## Contents

<table>
<thead>
<tr>
<th>Introduction</th>
<th>Page  iv</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Part 1</strong></td>
<td><strong>Ourselves</strong></td>
</tr>
<tr>
<td>Unit 1</td>
<td>Our body</td>
</tr>
<tr>
<td></td>
<td>Page 1</td>
</tr>
<tr>
<td>Unit 2</td>
<td>The body machine</td>
</tr>
<tr>
<td></td>
<td>Page 3</td>
</tr>
<tr>
<td><strong>Part 2</strong></td>
<td><strong>Living things</strong></td>
</tr>
<tr>
<td>Unit 3</td>
<td>Animals</td>
</tr>
<tr>
<td></td>
<td>Page 6</td>
</tr>
<tr>
<td>Unit 4</td>
<td>Life cycles</td>
</tr>
<tr>
<td></td>
<td>Page 9</td>
</tr>
<tr>
<td>Unit 5</td>
<td>Plants</td>
</tr>
<tr>
<td></td>
<td>Page 12</td>
</tr>
<tr>
<td>Unit 6</td>
<td>Seeds, fruits and flowers</td>
</tr>
<tr>
<td></td>
<td>Page 14</td>
</tr>
<tr>
<td><strong>Part 3</strong></td>
<td><strong>Materials and matter</strong></td>
</tr>
<tr>
<td>Unit 7</td>
<td>Solids, liquids and gases</td>
</tr>
<tr>
<td></td>
<td>Page 17</td>
</tr>
<tr>
<td>Unit 8</td>
<td>Measuring instruments</td>
</tr>
<tr>
<td></td>
<td>Page 19</td>
</tr>
<tr>
<td><strong>Part 4</strong></td>
<td><strong>Sky and space</strong></td>
</tr>
<tr>
<td>Unit 9</td>
<td>Day and night</td>
</tr>
<tr>
<td></td>
<td>Page 23</td>
</tr>
<tr>
<td>Unit 10</td>
<td>The Moon</td>
</tr>
<tr>
<td></td>
<td>Page 25</td>
</tr>
<tr>
<td><strong>Part 5</strong></td>
<td><strong>The Earth and the atmosphere</strong></td>
</tr>
<tr>
<td>Unit 11</td>
<td>Seasons</td>
</tr>
<tr>
<td></td>
<td>Page 28</td>
</tr>
<tr>
<td>Unit 12</td>
<td>Water</td>
</tr>
<tr>
<td></td>
<td>Page 30</td>
</tr>
<tr>
<td>Unit 13</td>
<td>Air</td>
</tr>
<tr>
<td></td>
<td>Page 34</td>
</tr>
<tr>
<td>Unit 14</td>
<td>The environment</td>
</tr>
<tr>
<td></td>
<td>Page 36</td>
</tr>
<tr>
<td><strong>Part 6</strong></td>
<td><strong>Electricity and magnetism</strong></td>
</tr>
<tr>
<td>Unit 15</td>
<td>Electricity</td>
</tr>
<tr>
<td></td>
<td>Page 39</td>
</tr>
<tr>
<td><strong>Part 7</strong></td>
<td><strong>Machines, force and energy</strong></td>
</tr>
<tr>
<td>Unit 16</td>
<td>Simple machines</td>
</tr>
<tr>
<td></td>
<td>Page 42</td>
</tr>
<tr>
<td><strong>Part 8</strong></td>
<td><strong>Sound / Light and colour</strong></td>
</tr>
<tr>
<td>Unit 17</td>
<td>Sounds</td>
</tr>
<tr>
<td></td>
<td>Page 46</td>
</tr>
<tr>
<td>Unit 18</td>
<td>Light and shadow</td>
</tr>
<tr>
<td></td>
<td>Page 49</td>
</tr>
<tr>
<td><strong>Worksheets</strong></td>
<td>Pages 51 to 58</td>
</tr>
</tbody>
</table>
Introduction

This Teaching Guide has been written with the purpose of assisting the teacher to transmit concepts clearly, correctly and effectively in a limited period of time. Ideas to begin, build and conclude a lesson have been given; yet, these are not the only or best way to teach: a good teacher comes up with new ideas and strategies.

When teaching science, or any other subject, to young pupils, one must never forget that at this stage they need concrete examples and in order to understand abstract concepts. For example, during a lesson on air, if they do not actually experience the air in a balloon being released, causing it to deflate, they will never truly understand the concept of air since they cannot hold or see it.

A successful teacher uses a number of strategies in the classroom:

• **Posing questions and inviting pupils’ questions:**
In order to keep the pupils engaged in the lesson, ask short, relevant questions. Write a summary of different responses on the board and then summarize them. For example:

*When you look in the mirror, what do you see?*

Expected responses are: I see myself.

  I see my body.
  I see my face, eyes, nose…

Write the responses on the board and then sum up, e.g. We see our body, face, eyes, nose in the mirror. Before beginning a lesson, tell the class the topic and ask them to think of any questions that comes to their minds regarding it.

• **Conducting interactive demonstration**

The teacher should be well aware of the purpose of the demonstration and should have conducted it beforehand to ensure that the results are as desired. Ask a question and have the pupils predict the outcome of the demonstration. They could respond before or after discussion with another child. For example:

*Which do you think will sink in water; an egg or an egg shell?*

There could be various responses to this. Demonstrate practically, and then conduct a class discussion. Conclude the discussion by summarizing all the ideas shared.
Using cooperative learning in the classroom

Two examples of cooperative learning strategies are described below:

Think-Pair-Share

Begin by posing a question to the class that requires the pupils to think critically.

a. Think

Give a specified amount of time for the pupils to think alone about the answer to the question. Pupils would record their own answers.

b. Pair

Pupils pair up with a partner to discuss the question, listen to, and expand on one another’s ideas.

c. Share

Pupils share their answers with the whole class.

Jigsaw

Research shows that pupils learn best when they teach others what they have learned. Jigsaw helps pupils learn and teach one another. It has four steps:

1. Form cooperative groups called HOME groups with each group member being given different material to read or learn. For example, the first group member is given page 1 of an assigned text, the second member page 2, etc.

2. EXPERT groups are formed of groups of pupils with the same assigned material. This group must study the material together and plan ways to teach the material to their HOME group members and check for understanding.

3. Pupils return to their HOME groups and take turns teaching their HOME group members the material they were assigned and are now experts on. The goal is that every member of the group should master all the material presented.

4. Check how well the pupils have worked together by giving a quiz or asking them to make a presentation.

How to do Circus Format Activity

This activity usually requires two consecutive periods.

Arrange some tables and chairs (according to the number of pupils) in the class. Each table is a ‘station’.

Activities must relate to the current topic. Instructions must be written along with the activity. If the pupils are young, give them verbal instructions. Remind them to handle things with care and to leave the station as soon as the bell rings.
**Grouping the class**

Arrange the pupil into five groups according to the strength of your class.

Allocate time, (usually five minutes).

- Group 1 will sit at station 1.
- Group 2 will sit at station 2.
- Group 3 will sit at station 3.
- Group 4 will sit at station 4.
- Group 5 will sit at station 5.

Pupils will perform the activities and record their observations in their notebooks. After five minutes, ring the bell as a signal for groups to move to the next station.

- Group 1 will move to station 2.
- Group 2 will move to station 3.
- Group 3 will move to station 4.
- Group 4 will move to station 5.
- Group 5 will move to station 1.

In this way, pupils will perform all the activities.

At the end of the activity, they will give a presentation on what they have learnt. Give them ten minutes to prepare their presentations.

**Presentations:**

Group 1 will give a presentation on station 1 activity.

Group 2 will give a presentation on station 2 activity, and so on.

The teacher can provide input where necessary, by prompting words, etc.

The primary objective of this entire process is that the pupils are actively involved in the learning process rather than being ‘lectured’. **In all cases, do not begin to read the lesson from the textbook before you begin a discussion leading up to it. Reading the text comes after the discussion and brainstorming has taken place.**

**Using the photocopy masters**

The worksheets are a reinforcement of the lesson and can be used for homework or classwork.
Unit 1

Topic: Our body

Teaching objectives:
• To explain how the skeleton supports and protects the body
• To identify the function of each component of the skeleton

Key vocabulary: skeleton, bone, muscle, joint

Lesson 1: 40 min

Introduction: 5 min
• Before opening the book and reading the lesson, warm-up with a few pertinent questions to lead a discussion.

* Name a few important body parts.
* What functions do they perform? (E.g. Eyes help us to see and ears help us to hear.)
* Explain to the pupils that all the parts discussed can be seen. In this lesson another body part is going to be studied that cannot be seen, because it is inside our body.

Main teaching: 30 min
• Now read the lesson with the class and note the functions of each component of the skeleton.
• Pause after every few minutes and ask related questions:
  * What are bones made of?
  * Are bones solid?
  * What makes bones strong?
  * What do bones do for us? Write their responses on the board.
• Call a few pupils to come up and demonstrate how they use their muscles. They can walk, lift, sit, jump to show how the bones, with the help of the muscles and joints, help us to move.
• Pupils can do the related exercises at the end of the lesson.
Wind up: 5 min
Recap the salient points of the lesson by using the Think-Pair-Share strategy. Ask them the following questions:

a) What is the human skeleton made of? (bones, muscles and joints)

b) How is the skeleton important for the body? (It helps us to stand and move and gives shape to the body.)

c) How can we make our muscles strong? (by eating healthy food)

Lesson 2: 40 min

Teaching objectives:
- To demonstrate the function of the skeleton with an activity
- To examine the skeletons of different groups of animals

Materials: outline of the human body, ice cream sticks, glue stick, chicken and fish bones

Main teaching: 30 min
- Show the pupils some chicken and fish bones. Tell them that these are bones of internal skeletons. Can they suggest words to describe these bones (hard, smooth, strong, etc.)? Are some bones stronger than others? Why? Remind them that an insect has its skeleton outside its body. The skeleton is called exoskeleton; exo means outside.

- Prepare the outline of the human body as shown in the drawing. Cut along the drawing’s edge. Give about five ice cream sticks to each child. Demonstrate how to attach the sticks at the back of the figure in such a way as to make the figure stand upright.

- Show the pupils another outline of the figure which is not supported by the sticks. Ask them to compare the two figures. What differences do they notice?

