and why. Questions like—
   Why do these objects go together?
   Why does this object belong to this group?
   Can you sort the objects in a different way? etc. may be asked.
7. From the collection made for the previous activity, place the ball or a marble on an inclined surface and ask the students to observe how it moves down the surface. Ask the students to sort the objects on the basis of their movement on an inclined surface and ask them to name some more of such objects which will roll or slide.
8. Blindfold one of the students, give her/him one of the objects. Ask to touch and feel it and then guess whether it will roll or slide.
9. Read the story on pages 13 and 14 to children and talk about it. You can start a conversation about the pictures, like, what is shown? What is happening? Can also ask questions like, how did the dholak keep on rolling? How did it know the way to the lambs hut? Was the lamb steering from inside? These are not the questions to get 'correct' answers for, but simply to imagine different situations.
10. A few sheets of shapes are given at the back of the book. Ask the students to cut out each of the shapes to make a shape kit. Now ask them to use these shapes to make pictures/figures.
11. Ask the students to sort the shape in their shape kit and match similar shapes.



## 2 Numbers from One to Nine

When children join the school they are likely to have some sort of experience with numbers and oral counting. But they may not be very confident with these numbers. Proper care should be taken to introduce the counting process systematically which builds their conceptual understanding of the number system. The basic idea behind counting is that objects of a well defined collection are matched one-to-one with an ordered set of number names. Efficient application of this idea in real situations has a few pre-requisites— matching objects of a common property, sorting and classifying objects, and ordering the relevant collection in some way. Practical activities in the classroom that involve matching, sorting, classifying, ordering concrete objects would be very useful.

For the purpose of this chapter we can say that a child knows counting if she—

(a) Can speak the number names in correct order.

(b) tell the correct number of objects in a given collection, i.e. can answer "how many pencils are there in my hand?"

(c) can pick up required number of objects from a collection, i.e. "give me 7 marbles".

Clearly, the ability to count in this sense is possible only when in addition to remembering the number sequence the child—

(i) assigns one and only one number to each object in the process of counting

(ii) understands that the order in which the objects are counted does not matter and

(iii) understands that the last number named also represents the total number of objects in the collection.

To attain these abilities, the teacher may carry out the following activities:-

1. Place two collections before a child and then ask her/him to match the objects of one collection to the objects of the other collection. (The matched objects need not have any property common to them). Ask questions such as "which collection has more objects" "which has less"? "which objects do not have a partner in the other collection?"
2. Give students a collection of bottles with corresponding caps. Ask them to put a cap on each bottle. This activity can be repeated with a wide variety of other materials also. For example:-

(a) put a cup on each saucer.

(b) put a pebble on each leaf.

(c) put a pencil on each note book etc.

In this entire activity, the following vocabulary may be developed:

more, less, as many as, the same number.

3. Take some beads/marbles/chalk pieces. Keep them in front of the children. Count them loudly.

one, two, three, four, .....nine.

As you count loudly, ask children to repeat the words and point distinctly to each object as you count them.

Show the children some fingers and ask them to count and then clap/jump as many times. Clap any number of times and ask the children to show those many fingers. Ask children to collect small pebbles or any other easily available safe objects and ask them to count, ask question from each other "how many are these?", "give me five bottle caps" and so on.

4. Ask the students to count their body parts (such as eyes, nose, fingers, ears, etc.) and other objects around. For example, the objects in the class, family members, trees in the school, etc.
5. Hold some chalk pieces in one hand; keep the chalk pieces on the table one by one. As you keep them one by one on the table, make the children to count:

"one; two; three; four; five; six; seven; eight; nine"

Remember that before the children attempt to read and write numerals 1 to 9 they should be very confident in counting up to nine.

6. The rhymes on pages 22 and 23 could be used for several activities ranging from collective recital after the teacher, to a spontaneous performance in front of the class.

7. Use number cards to introduce numerals before working on page 27. A group of 4 children could be given a set of 9 cards, each card having a numeral from one to 9 on one side and that many dots on the other. Since the children can count the number of dots, this can be used as a key in reading the numeral on the card. Children can practice reading numerals by asking each other to read and checking by counting the dots on the reverse side of the card. Work on the page only after the children are confident in reading numerals on the cards. Then allow children to use their cards as prop while working on pages 27 to 33.
8. To introduce "zero", collect some objects, up to five in number, on your table. Ask children to tell how many are they. Then remove one, saying "one goes out" or something similar, and ask "how many left?" When the last object is removed some child in the class may say "zero", most are likely to say "nothing". You can introduce the idea of zero as a number here, that signifies nothing in a collection. For example, saying "zero pen on the table". Let children do this activity in small groups. Once the children get the idea of zero, you can introduce another card in their set with zero on one side and blank on the reverse.

## 3 Addition

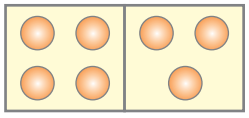
Addition is essentially the concept of putting (combining) collections together where attention is focused on the number of objects in the collection. Before we take up the concept, let children get sufficient exposure and experience of combining collections. Children may be provided enough opportunities to handle a wide variety of concrete materials. 'One more' idea may be initially introduced and then often recalled.

For the development of the concept, there are three stages—

1. Objects of each collection are counted, the collections are combined and the objects of the resulting collection are counted.
2. Objects of the first collection are counted. Objects of the second collection are counted beyond the number of objects of the first collection and so on.
3. Objects of collections are not used. Instead, the numbers of objects of the collections are used.

**Activities**

1. Collect some objects like leaves, pebbles seeds etc. Keep them in two different groups and ask a child to tell how many objects are there altogether in the two groups.
2. Take two cards having pictures of different number of objects (of the same kind). Ask the students to tell how many objects are there altogether.
3. Ask a child to come to the blackboard and draw three triangles. Ask another child to draw two triangles. Ask the third child to tell how many triangles are drawn on the blackboard altogether.
4. Take a domino, say 4-3 domino. Ask a child to count the holes on its two parts. Ask another child to tell the total number of holes in the domino.



5. Exercises like those on page 60 have many correct answers. Try with concrete objects to make, say 5, in as many ways as one can. Then ask children to make different numbers in many ways. Write a number on the blackboard, say 7, and ask a volunteer to give one answer for it. Then ask others to give more answers, till all the answers are listed on the board.

**Commutative Property of addition**

Help children to learn the commutative aspect of addition using concrete objects and then with the help of dominoes.

Ask questions like -

4 pencils and 2 pencils are how many pencils altogether?

2 pencils and 4 pencils are how many pencils in all?

Give many such examples, so that the child can appreciate the commutativity of addition. No need to introduce the term and ask abstract questions about commutativity, just an understanding that whether one takes 2 first and adds 4 or the other way round, the answer will remain the same.

**Zero in Addition**

Take a container and put some objects in it. Ask the children to count the objects. Now put three objects more and ask the children to say three more objects have been added. Ask them to count the objects now.

Take another container and put, say five objects in it. Do not put any more objects. Ask children to say zero objects have been added. Ask them to count the objects in the container. Help children to realise that "five and zero make five only".

At the end, the children must learn adding two numbers, without using concrete objects. Speak out slowly any two numbers, say 2 and 4. Ask a child what does 2 and 4 make. The child should say 6. If the answer is wrong, help her/him to get the right answer, using concrete objects and counting beyond one number. Continue this process with several pairs of numbers.

**Verbal problems**

An important goal of addition is to use it in solving problems of practical utility. You will need to present problems orally to a child and ask her/him to answer. The child should use the earlier experience and maturity gained in solving the problem orally.

A few examples are given below as sample. You may ask children to work out these problems mentally. Based on it, you need to create or develop many more problems so that you can use them for providing an opportunity to learn and to evaluate, as the need may be.

Examples of problems—

1. Noori has 6 red pencils and 2 black pencils in her box. How many pencils are there in the box altogether ?
3. In a garden there are 4 mango trees and 3 orange trees. How many trees are there in the garden altogether?
4. There are 2 books on a shelf. 5 more books are added on the shelf. How many books in all will be there on the shelf ?
6. John has 5 toffees. His mother gave him 4 more. How many toffees in all does he have ?

## Three Aspects of Subtraction

There are three aspects of the concept of subtraction, all three being closely related. However, children will get this close relationship only after a lot of practical experience.

The three aspects are:-

| | |
|---|---|
| 1. Taking away: | Gaurav has 5 pencils. He gave 2 pencils to his sister. How many pencils are left with him? i.e. 5 – 2 = ? |
| 2. Comparison: | Gaurav has 5 pencils. Akbar has 2 pencils. How many more pencils does Gaurav have than Akbar? i.e. 5 – 2 = ? |
| 3. Complementary addition: | Gaurav has 5 pencils. Akbar has 2 pencils. How many more must Akbar take to have the same number of pencils as Gaurav. |

The idea of subtraction is essentially an idea of taking away from a collection, and the other two are interpretations of this for the purpose of problem solving. in this class, we shall restrict to only the first aspect i.e., taking away.