- Lead them on to the main objective of the lesson, that the skeleton provides support to the body and helps it to stand upright and move, without it the body would not be able to do so.

Wind up: 5 min
- Ask a pupil to come up and do some actions e.g. standing, sitting, bending and walking. How is she/he able to do all this? The skeleton, together with the muscles and the joints, help us to do all these actions.

EXERCISE (pages 4–5)

1. a) All the bones of our body make up our skeleton.
   b) Answers will vary.
   c) Muscles and joints help the skeleton to move.
   d) (i)

2. a) joint b) food c) move
   d) the same e) 206 f) shape
**ACTIVITY (page 5)**

1. This is a collective exercise in which each pupil will bring one photo or picture of some healthy food. You will need to cut them neatly along the edges and glue them on a chart.

2. Ensure that the material needed is ready in advance, and time the activity. At the end of the activity, ask the pupils some differences they notice between the shape that has the stick glued to it, and the one without a glue stick. They should be able to tell you that the shape with the stick helps it to stand. Explain that the skeleton too keeps the body upright.

**Unit 2**

**Topic: The body machine**

**Teaching objectives:**
- To explain that eating a balanced diet, maintaining proper fluid intake, and regular exercise are needed to maintain health
- To recall the functions of the sense organs and the major internal organs of the body
- To locate the major body organs in an outlined diagram

**Key vocabulary:** stomach, brain, lungs, heart, senses, ear, nose, eye, skin and tongue

**Lesson 1: 40 min**

**Materials:** paper, a pair of scissors, glue stick, biscuits, glasses of hot and cold water, flower or perfume, a box with different objects, cut-outs of the main organs

**Introduction: 5 min**
- Warm up with a discussion.
  
  *Do you have a car? For what purpose is it used? Does it go very fast? What does a car need in order to run? It needs fuel or petrol to run. How do you look after the car? You clean and wash it and make sure that the engine has enough oil, etc.*

- Explain that our body is also like a machine. It has many parts. We call them organs. Some of them are visible, while others are inside our body. If we want to keep our organs healthy and work efficiently, we have to look after them carefully.

**Main teaching: 30 min**

*How do we keep a healthy body? How do we keep away from illness?* Brainstorm ideas and then write them on the board.

- eat fruits and vegetables
- drink boiled water at least 6 to 8 glasses per day
- keep ourselves clean
- exercise and get enough sleep

*Can you think of any other ways?*
Part 1 | Ourselves

• Read pages 6 and 7 in the class.
• Give a piece of biscuit to each pupil and let them nibble it. Ask them about its taste. *It tastes sweet.* Which organ helps you to taste food? Our tongue tells us that what we are eating is sour, like a lemon, or sweet, like sugar.
• Ask the pupils to close their eyes for a few seconds. *What do you hear?* Voices, a horn honking, opening and closing of pencil boxes, etc. Which organ is helping you to hear? Our ears help us to hear sounds, music, and voices.
• Write a sentence on the board. Ask a pupil to read it. Which organ helps you to read? Our eyes help us to see light, shapes and colours.
• Call up a few pupils to touch the two glasses of hot and cold water. Which organ helps you to know if something is hot or cold? Our skin is that organ that makes us feel hot, cold, pain, etc.
• Let them smell any perfume or flower to realize that the nose is that organ which helps them to recognize different smells.

Wind up: 5 min
• Write all the sense organs on the board. Later the pupils will write the names of the five sense organs and their functions in their notebooks.

Lesson 2: 40 min

Introduction: 5 min
• Take the whole class in the school compound. Ask them to run and play for sometime.
• Ask them what happened to their breathing after running/playing. Encourage them to use words like *breathless* or fast. *We breathe fast after running.* What about your heart beat? *It increases after playing and running.* The heart is the organ which you can feel beating inside your body.

Main teaching: 30 min
• Read page 8 of the textbook.
• Prepare a box with different objects in it: a pencil, a thumb pin, some tissue, a match stick, a common pin, a glass marble, an eraser, piece of thread, a button, etc.
  Ask each pupil to observe the objects for a while, and then write the names of as many as they remember. *The brain is the organ of the body that helps us to remember.*
• Ask them about the lunch they have brought from their home. Point towards your stomach. *The stomach is the organ that helps us to digest the food.*
  After the above activities have been done in the class, write their responses on the board about the four main organs:
  1. The organ that helps us to think and remember is the brain.
  2. The heart sends blood to all parts of the body.
  3. The lungs help us to breathe.
  4. We digest the food we eat with the help of the stomach.
• Prepare cut-outs of the four main organs. Make the outline of the human figure on a chart paper (see example on page 10 of the textbook).
  Make the pupils sit in groups. Ask them to paste cut-outs of the organ in the given outline with the help of glue sticks at the right position. They will paste their work on the class soft board.
Wind up: 5 min

- Put the children into pairs. Ask them the following questions, giving them a few minutes to consult and then respond.
  a) How do we maintain good health?
  b) Name the sense organs.
  c) Name the important internal organs of the body.

**EXERCISE (page 9)**

1. a) pumps blood to all parts of the body  
   b) help us to breathe  
   c) helps us to think/remember  
   d) helps us to digest food

2. sight, smell, feel/touch, hear and taste

3. eyes, nose, skin, ears and tongue

4. Answers will vary.

5. Answers will vary.

6. a) different  
   b) boiled  
   c) strong  
   d) healthy

**ACTIVITY (page 10)**

1. Encourage them to use words like hard and strong to describe the bones they are feeling.

2. a) The middle finger, like the other fingers, has two joints.
   b) A thumb has only one joint. You can also explain that joints help the fingers to bend and spread.

3. Ensure that the pupils put the organs in their rightful places in the outlined diagram.
Unit 3

Topic: Animals

Teaching objectives:
• To explain that animals may be herbivorous, carnivorous or omnivorous, and to compare differences and similarities among them
• To classify the animals which live on land, in water, both land and water
• To investigate adaptation in animals as a means of survival

Key vocabulary: land, water, fly, nest, feed, suck, carnivore, omnivore, herbivore, wings, beak, webbed feet, pointy teeth, hump, flat teeth

Materials: papers for drawing, toy animals, mirror

Lesson 1: 40 min

Introduction: 15 min
Group work: Put pupils into small groups. Ask them to choose their favourite animal, draw a picture of it, and write a few sentences about it e.g. its size, shape and appearance, habitat, food, any special body part, etc.

Main teaching: 20 min
• Display or draw pictures of animals with different diets, e.g. giraffe, rabbit, bird, bear, etc. Do all these animals eat the same food?
• Write the following words on the board: herbivore, carnivore, omnivore
• Put the pupils into pairs and ask them to brainstorm as to what food each of these animals eat:
  rabbit: (lettuce, carrot)
  shark: (seal, fish)
  bird: (worms)
  deer: (grass, leaves)
• Listen to their feedback, and then provide them with the correct information. A rabbit eats lettuce and vegetables, so it is a herbivore.

• The pupils should examine their own teeth using a mirror. What type of teeth do you have? Notice that some are sharp and pointy, while the rest have flat edges. Humans are omnivores, so they have both types of teeth. There is no need at this stage to introduce terms like, incisors, molars and canines.

• Explain that the flat teeth are used for chewing grass, while the sharp ones are used for tearing meat. Show the pupils a photo of a snarling tiger, cat or lion. The lion’s teeth are sharp and pointy, because it is a carnivore. Goats or deer have flat teeth, because they are herbivores.

Wind up: 5 min
• Check the pupils’ understanding by asking the following:
  Name the three groups of animals we learnt about today.
  Give a few examples of land, air and water animals.
  Based on their teeth, which animals are carnivores?
  What could happen if the lion had flat teeth?
  What do your own teeth tell you about your diet? Humans are …?

Lesson 2: 40 min

Introduction: 5 min
• After a quick recap of the previous lesson, direct the focus of the lesson to how humans, animals, birds and fish are different from one another.

Main teaching: 30 min
• Make four columns on the board. Fill them with pupils’ responses.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Humans</th>
<th>Land animals</th>
<th>Birds</th>
<th>Fish</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>no wings</td>
<td>no wings, some insects have wings</td>
<td>have wings and beaks</td>
<td>have scales and gills</td>
</tr>
<tr>
<td>2</td>
<td>walk and run</td>
<td>walk, run, crawl and hop</td>
<td>hop and fly</td>
<td>swim</td>
</tr>
<tr>
<td>3</td>
<td>covered by skin</td>
<td>covered by skin or fur</td>
<td>covered by feathers</td>
<td>covered by scales</td>
</tr>
<tr>
<td>4</td>
<td>have two legs, two arms</td>
<td>have four legs, insects have six legs</td>
<td>have two webbed feet</td>
<td>have no limbs</td>
</tr>
</tbody>
</table>

• Engage them in a discussion about certain special parts, such as beak, claws, feathers, sharp teeth, horns, hump, tail, trunk, fins.

• Talk about the main features of animals that live on land, birds, fish, and animals which live both on land and in water. It is advisable to let them see the pictures of animals, or provide them with toy animals to help make observations.

• Ask them some questions:
  Why do you think a giraffe has a long neck?
Why do you think some animals have very long, sharp teeth? How do these compare with the teeth of an animal that only eats grass and leaves?

Why does the camel have a hump on its back? Why are its feet flat and large?

Which animals have horns?

• Explain that animals have different body parts to help them live, find food and move. Birds have wings to fly. They have beaks to catch worms, and eat grains and seeds. Ducks and frogs have webbed feet to help them swim. Meat-eaters have long, sharp and pointy teeth to help them tear meat. Plant eaters have big, flat teeth to eat plants. Animals that eat both plants and animals have sharp, as well as flat teeth. Camels store food and water in their humps. They can live without food and water for many days using what they have stored. They have large feet which help them to keep their balance. Animals like the bull, moose and elk have horns.

Wind up: 5 min

• Let them write the definitions of the following words in their notebooks.

**Herbivore:** Some animals eat plants. They are called herbivores.

**Carnivore:** Some animals eat other animals. They are called carnivores.

**Omnivore:** Some animals eat plants and other animals too. They are called omnivores.

**EXERCISE (pages 14–15)**

1. a) Answers will vary; some examples are: lion, tiger, leopard, wolf, etc.
   
   b) They have such teeth to help them tear meat.
   
   c) Ducks are able to swim in water with the help of webbed feet.
   
   d) A giraffe eats leaves and these are usually high up on the branches of trees. The giraffe uses it long neck to reach the leaves.
   
   e) omnivores

2. a) plants/leaves  b) plants  c) crow and bear

3. a) horn  b) fur  c) trunk  d) claws

4. Answers will vary, but below are some examples:

<table>
<thead>
<tr>
<th>Herbivore</th>
<th>Carnivore</th>
<th>Omnivore</th>
</tr>
</thead>
<tbody>
<tr>
<td>goat</td>
<td>dog</td>
<td>humans</td>
</tr>
<tr>
<td>cow</td>
<td>lion</td>
<td>bear</td>
</tr>
<tr>
<td>deer</td>
<td>wolf</td>
<td>crow</td>
</tr>
</tbody>
</table>
ACTIVITY (page 15)

1. In order to save time, the pupils can cut and paste the pictures for homework. However, it would be better if the labelling of the picture is done under the teacher’s supervision and guidance. Make sure that the pupils write the labels in small letters.

2. A field trip can be arranged to visit the zoo.

3. It would be fun for the pupils if they drew a fish, or glued a sticker of one in the centre of the page. Around this picture they can draw a web giving information about the fish’s skeleton, habitat, scales, gills, etc.

Unit 4

Topic: Life cycles

Teaching objectives:

- To explain animal life cycle and animal adaptations for survival

Key vocabulary: life cycle, tadpole, gills, larva, pupa, caterpillar, nymph

Lesson 1: 40 min

Introduction:

- Begin the topic with a general discussion on animals.
  
  **Do you keep a dog or a cat at home at home? Do they have babies? Do they look like your cat/dog?**
  
  Draw on the board some familiar animals with their young ones:

  - puppy and a dog
  - kitten and a cat
  - duckling and a duck
  - small fish and a big fish
  - chick and a hen

- **What do you notice about the size of the mother and the young one? Do they look like one another? Which animal gives birth to its young ones and which one lays eggs?** After this discussion, bring them to the topic of life cycles of animals.

Main teaching: 30 min

- Do not read anything from the text yet. Make the pupils sit around you in a circle for a short story telling session.

  **I am going to tell you a story of a frog. Mrs. Frog lived near a pond. Some times she would jump into the water and swim, and some times she would live on the land. One day she went into the water to lay many tiny eggs. A frog’s eggs are called spawn. After a little while, a tadpole, which is a very tiny baby frog, began to grow inside the egg. After a few weeks this tiny tadpole was strong enough to come out of the egg. It had no limbs and no jaw, but was squiggly and had a tail. Now it wanted**
to swim in the water. After some more weeks had passed, the tadpole's back legs began to grow. The next thing to grow were the front legs of the tadpole. Now the tadpole could not only swim, it could also jump. The tadpole was growing up fast! Some more time went by and the tadpole's tail disappeared. Why? It was now grown up and had become a frog. It jumped out of the water and hopped on the land.

• Read pages 16 and 17 of the unit. Explain the meaning of the term ‘life cycle’. The life cycle of an animal is all the stages through which it passes in its life. These changes may take place inside an egg (e.g. chick) and some changes take place outside an egg (e.g. frog).

Wind up: 5 min

• Recap the key concepts taught:
  All animals go through a life cycle, which is all the stages in its life. If animals died without having babies, then all animals would one day disappear.

Lesson 2: 40 min

Materials: a lemon plant, magnifying glass, card sheets, a butterfly and a frog

Introduction: 5 min

• Recall what they learnt about animal life cycles in the previous lesson.

Main teaching: 30 min

• This activity takes many days to complete. It is up to you that you start the activity from the very first day and follow up until its completion. Let the pupils observe the different stages of the life cycle of a butterfly.

  Bring a lemon plant to the class. As a butterfly gives eggs on the underside of the fresh leaves of lemon plant, use the magnifying glass to look at the eggs. You can also start this activity four or five days before the starting of the unit, so that they are able to observe the caterpillars feeding on the fresh leaves of the lemon plant.

  Explain the different stages of the life cycle of a butterfly by making diagrams on the board. Pupils will make the life cycle in the form of a circle. Make them realize that every young one of an animal does not come out of an egg, resembling their parents, but some animals undergo many changes in their shape and features. In this context, discuss the different stages of the frog’s life cycle. Remember to point out that the tadpole’s tail helps it to swim in water, while its gills help it in breathing.

• Bring the specimen of a butterfly and a frog. Discuss their external features. Where do you find these animals? What helps the butterfly to fly in the air? Why does it sit on the flower? Where does the frog live? Does it have a neck? Discuss about its bulging eyes, fore limbs, hind limbs, about its skin and what kind of sound a frog makes.

• Prepare small cards with diagrams of the different stages in the life cycles of the butterfly, frog and fish. Make three circles on the board. Write in the middle of the first circle “life cycle of butterfly”, write in the second circle “life cycle of a frog” and in the third circle “life cycle of a fish”. Ask some of the pupils to come up and paste the cards in the right category.
Wind up: 5 min
Ask a few questions to recap the concepts taught:

a) *Do all animals go through a life cycle?*

b) *What is a life cycle?*

c) *Can you name me all the stages of a frog’s/butterfly’s life cycle?*

**EXERCISE (page 19)**

1. a) eggs  b) fry  c) tadpoles

2. land and water  four  bumpy and wet  does not have flies  croaks  tadpoles

**ACTIVITY (page 19)**

Caterpillar to butterfly craft

**Materials**
- Pinch-type clothes-pin
- Medium-size pom-poms
- School glue
- Pipe cleaner
- Paper (white)
- Water
- Colours
- Paint brush

**Instructions:**

**Caterpillar:**
- Glue pom-poms onto one side of clothes-pin. Twist a 3-inch piece of pipe cleaner around top end to form antenna.
- Let it dry.

**Butterfly wings:**
- Lay paper towel flat.
- Mix water and paint to colour the paper. Use a paint brush to paint the paper. The more colours you use, the more colourful the butterfly will be. Allow it to dry.
- When dry, fan fold the paper into approximately half inch sections.

**Caterpillar becomes a butterfly:**
- Pinch the middle of the wings and clip inside the clothes-pin.
Unit 5
Topic: Plants

Teaching objectives:
• To compare herbs, shrubs and trees
• To discuss some of the ways in which plants are useful

Key vocabulary: herbs, shrubs, fibre, bark, medicine, sugar cane, soil

Lesson 1: 40 min

Introduction: 5 min
• Remind them about the three broad groups of living things that exist on the Earth: human beings, plants and animals. Briefly discuss the characteristics of living things that they know. Living things grow, have babies, breathe, and need food to remain alive. Explain that in this lesson, plants are going to be studied.

Main teaching: 30 min
• Take the pupils out into the school ground or to a park nearby.
  Ask them to make drawings of some plants or trees keeping in view
  a) their size;
  b) their general shape;
  c) the way the branches grow (sideways, upwards, downwards);
  d) the size, shape and colour of the leaves;
  e) the smell of the flower, its colour and shape.
• Encourage them to feel the bark, take rubbings of it, perhaps pick up a couple of samples of bark, leaves and flowers. Point out that plants grow in all shapes and sizes. Some grow in the soil on land, while others grow in water. Help them to put together the definition of herbs, shrubs and trees.

Herb
A herb is a seed plant whose stem is not woody and is used in making medicine, for seasoning or flavouring, e.g. mint, coriander (dhaniya), etc.

Shrubs
A shrub is a short, woody plant with thin and weak stems.

Trees
A tree is usually a large plant having a trunk.
• Read the lesson, pausing and discussing the many uses of plants.
Part 2 | Living things

Explain that if they like breathing clean air, resting under a shady tree on a hot day, and enjoy eating fruits, then the best way to show that they care is to plant a tree. Have a tree planting ceremony with the class.

**Wind up: 5 min**
It will be useful to show the class a bunch of mint leaves, identifying it as an herb, and chrysanthemum and rose plant as shrubs. Ask them to write the definition in their copies with the drawing of each of them as examples.

**Lesson 2: 40 min**

**Introduction: 5 min**
- Begin the lesson by pointing out that all living things need food to remain alive. *What did you eat for breakfast? If human beings ate nothing, they would die and same is the case with any animal. Since plants are living things too, they also need food. But they do not eat bread and fruit or drink milk like us. All plants need air, water and sunlight to grow. Can food be cooked without a stove? No, in the same way, plants need the warmth of sunlight. Leaves are said to be the food factories of plants where they prepare their own food, using water, air and sunlight. If a plant did not get any one of these, it would die.*

**Main teaching: 30 min**
- Emphasize that plants are very sensitive and need good care. If they have plants at their home, they must water them carefully, not too much, nor too little.
- *How are plants useful for us?* Write their responses on the board. *We eat different parts of plants as food. Plants provide wood to make furniture, tools, toys, buildings and bridges. They provide us with clean air to breathe.*
- Why are plants important to people? Six areas can be discussed:
  1. **Food:** Pupils can be asked what they had for breakfast. Example: If a pupil says “Toast and jam,” explain that flour comes from grains and jam comes from fruits.
  2. **Air:** Ask the pupils where the oxygen that we breathe comes from. When leaves make their food with sunlight, they release oxygen.
  3. **Building materials:** Ask the pupils what pencils, desks, and houses are made of. Wood comes from trees.
  4. **Clothing:** Ask a pupil wearing a cotton shirt if s/he knows what it is made of. What are linen sheets made from? (flax). Many dyes originally came from plants.
  5. **Gifts, beauty, recreation:** Ask the pupils if they give flowers or plants to their mother, or enjoy planting flower gardens, or playing in parks or sports fields. Trees make the environment beautiful. When we are surrounded by trees, we feel relaxed and peaceful.
  6. **Paper:** Explain that the paper used to make this book came from a tree. Paper is made from wood. The wood is first finely chopped and mixed with water to make a soft pulp. The pulp is then turned into paper.
• Help the pupils to arrange the following objects on a table:
different parts of the plants, such as spinach leaves, carrots, some fruits, dates, some edible
seeds, bottle of sunflower oil, soap, shampoo, tea leaves, any perfume, any herbal medicine, etc.