This concept of subtraction is encountered whenever we start with a given number of things in a collection and a part of it is taken away ( removed, destroyed, eaten, blown up, lost etc.) In each case, the question being asked is "how many are left". It also includes situations where a part of a collection is identified as possessing some attribute while others don't have that attribute and the question asked is, "how many are not?" or "how many do not?". For example, Prem has 9 dogs. Out of these, 2 dogs are black. How many dogs are not black?

To introduce subtraction the teacher may take up activities as suggested.

1. Collect some objects like leaves, pebbles, seeds etc. Ask the students—how many are there. Take out some of the objects from the collection and tell the students how many you took away. Now ask them how many are left.
2. Collect balls/pencils of 2 different colours. Ask the students—how many are there? How many are red? How many are not red?
3. Take a domino. Ask the students to count all the holes on the card. Hide one of the two parts. Ask the students how many holes are there in the hidden part.
4. After the students have got sufficient experience in subtraction with concrete objects and pictures, ask them to subtract one number from the other. The next stage would be solving the problems like 4 – 2 = ?

## The symbolism used

The symbols used for "taken away" are substantially more difficult to understand than symbols so far in the book. They are also somewhat ambiguous. Therefore, the teacher needs to be extra careful in explaining them, particularly pages 63 and 64.

Also the idea of supplying missing number on page 68 is very difficult for five and six year olds. A lot of experience with concrete objects and talking should be given before working on this page.

## Verbal problems

Children need to learn how to connect the operation of subtraction with a range of problems using the idea of taking away (or partitioning). The key phrases such as—

take away, How many are left?, How many are not?, How many do not? etc. have to be developed.

Develop a large number of simple word problems, based on taking away (or partitioning) and present them orally one by one to the children. Children may be encouraged to answer these problems, without using concrete materials. For the guidance purpose, some problems are given below—

**Problems**

1. Reena has 4 apples. She gives 2 to her friend Anju. How many apples are left with Reena?
2. Three birds are sitting on a tree. 1 bird flies away. How many birds are left on the tree?
3. Four parrots are sitting on a tree. 2 of them fly away. How many parrots are left on the tree?
4. There were 9 balloons with a girl. 3 of them burst. How many balloons are left with the girl?
5. Vedika has 18 pencils. 3 of them are red. How many pencils are not red?

## Numbers from 10 to 20



Children would have a substantial understanding of mathematical language, concepts, abilities and skills by the time they reach Chapter Five in this book. Some of the things they shall directly use to build their understanding of number system further are listed below—

1. Can count up to nine,
2. Can read and write numerals up to nine,
3. Have experience of using number cards to learn independently and with their peers,
4. Understand "zero" as a number, can read and write the numeral for "zero".
5. Can add and subtract, both orally and in the written form.

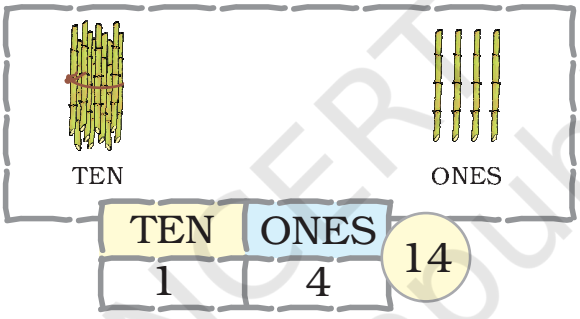
To help children understand number system further, we must remember that reading and writing from 10 to 20 is a major development for the child. Writing of numerals becomes rule governed beginning with ten. Up to nine, children have to learn writing the numeral only by practice, there is no rule involved in writing 3, 5, or 8. Writing 10 or 17 or any number beyond ten involves a rule, or more accurately a set of rules. The number system base–10 (as we use it) is built on the idea of grouping at 10, and place of digit indicating the size of the group. This idea if fundamental to the arithmetic that the child is likely to do till upper primary. This chapter tries that the child makes a beginning in understanding important concepts of number system through a first hand experience of constructing numbers beyond ten. Therefore, notes for this chapter are a little more detailed.