Discuss the source and use of each object.

Wind up: 5 min
• Conclude the lesson by asking the pupils to come up with some uses of plants. Time their
response and tell them in advance that the child who gives the most number of uses is the
winner.

EXERCISE (page 23)
1. a) shrub  b) tree  c) tree  d) tree  e) shrub
2. a) rose plant  b) money plant
   c) vinca rosea plant  d) sunflower plant
   Answers will vary. Below are a few examples.
3. a) spinach  b) potato
   c) carrot, radish, beetroot  d) mango, banana
   Answers will vary.
4. Rose plant is used for extracting oil.
   Teak is used for making beautiful furniture and doors.
   Rubber is used for making erasers, belts, gloves, balloons, etc.
   Mint is used for flavouring food.

ACTIVITY (page 24)
Answers will vary.

Unit 6
Topic: Seeds, fruits and flowers

Teaching objectives:
• To investigate parts of a fruit and the insides of a seed
• To identify the main parts of a flower and describe each ones function
• To distinguish roots from shoots
• To explain the function of roots

Key vocabulary: fruits, seeds, flower, poisonous, pots, nuts, shoot, root, sepals, petals, nectar, 
pollen.
Materials: a bean seed, a magnifying glass, a basket containing fruits (tomato, apple, guava, mango, peach lemon), lady finger, walnut and a knife

Lesson 1: 40 min

Introduction: 5 min
• Ask the pupils to give you names of some fruits. Write them on the board as part of a warm-up exercise. Cut open several of the fruits and draw attention to the seed/seeds inside each one. Discuss with them about their shape and the taste of the fruits.

Main teaching: 30 min
• Arrange the class into small groups. Give each one different type of fruit with one seed, with few seeds and with many seeds. Cut the fruit to show the inner part. Pupils should describe the seeds, the fleshy part and the skin. Make them count the seeds and sort out fruits according to the number of seeds in them. Show them fruits which cannot be eaten (berries, pods and nuts). Tell them that they are bitter in taste and some are poisonous, so they cannot, and should not, be eaten. They can now do activity 1 and 2, page 30 in the class.
• Collect small groups of the pupils around you and, using a magnifying glass, let them observe the bean seed. Explain that the seed is a plant part that can grow into a new plant. Cut open the bean to show the seed leaf inside it. The seed leaf is the embryo, or the baby plant that is growing inside the seed. Why do you think the outer covering (seed coat) of the seed is so hard? It protects the tiny embryo inside the seed. You wear a coat to keep you from the cold. Seeds from flowering plants have seed coats to protect them.
• Now read the entire lesson, pausing to ask relevant questions:
  a) Do all fruits have seeds?
  b) Give some examples of fruits that you like to eat.
  c) Are walnut and watermelon both fruits? How are they different from one another?
  d) Do all the fruits have the same number of seeds?
  e) Do all the seeds look alike and are of the same size, or are they different?
  f) The seed is the part of the plant that can grow into a……………..? New plant.
  g) What is inside a seed?

Wind up: 5 min
• Have a fun, short quiz to conclude the lesson. Tell me the name of the fruit that has only one seed
 Repeat with different numbers.

Lesson 2: 40 min

Materials: a baby root and a shoot, a flowering plant, a magnifying glass

Introduction: 5 min
• Have the pupils recall their existing knowledge on plants.

Do all plants look alike? What needs do plants have? How do they get their food? Discuss the parts of flowering plants and the process of photosynthesis, the process by which plants make food. Talk about plants that are familiar to them. What do they look like? Where do they grow?
Main teaching: 30 min

- Remind the pupils that just as humans have many parts to their body, like nose, eyes, mouth, etc. a plant too is made up of different parts. Show the class a tiny shoot and root. Let them examine it with the help of a magnifying glass.
- Make the diagram of a baby root and a baby shoot on the board along with labelling. Ask them to draw it in their copies.
- *Which part of the baby plant of a seed grows upwards and which part grows down?* Plants have underground organs called roots. Plant organs that are above the ground make up the shoot system: stems and leaves.
- Show them a flower. Make them notice its shape and size. Do flowers have a smell? Split the flower into half. Examine what the inside looks like. Point out to the petals, sepals and the pollen. *Which is the most colourful part? Can you name it? Notice the green leaves on which these petals are arranged. These are called sepals. They protect the bud. Fine dust is produced by the flower which is called pollen.*
- Ask them why butterflies, bees and other insects like to sit on flowers. They drink its juice which is called nectar. Show another flower and let them differentiate between the colour, size, shape and number of petals and sepals.
- Ask them to paste a small flower in their copies and label its different parts. This can be done for homework.
- The class can now do the related worksheet.

Wind up: 5 min

- Ask the pupils to tell you one thing they have learnt about fruit, seed, and flower parts.
- Sum up by reminding them of the key concepts learnt.

**EXERCISE (page 29)**

1. a) skin, seed  
   b) root, shoot  
2. mango, apricot, plum, orange and papaya

**ACTIVITY (page 29)**

1. The pupils will enjoy labelling the different fruits. Guide them to use the correct spelling of the name of fruits.
2. It is important for the pupils to estimate or predict the results. So encourage them to predict the number of seeds inside a fruit. You can do the first as an example on the board and they can do the rest independently.
3. The class will enjoy preparing and eating the fruit salad. Please ensure that all theirs and your own hands are properly washed. Do not allow them to handle a knife.
4. Display a few types of common dry fruits, e.g. walnut, peanut or dried apricots and figs. Explain to them that Pakistan produces a variety of dried fruits in the northern areas of Chitral and Hunza where fruits like apricots and figs are dried under the sun. Fresh fruits have to be eaten soon before they begin to rot. Dried fruits can be kept and stored for a longer time.
Unit 7

Topic: Solids, liquids and gases

Teaching objectives:
• To explain that matter is classified into solids, liquids and gases
• To identify the properties of the three states of matter
• To demonstrate that temperature affects the state of matter

Key vocabulary: matter, solid, liquid, gas, thermometer, oxygen, melting, cooling, freezing, heating

Materials: ice cubes, water, evaporating dish, milk, some solids, for example, a scale or wooden piece, candle, match box, bell, jar, honey, glass, a deflated balloon, trough of water, empty bottle, thermometer

Lesson 1: 40 min

Introduction: 5 min
• Look around you. What can you see? Do these things take up space and have weight? Explain to the pupils that everything around them, living or non-living that occupies space and has weight, is called matter.

Main teaching: 30 min
• Display the following in the class: water, milk, honey, a wooden piece, scale, pencil, any stationery box (items may vary)
• Make two columns on the board: Solids and Liquids. The pupils will classify the things and write their responses in the columns.
• Pour the milk and water into an empty mug and glass. Ask them to compare the properties of solids and liquids. Show the pupils how solids have definite shape. Liquids take up the shape of the container into which they are poured.
• Show them the deflated balloon. Blow it in front of them. Ask them what is inside it. Does it occupy any space? Let the air escape and see what happens. The air inside rushes out and
pushes the balloon forward. The pupils can feel the air by blowing out their breath on their hands. Ask them to keep their fingers together and wave their hands through the air. *When we run, we can feel the air against our face. Air is present all around us. We cannot see it, but we can feel it.*

- Fill the trough of water. Push the bottle under water. As water rushes into the bottle, let them see the air bubbles which comes out from the mouth of the bottle.

**Wind up: 5 min**

Ask the pupils to write examples of any two solids, two liquids and two gases in their notebooks.

**Lesson 2: 40 min**

**Introduction: 5 min**

- Ask the pupils if a material always stays as a solid or a liquid. How can it be changed? What happens to ice cream if it is not kept in a freezer? Why does snow melt? Show pictures of water and ice and clouds.

**Main teaching: 30 min**

- Take a bottle with a large opening. Put a funnel into it. Seal the opening around the funnel with plasticine or modelling clay. Ensure that no air should escape. Now pour some water into the funnel. Make a small hole in the modelling clay. Ask them what happens.

- The following activity needs to be performed in the lab where freezer is available. Take out the ice cubes from the freezer and put them in a saucer. *Ice is solid.* Leave them at room temperature for a few minutes. *Temperature affects the solid ice cubes. It changes them into water due to a rise in temperature.* (Make sure that they understand the difference in the temperatures of the freezer and the room). *What will happen if we will heat this water?* Put the water in an evaporating dish and heat it on a Bunsen burner till it evaporates. *The water which is liquid has changed into water vapour, which is gas.* Pupils should realize that solid can be changed into a liquid and liquid can be changed into a solid state.

- Show them a thermometer. Explain to them that the thermometer is an object that tells us how hot or cold something is. Caution them to handle it with care as it is made of glass.

- Explain that air contains many gases. Some of these gases are very useful while some are harmful. One the most important gas present in the air is oxygen. All living things need oxygen to remain alive. Fire needs oxygen in order to burn. Emphasize the importance of oxygen gas. If there will be no oxygen, there will be no life.

- Light a candle and invert a glass jar over it. The flame will soon be extinguished. Explain to the pupils that when the jar was put on the candle, the supply of oxygen was cut off and so the flame stopped burning.

**Wind up: 5 min**

- Conclude the lesson by bringing together the key points of the lesson:

  Matter has three forms; solid, liquid and gas.

  Give me a list of solid/liquid/gas.

- Can a solid hold its shape? Yes. But liquid cannot as it takes the shape of its container.

- Give one example of change of matter.
EXERCISE (pages 33–34)

1.  

<table>
<thead>
<tr>
<th></th>
<th>Colour</th>
<th>Shape</th>
<th>Smell</th>
<th>Shape can be changed easily</th>
</tr>
</thead>
<tbody>
<tr>
<td>eraser</td>
<td></td>
<td>rectangle</td>
<td>Some</td>
<td>No</td>
</tr>
<tr>
<td>lunch box</td>
<td></td>
<td>square</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>bottle cap</td>
<td></td>
<td>circle</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>water</td>
<td>no colour</td>
<td>no shape</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>milk</td>
<td>white</td>
<td>no shape</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

The teacher can use her own examples also.

2. oxygen, nitrogen, carbon dioxide, hydrogen, etc.

3  a) liquids  b) Gases  c) Liquids  d) gases
   e) boil  f) Oxygen  g) liquid  h) ice  i) liquids

Note: When the blank is at a sentence’s beginning, the word that is used to fill it must begin with a capital letter.

ACTIVITY (page 34)

1. Make sure that both the glasses are under water. The glass must be upside down and full of water before you try to catch the air in it.

2. Water does not enter the bottle because there is only one opening. The air in the bottle keeps the water out. When a small hole is made in the plasticine, air can be pushed out from it when water goes through the funnel.

Unit 8

Topic: Measuring instruments

Teaching objectives:
• To explain the terms length, weight, height, temperature, etc.
• To identify some instruments and explain their use to measure physical quantities
• To use estimates to measure these quantities

Key vocabulary: instruments, measuring tape, ruler, meter rod, thermometer, digital clock, wrist watch, weight, length, height, time and temperature

Materials: ruler, plastic measuring cylinder, three different sized cups or glasses, weighing balance, weighing machine, stopwatch, clock, thermometer, three different lengths of string
Lesson 1: 40 min

Introduction: 5 min
Do not make the pupils read from the textbook yet. Ask the following questions as a warm-up exercise.

a) How tall are you?

b) Who is taller, you or your friend?

c) How much milk do you drink in a day?

d) What is the distance from your home to school? Far or near?

e) Is your school bag light or heavy?

f) What time do you get up in the morning?

Main teaching: 30 min

- Set up six stations where different groups of pupils will be doing different activities. You will need to be alert and ensure that groups move from station to station so that every child gets the chance to do all the activities that you have planned.

Station 1
Cut sets of different sizes of strings according to the number of pupils in your class. Give each one three strings and ask them to measure the length of each string and write them in their notebooks. Remember that they can either do this by measuring them with a ruler, or simply put them in order as long, longer and longest, or short, shorter and shortest. If they have not yet been taught the units of measurement in their math class (mm, cm, km, gm, kg, etc.), do not attempt to teach or explain these to the class. This lesson only intends to teach some basic measuring terms and introduce the instruments used to measure the physical quantities.

Station 2
Let the pupils measure water by pouring into various-sized glasses. Ask them which glass has the most quantity of water, which has less and which one has the least.

Station 3
Display a clock and some plain papers to write. Each pupil will write two sentences on the paper and the other pupils will note the time taken to write these sentences. They will recorded it in their notebooks.

Station 4
Display a weighing machine or a kitchen scale. Note the pupils’ weight or weigh some things on the kitchen scale. Draw their attention to the needle pointing to the weight. The weighing instrument shows us the weight of objects and we know how heavy or light a thing is.
Station 5
Using a height measuring chart or a measuring tape, pupils will measure each other’s height and will note who is the tallest and the shortest in their group.

Wind up: 5 min
• Conclude the lesson by recalling what has been taught in this lesson:
  a) We measure to find out how tall, long, short, far, near, heavy or light some thing is.
  b) We need measuring instruments to measure things. There are different instruments used to measure different things. If we want to know our weight, we cannot use a ruler. We have to measure our weight using a bathroom scale. Similarly, if we want to find out our height, we must use a height chart or a measuring tape. We cannot use a clock to measure length.

Lesson 2: 40 min

Introduction: 5 min
• Recall all the salient points of the previous lesson. You can repeat the concluding points of the previous lesson.

Main teaching: 30 min
• Arrange the class into small groups and ask them the following questions, allowing them a few minutes to confer and discuss amongst themselves.
  a) What instruments do we use to measure length/ height/ weight/time?
  b) How do we measure liquid?
  c) If we want to know how near is the park to our home, are we measuring length or distance?
  d) If we want to know how tall someone is, are we measuring height or length?
  e) If we want to find out how light or heavy something is, what instrument do we use?
• Display the thermometer to them. A thermometer is a measuring instrument. It tells us the temperature of the air around us. It shows us how much cold or hot the temperature is. Temperature is a measurement showing how hot or cold some thing or some place is. Our body also has a certain temperature. The thermometer is used to find out the body’s temperature when you have fever or are feeling sick.
• Give your own input where necessary or when you feel that the pupils are not able to express their ideas properly. Try to acknowledge their efforts during their presentations.
• Now read the lesson in the class.

Wind up
• Complete Exercise 2 on the board with the help of the pupils’ input which will conclusively sum up the lesson.
EXERCISE *(page 38)*

1. a) ruler  b) watch  c) more  d) kitchen scale

2. thermometer  temperature
   bathroom scale  weight
   measuring tape  length
   clock  time
   beaker  liquid

ACTIVITY *(page 39)*

1. Answers will vary.

2. Since paper cups are being used in place of pans, do not let the pupils put heavy objects on them. Point out that when one cup is tilting downwards, it shows that the object in it is heavier than the object which is on the other cup.

3. Pupils will enjoy displaying to the rest of the class different measuring instruments they have brought from home. The teacher can give some incentives like stars or stickers to motivate the pupils.

4. The pupils will enjoy making this smoothie, where the teacher must emphasize that it is important to measure the quantities of the ingredients, otherwise the food will not taste good.
Unit 9

Topic: Day and night

Teaching objectives:
- To explain how day and night happen
- To emphasize that day and night are the result of the Earth rotating or spinning on its axis
- To explain that a year is the time taken for the Earth to make one complete orbit around the Sun

Key vocabulary: planet, sphere, spin, orbit, rotate, axis

Materials: a football, a ping pong ball, torch, toothpick, plasticine ball, an orange

Lesson 1: 40 min

Introduction: 5 min
- Show the class a ping pong ball. What is the shape of this ball? It is a sphere. The Earth on which we all live is also shaped like a sphere. The Earth is a planet.
- Now show them the football. This is also a sphere but it is much bigger in size compared to the ping pong ball. The Sun is also a sphere and it is very, very big as compared to the Earth. Do you think the Sun is hot or cold? It is hot because it keeps us warm. When we stand outside in the sunlight, we feel hot. That means that the Sun is very, very hot. The Sun is not a planet like the Earth. It is a star.

Main teaching: 5 min
- Using a plain or a yellow chalk, draw the Sun on the board and then draw the Earth, preferably with a blue and green chalk. Explain to the pupils that the Sun does not move from its place. It is a star which gives off light and heat all the time. But the Earth keeps moving and it moves in two different ways.
- Call two pupils to the front and ask one of them to spin. The Earth spins like a top, though we do not feel its movement. This movement is called rotation. Write the word on the board. This movement or rotation of the Earth causes day and night. The Earth rotates on its axis which is an imaginary line that cuts through the centre of the Earth. Write the word on the board.
• For further explanation, make a diagram on the board showing the Sun in the middle and the Earth revolving round it. Make the second pupil circle around the first one. The path on which the Earth is travelling is called the orbit. Write the word on the board. Revolution is the second movement of the Earth and this movement takes a whole year to be completed. The pupils can draw the diagram in their notebooks. Make sure they label it correctly.

• You can now read the lesson together with the pupils.

Wind up: 5 min
• Sum up by asking the following:
  a) Is the Earth a planet or a star?
  b) Which is bigger, the Earth or the Sun?
  c) Which one is made of hot gases and gives out heat and light?
  d) What causes day and night, the Earth’s rotation on its axis or its movement on its orbit?

Lesson 2: 40 min

Introduction: 5 min
• Bring a globe and a torch. Turn on the torch light towards the globe. Explain that the part of the globe which is facing the torch’s light is bright. The Earth too is bright and experiences daytime when it faces the Sun. The other side of the globe which is away from the torch’s light, is dark. The Earth too experiences night-time when half of it is turned away from the Sun.

Main teaching: 30 min
• The class can do Activities 2 and 3 in the class. Give the pupils some plasticine to make models of the Earth and the Sun. Provide them with a toothpick each. Explain that the toothpick signifies the axis of the Earth. Remind them that the axis is the imaginary line that cuts through the centre of the Earth on which it rotates, causing day to change into night, and night to change into day. Instruct them to keep in view the different sizes of the Sun and the Earth.
• Like all the other stars, the Sun is a ball of burning gases. It is the nearest star to our Earth. That is why it looks the biggest and the brightest of all the stars. It is the biggest source of heat and light. Warn them never to look at the Sun directly as it will hurt their eyes.
• If possible, take them to the library to look at pictures of the Sun and the Earth.

Wind up: 5 min
• Conclude the lesson by bringing their attention back to their home planet. How would you describe the Earth; dark, silent and lifeless, or bright, full of sound and movement and filled with living things? After they have given an appropriate answer, explain that the reason the Earth is so is because it has three very important things—air, water and sunlight. This makes it possible for us and other living things like the plants and the animals to live on it.
EXERCISE *(pages 41–42)*

1. b) There are *eight* planets orbiting the Sun.
   c) The *Earth* travels round the *Sun*.
   d) The Sun appears to be so bright because it is the *nearest* star.

2. a) The Earth takes a whole day or 24 hours to spin round on its axis.
   b) The Earth takes one year to orbit the Sun.
   c) The path on which the Earth travels around the Sun is called the orbit.
   d) The Earth is like a ball. This shape is called a sphere.

ACTIVITY *(page 42)*

1. Make sure that the pupils spin the ball anticlockwise, as the Earth spins in the direction of east. Explain that it if you are on the spot marked X, it will take you 12 hours to see the Sun at the same time the following day.

   This activity is possible if the pupils have understood how the Earth rotates and revolves. Hold a football (the moon) in front of the class. Make sure the classroom is fairly dark. Have one pupil shine a torch (the Sun) on the football. Make the child move to different positions in the classroom. The pupils will be able to see that sometimes the whole of the football is lit up. At other times, only part of the football is lit up.

2. Activity has been conducted in the class as part of the lesson.

3. Activity has been conducted in the class as part of the lesson.

Unit 10

Topic: The Moon

**Teaching objectives:**
- To compare and contrast the Moon and the Earth
- To explain the movements of the Moon on its axis and around the Earth
- To explore space travel

**Key vocabulary:** spin, rotate, orbit, spaceship, satellites

**Materials:** football, torch
Lesson 1: 40 min

Introduction: 5 min
The Moon is an object that continues to fascinate all, particularly children. They consider it a mysterious object and want to know more about it. Encourage the pupils to ask you questions about the Moon.