Preparation before starting work on the book

1. **Counting up to 20:** Through a variety of activities and practical experience and use of concrete objects teach children counting up to 20. They should be able to—
   (a) recite number names till 20;

(b) give X less than or equal to 20 objects out of a collection of objects; and
(c) tell number X is equal to 20 of objects in a given collection of objects.

2. Then ask them to collect 20 small sticks, little bigger and thicker than matchsticks, say about five centimetres in length and a little thinner than a pencil. Ask all children to make one bundle of ten sticks by tying them together with a thread or by a rubber-band and keep the remaining ten sticks loose.
3. Ask children to keep their sticks in front of them. Then ask the class to give you 14 sticks without opening the bundle. Some child will definitely figure out how to do it. If no one does, you show one bundle of ten and four loose sticks. Spend some time on it, asking children to give at random 13, 16, 19, 10, 14, and so on. Soon children become very confident in giving the required number of sticks in bundles and loose sticks.
4. When children become confident in handling numbers up to 19 in the form of bundles and sticks, draw, say, one bundle and seven sticks on the board and ask children to give as many sticks and name the number. Most of the children should be able to handle it in a day or so.
5. Next step is to write the number of bundles and sticks below them and repeat the exercise in point 4 above.




6. Device as many interesting activities as you can around these ideas and give a good practice to children in giving sticks, asking for a certain number of, and checking if you have received the correct number, drawing bundles and sticks on the blackboard, writing numerals on the blackboard, reading numerals from the blackboard and so on. Do not worry even if the whole process takes about 10 days, as long as you can keep the interest of the children in this activity.

**Working in the book:**

1. If a teacher works on the strategy outlined above or any other well conceived strategy that covers all the concepts, there shall be no difficulty for the children in working on the pages of this book. And the teacher will have no difficulty in understanding what she should expect from the children, on each page.
2. Let the children freely talk and discuss while they are working on their books, and also allow them to use the bundles and sticks to figure out exercises in the book.
3. Pages 71-72 sequence the numerals that the children already know how to read and write.
4. Page 70 has been given to practice making groups of 10, necessary for number system. Pages 73 and 74 give practice in making groups of 10, writing ten and ones, and writing numerals. Children shall be able to do all this.

You can use the same strategy in extending the number system to 50 and then to 100.

## 6 Time

Perhaps the first practical use of time for children is to get acquainted with the sequence of daily routine that they follow. For a child, the day begins when she/he gets up. After that, a routine follows like cleaning, bathing, breakfast, going to school, recess, coming back home, rest, play, homework, helping parents in some places, watching TV, going to bed. The day ends at night when she/he goes to bed.

Children are to be familiarised with certain time-based activities that help them to understand the meaning of terms like earlier-later. Ask children to narrate their sequence of events in a day and if possible write the events on a notebook before they go to bed.

Children need to be made aware that we can keep track of how long it takes to do something.

Young children have a poor sense of the rate of time passing by. They feel that an interesting game lasts for a short time while a boring class lasts for a long-time. This misconception can be broken if they learn to keep track of the duration.

To start with, the children should be able to, see or hear the small intervals of time passing by. For this purpose you can make a simple time measuring device like a pendulum by tying a small pebble or any other small stone-heavy object to the end of a string. Suspend it freely from the other end.

This pendulum can be used to keep track of duration of activities as suggested:-

1. Count the number of times the pendulum swings till you tie your shoe laces
2. Find who took longer to tie the shoelaces.
3. Count the swings it takes you to draw a house, walking across a playground, running across the same play ground, etc.

## 7 Measurement

### (a) Length

**Comparison of Two Objects**

To start with, two rods which are clearly different in length must be chosen. Pointing out to these rods, questions such as which rod is longer/shorter may be asked. Similarly, we may take two pencils and ask them which pencil is longer/shorter?

With the help of several such examples, we should draw out the two aspects in any comparison. For example, children must learn that if the blue pencil is longer than the red one, it follows that the red pencil is shorter than the blue one.

You may ask children:

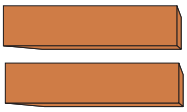
– Find objects longer than this pen.
– Find objects shorter than this stick.
– In the class, who all are taller than you?
– In the class, who all are shorter than you?