Main teaching: 30 min
- Explain to them that in the olden days, people thought that it is not possible to go to the Moon as it is very far from the Earth. The light and dark shadows that we can see on the Moon puzzled people who created various stories to explain them. They even believed that an old woman sat there spinning a wheel. But we now know that no living thing exists on the Moon. New inventions like satellites and spaceships made it possible for astronauts to step on the Moon. An astronaut is someone who travels in space on a spaceship. A spaceship is a special machine that is used to travel into space.
- Read pages 42 and 43 with the class. Remind them of the spinning and orbiting movements of the Earth and tell them that the Moon too spins on its axis and orbits around the Earth.
- Discuss the changing phases of the Moon either with the help of the diagram in the book, or draw them on the board.
- Bring the class to the library. Guide them to find out about satellites and spaceships, explaining to them that spaceships and satellites are man-made machines which are sent into the space. They bring photos of different planets and the Moon back to the Earth. Show them the picture of the American astronaut, Neil Armstrong, who was the first man to walk on the Moon, in 1969. Let them know that the Moon is the only object outside the Earth that has been visited by a human being.

Wind up: 5 min
- Put the pupils into pairs. Recap the salient points of the lesson by asking them some questions:
  a) Which is nearer to the Earth, the Moon or the Sun?
  b) How many moons orbit around the Earth?
  c) Tell me one similarity between the Earth and the Moon.
  d) Tell me one difference between the Earth and the Moon.
  e) Can we live on the Moon or grow plants there? Why not?
  f) Has man ever visited the Moon?
  g) Who is an astronaut? What does he wear when he goes out into space? How does he travel in space?
Lesson 2: 40 min

Introduction: 5 min
• Recall what they learnt about the Moon in the previous lesson. You can ask the questions used to recap the previous lesson.

Main teaching: 30 min
• Ask them about the changing shapes of the Moon.
  Why can’t you see the Moon in the daytime? As this is difficult for them to explain, help them to understand that the Moon is a non-luminous object (an object which does not have its own light). It only shines when the Sun’s light reflects on it. So it is very easy to see the Moon in the night as compared to day, because in the daytime the Sun shines very brightly.
• Prepare a chart showing changing positions of the Moon. Paste it on the board and ask the pupils to make the drawing in their notebooks.
• Emphasize the absence of air on the Moon. If there is no air and water, is it possible for anybody to live on the Moon? Without water, a person can live for a few days but without air he will die as oxygen is necessary for life. When astronauts travel in space, they wear a special spacesuit that has an oxygen tank attached to it.

Wind up: 5 min
• Put the pupils into pairs, giving each one a small slip of paper on which they will write one sentence about the Moon. They shall then exchange the paper with their partner.

EXERCISE (page 45)
1. a) little    b.) no    c) does not have    d) is not    e) smaller    f) like    g) phases
2. a) The shape of the Moon is spherical.    b) It cannot be seen in the day.    c) Answers will vary.    d) The Moon moves round the Earth.    e) An astronaut travels in space on a spaceship.

ACTIVITY (page 45)
1. Ask the pupils to glue pictures of any aircraft or spaceships in their copies. They can find the pictures from any magazine or newspaper, or if they have access to a printer, they can get a few with the help of the Internet. They can also attempt the photocopiable worksheet related to this lesson.
2. This activity has been explained in Lesson 2 of Unit 9.
Unit 11

Topic: Seasons

Teaching objectives:
• To discuss the distinct features of each season
• To identify the salient climatic features of each season and emphasize their effects on lifestyle and activities

Key vocabulary: seasons, spring, summer, autumn, winter, monsoon

Lesson 1: 40 min

Introduction: 5 min
Show the pupils some scenes of summer, winter, spring and autumn and let them guess which scene belongs to which season.

Main teaching: 30 min
• What is the season now? Choose your favourite season and write a few sentences about it in your notebook. Draw the picture of your favourite season. Why do you like this season?
• Explain to the pupils that in most countries of the world, there are four seasons: spring, summer, autumn and winter. The weather changes during different seasons, affecting our lives and that of plants and animals.
• Now together with the class, conduct a brainstorming session. Write the key points on the board. Give your input where necessary.

Spring
• Spring begins as soon as the winter ends
• Snow begins to melt from mountain tops.
• Birds come back to warmer days and nights.
• Young plants begin to grow and turn green.
• Flowers bloom and bees and butterflies collect nectar from them.
Summer
• Everyone feels very hot.
• It gets very warm and sunny.
• We wear light clothes to keep cool.
• We like to drink cool drinks and eat ice cream.
• The days are long and hot.
• Mangoes ripen in summer.
• People go to the seaside to keep away from the heat.

Autumn
• Autumn comes just before winter.
• A cool, dry wind blows, making the leaves dry and fall from the trees.
• All the trees look bare.
• Animals that sleep during winter begin collecting and eating food, because they know that they will not find much food in the cold season.
• Birds fly away to warmer places where they can find food and shelter.

Winter
• The air is cool and fresh.
• We put on some warm clothes.
• The days get shorter and the nights are cold and long.
• Mountain tops are covered with snow.
• Some animals, like frogs and squirrels, sleep during the cold winter.
• We love to drink hot coffee and tea.
• We like to sit near the fire, wearing woollen clothes.
• Explain the features of the monsoon season. In Pakistan, the summer season is very wet. Very often there are thick grey clouds in the sky. The wind begins to blow and there may be some or a lot of rain, known as monsoon rain.

Lesson 2: 40 min

Introduction: 5 min
• Make the pupils recall the previous lesson by asking them short and simple questions:
  a) Can you tell me the names of the four seasons?
  b) What is the weather like in winter/summer/autumn/spring?
  c) What sort of clothes do people wear during winter and summer?
  d) Why do birds fly away in autumn? Where do you think they go? When do they come back?
  e) What do some animals do during winter?
  f) What are the monsoons? What is it like in your town/city during the monsoon season?
Main teaching: 30 min
- Read the lesson in the class. Guide the pupils to complete a few exercises in the class.
- Keep aside one or two periods for doing the related craft activities. The materials required should be available and ready in advance. You can divide the whole class into four groups, assigning each group the task of making a craft related to one season.

Wind up: 5 min
- Display their crafts in the class.

EXERCISE (pages 48–49)

1 a) Winter (Should be capitalized as it is at the beginning of the sentence.)
   b) summer   c) autumn   d) winter
   e) warmer   f) spring    g) rain
2 a) winter   b) summer    c) autumn    d) spring
3 a) Answers will vary.
   b) Answers will vary.
   c) spring, summer, autumn and winter
   d) Answers will vary.

ACTIVITY (pages 50–51)

All activities related to this lesson have been explained step by step in the textbook (pages 50 and 51).

Unit 12

Topic: Water

Teaching objectives:
- To identify the sources of water and its uses
- To create awareness of the importance of water conservation
- To explore the sources of water pollution
- To investigate the properties of water

Key vocabulary: stream, ponds, lakes, well, river, evaporate, pollute, waste, save

Materials: three glasses, egg, salt, sugar, rice, water, spoon
Lesson 1: 40 min

Introduction: 5 min
• Ask the pupils what comes out when they open the tap. In how many ways did you use water today? Write their responses on the board and allow them to note these in their notebooks. For example, drinking, washing, bathing, watering plants, etc.

Main teaching: 30 min
• Ask them if they have ever gone to the seaside, near lakes or river banks. These are sources of water, or the places where water is found. Water is everywhere, even in the air. Ask them about which animals live in the water. They are sure to know that fish live underwater. Remind them of the three states of matter they studied in a previous unit and that water is a liquid state of matter.
• How does water get into your homes? The water that we use comes from lakes, rivers, and from under the ground. It is transported to our homes through pipes. Ask them if they have ever seen a well. A well is built to draw out water from under the ground. Explain to the class that lakes, rivers, oceans, streams and ponds are all sources of water, meaning that these are places from where we can get or use water.
• Now read pages 52 and 53 with the class. Discuss the pictures shown of the different sources of water. Mention the speed of flowing water. When water falls or flows fast, we can even use it to make electricity.
• After having discussed the fresh sources of water, talk about the oceans and the seas, using the photograph on page 52. Explain to them that though the larger part of the Earth’s surface is covered by water, this water is too salty. So it cannot be used for the purpose of drinking, washing or for watering plants and crops.
• The pupils can now do Exercises 1 and 2 in the class.

Wind up: 5 min
• Sum up the concepts taught in this lesson by asking them some direct questions:
  a) Name some sources of fresh water.
  b) Ocean, river, pond; which one has salty water? Can we use the ocean’s water to drink or to water the plants?
  c) Why is water so important for living things?
  d) What are some of the uses of water?

Lesson 2: 40 min

Introduction: 5 min
• Bring the pupils to the topic of clean and dirty water by asking a few probing questions.
  What do you think will happen if people had to drink dirty water? They would fall sick. You know that fish live in rivers and seas. If the water there became dirty, what will happen to the millions of fish living there? They too would die.
What makes water dirty? Factories use chemicals to make things. They throw these chemicals into rivers, lakes and streams. Human beings too, throw their waste in water. So the water becomes dirty. We call this polluted water. You can show them pictures of polluted water from the Internet.

Main teaching: 30 min
• Read pages 54 and 55 of the textbook. Now as you know that we need to drink clean water, how do you think water can be cleaned? We can do so by boiling it.
• Make the pupils realize that water is a precious resource and must not be wasted it. How much water do we need to drink per day? Why do we need more water in the summer? If we drink less water, what could happen? These are some questions you can use to emphasize that water is a very important and precious resource.
• Remind them that only fresh water of the rivers, lakes, streams and the water underground is potable (fit for drinking). Since water is so precious, we must not waste it.
• Read the ways of conserving (saving) water on page 55. Brainstorm more ways of saving water. Pupils can do Exercises 3 and 4 as classwork. The art class can be utilized to do Exercise 5.
• Ask the pupils to write down five ways to save water. They can write any of the points discussed in the textbook, page 55, or you may give them some ideas, like the following:
  a) Do not use more water than you need.
  b) Turn off the tap as soon as you are done with washing.
  c) Do not let the water tank overflow.
  d) Never throw rubbish into wells, tanks and ponds.