In this manner, the following vocabulary must be introduced to the children—

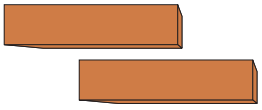
| | | | | | |
|---|---|---|---|---|---|
| Longer | – | Shorter | Thinner | – | Thicker |
| Taller | – | Shorter | Thick | – | Thicker |

### Conservation Experience

At the end, children must be given conservation experience i.e., equivalence. The words such as "as long as; as tall as; as thick as; etc." must be introduced to children through experiences.



Which slab is longer?
Are both of the same length?
Is each slab as long as the other?



Which slab is longer?
Are both of the same length?

### Ordering objects according to length

When three or more objects of varying length, width or height are given, the same can be arranged in the order of size by inspection, and checked by direct comparison, in case, the difference is obvious. At this stage, introduce to children the superlative forms— longest, shortest, tallest, thickest, thinnest, etc.

## (b) Weight

### Comparison of Two Objects

Before children can start measuring weights of objects, they must have some idea of heavy, light, heavier, lighter and so on.

In the beginning, take two objects, where one is much heavier than the other. For example, a watermelon and a lemon; a book and a pen.

### Comparison by Direct Handling

Place before children objects of similar volume, differing in weight only. Give them the basic vocabulary.

– The red box is heavy.
– The green box is light.
– The red box is heavier than the green box.
– The green box is lighter than the red box.

### Ordering Three or More Objects by Weight

When three or more objects of varying weight are given, the same can be arranged in order of weight by direct handling (difference in weights must be very definite). At this stage, introduce the superlative forms - heaviest and lightest.




Data handling is a tool to express or illustrate given information using picture symbols. For example—

Give students paper strips of different colours and ask them to write their names on the strips. Divide the class in pairs.

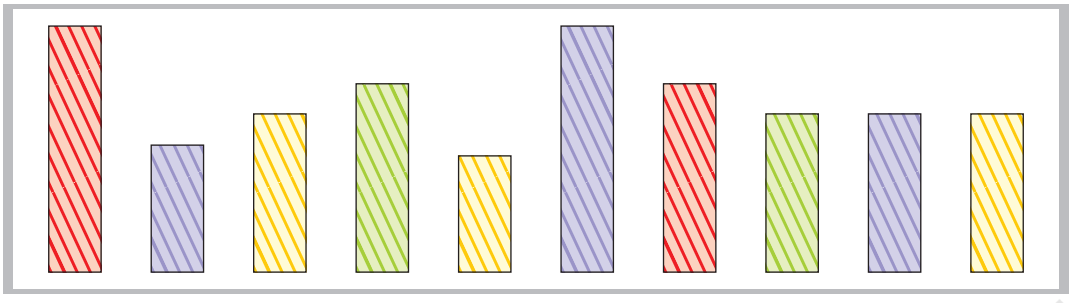
Ask each child to make her partner's strip equal to the length of his/her arm to measure each other's arm length. Collect all the strips.

Choose a sample of ten arm-length strips at random. Compare the lengths of strips. Display the strips on the wall.

Who has the longest arm? _____

Who has the shortest arm? _____

Name the children having a particular arm length.



## 10 Patterns

The study of patterns supports children in learning to observe relationships to find connections, and to make deductions, generalisations and predictions. Understanding patterns nurtures the kind of mathematical thinking that helps children become problem-solvers and thinkers. It is used as a problem-solving tool.

The teacher should start the activities by clapping in a pattern. For example:

1 - 1 - 1 _____

2 - 2 - 1 _____

1 - 2 - 3 - 1 - 2 - 3 _____ etc.

The teacher should bring a stamp pad in the class. Provide plane sheets to all the students and show them how to make impressions of a thumb on a paper. Ask them to make different patterns using thumb impressions.

The teacher can also use the shapes given at the back of the book and create different patterns from them.

## 12 Money

This unit is meant to provide children experiences in dealing with collections of coins and notes.

The teacher should design or do the following suggestive activities—

1. Introduce coins and currency notes to the children through conversation by asking them
   (a) From where do we buy things, say, pencils, erasers, sweets etc?
   (b) What do we give to the shopkeeper for the things we buy?
2. After you have introduced the coins and notes of different denominations, ask them to sort all the coins of say, 50 paise from a given collection of coins and so on.
3. Bring an empty pack of toothpaste, wrapper of soap etc. Ask the students to read the price tag on the pack and pick up a coin or note from the collection of coins/notes for which the said object can be bought.
4. Give them some coins/notes of same/different denominations and ask them to find the total value of the collection.
5. Ask the students to make a given amount by using coins/notes of different denominations.

# The Shape kit