Wind up: 5 min
• Bring together all the key points of this unit by emphasizing the following:
  a) Water is present in seas and oceans, rivers, lakes and ponds. Salty water is not potable.
  b) All living things need water to remain alive.
  c) Water is a liquid state of matter.
  d) We should save water, not waste it.
  e) Drinking polluted water makes people sick and pollution in seas and rivers causes the sea animals and plants to die.
EXERCISE (page 56)

1 a) Answers will vary. Do let them know that it is good to drink eight to ten glasses of water daily in the summer.

b) Answers will vary. Do let them know that it is good to drink six to eight glasses of water daily in the winter.

2. Seas, rivers, streams, ponds, lakes, and wells are some sources of water. Fresh water from streams, lakes and rivers and from under the ground is drinkable. Sea water is not drinkable because it is very salty.

3. Pupils can write any of the points mentioned in the textbook or they can come up with their own ideas.

4. All living things need water to stay alive.
   We clean and wash ourselves with water.
   Plants, trees and crops need water to grow.
   Fish can only live in water.

ACTIVITY (pages 56–57)

1 Before conducting this activity, explain what it means to dissolve. In easy language it means to mix something with a liquid, so that it becomes part of the liquid. Take three glasses of water. Put one teaspoon of salt in the first glass, one teaspoon of sugar in the second glass and some rice in the third glass. Stir the three mixtures with a spoon. The pupils will discover that salt dissolves very well and so does sugar. Rice does not dissolve in water. Pupils will fill the table and write what happened. They can redo the experiment, using warm water in which the sugar and the salt will dissolve much quicker. Explain that many substances can dissolve in water.

2 Remind the pupils that water not only exists in the form of a liquid, but it also exists in the form of a gas. When the sunlight warms the water, it changes into gas and disappears into the air. This water which is now gas is called water vapour.

3 Take two glasses of water. Pour some fresh, warm water into both the glasses. Put about ten teaspoons of salt into one glass. Stir the salt until it dissolves. Put an egg in each glass. What happens to the eggs? The egg in the dense salty water will float; the egg in the other glass without salt will sink. Do not explain to them the concept of density in water, as they are too young to understand it. You can say that some things float in water, while other things sink.

4 Fill a glass with clean water. Put one drop of ink into it. Observe what happens. The pupils will get the opportunity to see how one solution mixes with one another. It will help them to later understand the molecular structures of solids and liquids.

5 Answers will vary.
Unit 13

Topic: Air

Teaching objectives:
• To explain the composition of air
• To compare the important and useful gases with those that are impure or poisonous
• To explore some of the properties of air
• To discuss air pollution

Key vocabulary: smoke, dust, ash, gases, water vapour, poisonous, impure, wind, clouds, gales, wind

Materials: a balloon, kettle, water, a flag, a piece of cloth

Lesson 1: 40 min

Introduction: 30 min
• Ask the pupils to breathe deeply. When you breathe, what are you taking inside your body—food, water or air? Can you see air? Blow on your hand. You cannot see air but you can feel it. We know air is all around us.
• Make the pupils stand near a fan with the wind blowing on their faces. Now you can feel the air touching you because it is moving. Moving air is called wind.

Main teaching: 30 min
• Ask the pupils to think of the things which move in the wind. Branches and leaves on trees, clothes on a line, dust, waste papers, hair, smoke, kites, and clouds are some of the things that they may think up of. Remind them of what happens on a windy day. They can draw their own pictures after they have described a windy day.
• Take them into the school compound to feel the moving air. Engage them in some activities. While running, they will feel the air pushing against their faces and bodies. While waving their hands up and down, they will feel the air. Give them a flag. Ask them to run. Let them feel the direction of wind.

The pupils can write the definition of wind in their notebooks. Wind is moving air.
• Explain that winds can blow very strongly. Strong winds are called gales. Remind them of a speedometer. It measures the speed at which a car is being driven. Wind speed too, can be measured and recorded. Gales can cause damage. Show them a picture of devastation caused by a hurricane or a cyclone.
• Read pages 58 and 59 with the class, pausing to ask related questions:
  a) Why is air important?
  b) Is air a kind of matter?
c) What things does air contain?

d) How can poisonous gases be harmful to people?

e) Can we change water, which is a liquid into air, which is a gas? How?

Wind up: 5 min

- Sum up the lesson by recalling the key concepts that were taught: Air is necessary for all living things to be alive. It contains many gases. It can become impure when poisonous gases or substances enter in it. These can be due to traffic smoke, smoke being produced by factories, burning garbage or a volcano eruption. Air also contains water vapours.

Lesson 2: 40 min

Introduction: 5 min

- Show the pupils the picture of a volcano erupting on page 59. Remind them of the causes of air pollution that were discussed in the previous lesson. Refer to the Teacher’s notes, page 83, in order to discuss the key words related to volcano eruption.

Main teaching: 30 min

- Now discuss the most important gas that is present in the air. The gas that we breathe in is oxygen. This gas also helps in burning. If the air around us loses oxygen, then all living things will die. Humans cut trees for obtaining wood, though these trees give us oxygen and a clean environment. Some harmful gases from cars, buses, rickshaws, etc. enter the air, causing pollution. This also affects human health. Respiratory diseases, like lung cancer, asthma and coughs are caused by air pollution. The pupils can list the sources of air pollution and the effects in a table.

- Take the whole class to the kitchen. Put a little water in a kettle or a pan. Make the pupils note the amount of water. Let the water simmer and boil until its quantity is greatly reduced. Where has the water gone? It has changed into water vapours and disappeared into the air.

- Blow up a balloon in front of them. Is air a matter? Does it occupy space? Does it have any weight?

- Ask them to write some properties of air in their notebooks. Engage the pupils in a class discussion on how they can play a role in making their environment clean and free of pollution. Arrange them into small groups. Each group will write five points under the heading ‘Save our Environment’.

Wind up: 5 min

- Conclude this lesson by asking them to share with you all that they have learnt about air, wind, and air pollution.
EXERCISE (page 61)

1  a) Pollution          b) germs          c) poisonous
    d) water vapour      e) live          f) wind
    g) smoke, dust, ash and gases

2  a) No, oxygen is a very important and useful gas.
    b) Wind is moving air. We can feel it. Air also occupies space.
    c) Answers will vary.
    d) A gale is a strong wind.

Note: Please encourage the pupils to answer in complete sentences and not in short phrases.

ACTIVITY (page 62)

1  This is easily observable and will give young pupils an idea that tiny dust particles are ever present in the air.

2  This is also an easily manageable activity which will strengthen the pupils’ understanding of the process of evaporation, though this particular word need not be used by the teacher.

3  The sail will fill with air. Pupils will enjoy making the tiny parachutes. A handkerchief attached to four strings, which are in turn attached to a not too heavy object, will float down. The object should not be too heavy, otherwise it will fall down to the ground more quickly, before the handkerchief can spread and catch the air.

4  The uncrushed sheet of paper will resist the air and will float down. The crushed paper will not resist the air, and its weight will make it fall down quickly.

Unit 14

Topic: The environment

Teaching objectives:
• To identify our immediate and larger surroundings as our environment
• To classify environment into natural and man-made
• To explain that human activities are responsible for polluting the environment
• To introduce the 3R’s strategy for conserving the environment
• To create recycled and reusable objects

Key vocabulary: environment, natural, man-made, reduce, reuse, recycle

Material: A calendar having pictures or photos of natural and man-made environments, 3 R’s written on large pieces of card paper
Lesson 1: 40 min

Introduction: 5 min
• (Individual work) Look around you. What are the things that you can see? Listen to the response of the pupils. Give them a couple of minutes to write the names of any ten things which are around them. All these things are part of our environment. Our home and the school are part of our environment. We live in this town/city which too is part of our environment. So is the Earth, because we all live in it.

Main teaching: 30 min
• Show the pupils some photos of natural and man-made environments, pointing out the differences between them:
  1. Natural environment includes deserts, mountains, grasslands, oceans, rivers, ponds and lakes, etc.
  2. Man-made environments include houses, buildings, roads, factories, vehicles, shopping centres, etc.
• You live in a man-made environment. Fish in the sea live in a ………? Natural environment.
• Read page 63 with the pupils, pausing to ask questions. Draw their attention to the illustration. Ask them to tell you which objects are man-made and which ones are natural.
Can they point out the effects of human activities on the environment? Engage them in a discussion about those human activities responsible for causing environmental pollution. The following points can be discussed:
  1.  building cities
  2.  factories that create air pollution
  3.  cutting trees and destroying grasslands
  4.  hunting animals
  5.  traffic smoke
  6.  garbage rotting and burning on roads
  7.  cigarette smoke
  8.  the use of plastic bags
• The pupils can do Exercises 1 and 2 in the class.

Wind up: 5 min
• Summarize your teaching by telling the pupils that you are writing the following lists of words on the board. Each list has one word that should not be there. They should tell you which one is the odd word. Circle that word on the board:
  a)  river, road, mountains, forest (road)
  b)  flyover, school, cricket field, lake (lake)
c) traffic smoke, using plastic bags, litter thrown in the litter bin, pollution (litter thrown in the litter bin)

Lesson 2: 40 min

Introduction: 5 min
• After a short and quick recap of the previous lesson, introduce the 3 R’s to the class.

Main teaching: 30 min
• Show the card on which it is written Recycle. Ask them what it means to recycle. Recycle is to turn old, used objects into different new things. Garbage must be sorted before it can be recycled.
• Show the Reuse and Reduce cards. Reuse means to use things more than once, in the same way or in a completely new way. Reduce means to create less litter. For example, by not using disposable items we can create less litter or waste. Instead of using a tissue, we can use a handkerchief. Instead of drinking soft drinks from cans or disposable bottles, we could drink from non-disposable, glass bottles.
• Now read page 64 with the class. Arrange the material needed for all the activities. The pupils will enjoy creating these items which can be later displayed in the class or used as display for the Earth Day which is observed on 22nd April.

Wind up: 5 min
• The pupils will write in their notebooks three promises which they will make to themselves to keep their environment clean and healthy.

EXERCISE (page 64)

These are open-ended questions, so answers will vary.

ACTIVITY (page 65)

1. The materials required for this activity can vary, though some basic things that are required are: paper bags, crayons, scissors, glue, coloured paper, old socks, etc.
2. The materials required are: old jam bottles, paint, stickers, etc.
3. Explain to the class why plastic bags have a harmful effect on the environment. Plastic bags litter the landscape. They find their way into parks, beaches, streets and rivers. When they are burned they produce poisonous gases. We can reduce the amount of plastic bags used by using cloth bags to hold our shopping.
UNIT 15

Topic: Electricity

**Teaching objectives:**
- To introduce electricity as a form of energy
- To identify appliances which use mains electricity e.g. fan, light bulb, computer, etc.
- To provide a very basic explanation of the production and transportation of mains electricity
- To warn of dangers associated with batteries or mains electricity
- To compare mains electricity with batteries and cells

**Vocabulary:** mains electricity, battery, power station, cables, wires, inventor

**Materials:** different types of cells and batteries, bare and covered wire, plugs

**Lesson 1: 40 min**

**Introduction: 5 min**
Start the session by telling them a story.

*This is a story about a little boy named Thomas Edison. He was born many years ago in America. When he was studying in school, his teachers were not happy with his work, because he was often sick and could not hear very well. All the teachers of his grade thought that he will not be able to do well in school, and that he must leave school. But when he grew up, he became a great inventor. An inventor is the first person to make a new thing. Thomas Edison invented the light bulb. It took over a year to develop but he finally constructed a long lasting filament bulb, in 1879. He built his own generating station and supplied electricity to 80 customers. He invented 1300 other things, including the gramophone, motion picture, etc.*

**Main teaching: 30 min**
- Ask the pupils about all the things running on electricity in their classroom and in their homes. Write their responses on the board. Make them realize the importance of electricity which has made their lives very easy and comfortable.
• Give them a few minutes to draw any electrical appliance on a paper and display it in the classroom. Ask them where electricity comes from, where is it made, how does it come to their homes.

• Explain that electricity is a form of energy. It helps us to do many things. We cannot see electricity, but we can see where it is working all around us. Mains electricity is made in a power station. It is brought to our homes through thick wires called cables. This electricity is very powerful and can be very dangerous. If possible, take them outside the school to show the cables, going from pole to pole. *Electricity is travelling through these wires. Where is it coming from? It is coming from the power station.*

Ask them to bring any battery-operated toy to school for the next lesson.

• Read the lesson with the class.

**Wind up: 5 min**

• Recap the lesson by asking a few short questions:
  
  a) *What is electricity?*
  
  b) *How is it useful to us?*
  
  c) *Where does electricity come from? How does it travel?*

**Lesson 2: 40 min**

**Introduction: 5 min**

• Recall the concepts taught in the previous lesson by asking a few related questions. Pupils can display any battery-powered toys or objects they have brought to the class. These can be operated to show how they work. Point out that electricity is a form of energy that can produce light, make toys move, create sounds, etc.

**Main teaching: 30 min**

• Arrange the pupils into small groups. Give them some plastic-coated wire, some bare wire, cells and batteries. *These cells and batteries are used to store electrical energy in small amounts. You can use a battery to light a torch, but you cannot use a battery to run a fridge or an air conditioner, because those need large amounts of electrical energy to work. Therefore, they can only work with the help of mains-powered electricity.*

• Strip a plastic-coated wire and show the pupils what the inside looks like. Make a simple circuit in front of them and explain that the electricity from a small battery flows through a wire, goes into a bulb, heats up the special wire (called a filament), which then gives off light.

• Briefly touch upon how mains electricity is produced in a power station. Emphasize that it is very dangerous to touch a bare wire while it is attached to the socket. *Do not touch the plugs and wires with wet hands, and do not touch electrical appliances while running.* Also warn the pupils never to cut open batteries, as these contain poisonous chemicals that can burn the skin.

• The pupils can attempt some exercises or activities given in the textbook.

**Wind up: 5 min**

• Recall the salient points of the lesson to conclude it.
EXERCISE *(page 69)*

1  a) a television  
   b) It is very dangerous to put your finger in a plug socket.  
   c) a battery  
   d) a torch  

2  a) An inventor is the first person to make a new thing.  
   b) Thomas Edison, an American inventor, invented the first electric bulb in 1879.  
   c) Electricity comes from the power stations.  
   d) Big electrical objects cannot work on battery, because it can store electrical energy in small amounts.  
   e) Answers will vary. Some possible answers are listed below:  
      **Objects working with battery:** toy car, TV remote control, digital clock, wall clocks, etc.  
      **Objects working with mains electricity:** refrigerator, computer, TV, air conditioner, fan, tube light, washing machine, etc.

ACTIVITY *(page 70)*

The pupils will create their own warning signs on poster paper.
Unit 16

Topic: Simple machines

Teaching objectives:
• To recognize that machines are devices which are used to reduce human effort
• To identify the six simple machines
• To explain their uses and importance in daily life

Key vocabulary: machines, work, force, pushing, pulling, lifting, rolling

Materials: different types of screws, stapler, knife, scissors, hammer, a small pulley, any wheel, tongs, bottle opener

Lesson 1: 40 min

Introduction: 5 min
• Explain why machines are important. All machines are designed to make work easier by creating a force that is a push or pull. It makes an object move. Ask them to write the names of any ten machines they usually use at home. Are these machines helpful to you? How do they work? Are these machines helpful in saving time and effort?
• Display the following simple machines so that the pupils are able to observe their parts and learn how they work:
  knife, a pair of scissors, tongs, screw, hammer, bottle opener
The pupils will recognize the simple machines which they use often, and which are found commonly at home or in school.
• Cut and slice any fruit with a knife. Use a pair of scissors to cut a paper or a cloth. Use a stapler to staple some papers together. Open a bottle using a bottle opener.
• Explain that machines are devices that are used to make our work easier. They multiply forces for us. When we use the word ‘machine’, we usually think of a factory machine, a computer or a washing machine. In fact, some of the most useful machines are very simple and do not look
like machines at all. All machines, regardless of how big or small, are made from one or more of these six simple machines. Write the names of six simple machines on the board.

1. Lever  
2. Inclined plane  
3. Pulley  
4. Wedge  
5. Wheel and axle  
6. Screw

Wind up: 5 min
Sum up the concepts taught in this lesson by asking them some questions:

a) You want to cut your hair. Which simple machine will help you cut them?
b) Your father is driving his car. Which simple machine is helping the car to roll and move on the road?
c) You hoist Pakistan’s flag on the flagpole. Think which machine will help you to do this.
d) You play on a slide in the park. The slide is an example of which simple machine?
e) You cut your birthday cake. Which simple machine do you use to do that?
f) You want to open a soda bottle. Which simple machine will you use to do so?

Lesson 2: 40 min

Introduction: 5 min
• Recall the previous lesson by asking the pupils to name the six simple machines. Do they remember what the purpose of any machine is? Remind them that a machine helps to make work easy.

Main teaching: 30 min
• Discuss each simple machine at length.

Lever
The simplest kind of machine is the lever. It is useful when you want to move a heavy load or move something stiff.

Take two ice cream sticks or pieces of woods (six inches long). Put the pencil between the sticks near one end. Wrap the rubber bands tightly around the sticks to make a pivot. Now hold the gripper near the pivot to make it act like a pair of tweezers and try to pick up delicate objects.

Inclined plane
A ramp is a slope with one end higher than the other. It is used for moving heavy objects up and down. Many places, such as supermarkets or hospitals often have ramps reaching up to their door, as well as steps. People with wheel chairs have difficulty to get in and out of a building without ramps.

Pulley
The pulley helps us to lift heavy things straight up. Give them example from the daily life application. In villages, water from the well is drawn out in a bucket with the help of a rope fixed on a pulley. Window blinds or chik are open and closed by pulling the cord of a pulley.
Wedge
Blades and knives are some examples of wedges. A wedge is a simple machine that is used to cut and split a thing.

Wheel and axle
A wheel on the end of an axle makes a simple machine. Ask the pupils to share any common example of the wheel and axle. Car steering and door keys are some common examples of wheel and axle.

Screw
A screw is an inclined plane wrapped in a spiral. We use screws in lots of different ways. Ask the pupils to share some of the examples of different types of screws or you can arrange screws and let them see. It is used to join things strongly with nuts and bolts and to put tops on bottles.

- Ask the pupils to collect different kinds of screws and draw them. Arrange different pictures of simple machines and ask them to identify the kind of machine in their notebooks. As an exercise, you can ask them to do the following work in their notebooks:
  1. What are machines?
     Ans. Machines are devices which are used to reduce the human effort and make work easier.
  2. Write your own example of any simple machine next to each type:
     a) Inclined plane ________________ (ramp, sloping road, slide)
     b) Screw ________________ (drill, needle)
     c) Wheel and axle ________________ (tyres of cars, wagons, cycles, etc)
     d) Lever ________________ (seesaw, scissors, pliers, hammer, tongs)
     e) Pulley ________________ (flagpole, curtain rod, window blind)
     f) Wedge ________________ (nail, knife, fork, axe, saw, etc.)

Wind up: 5 min
Ask the pupils the following:

a) Why do we use machines? (To make our work easy.)

b) Name the six simple machines.

EXERCISE (page 72)

1. The bottle opener is an example of a lever.
2. The knife is an example of a wedge.
3. The sloping road is an example of an inclined plane. The bicycle’s tyres are an example of wheel and axle.
**ACTIVITY (page 72)**

1. The long lever is the best, though this must not be too long. Otherwise, if you put effort on to it, the tool may bend. The coin is the most difficult.

2. Let the pupils experiment by moving the pivot and marking the ruler (or other piece of wood). Which is the best spot for the pivot? The pupils should notice that the position of the pivot which gives the least effort is also the position which produces the least movement.

**Answers to Worksheet Unit 16**

<table>
<thead>
<tr>
<th>SCREW</th>
<th>LEVER</th>
<th>FORCE</th>
<th>AXLE</th>
<th>PULL</th>
<th>WHEEL</th>
<th>PUSH</th>
<th>WEDGE</th>
<th>WORK</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>W</td>
<td>X</td>
<td>O</td>
<td>W</td>
<td>P</td>
<td>Q</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>O</td>
<td>T</td>
<td>Q</td>
<td>E</td>
<td>S</td>
<td>L</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>R</td>
<td>L</td>
<td>R</td>
<td>D</td>
<td>N</td>
<td>E</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>K</td>
<td>B</td>
<td>O</td>
<td>G</td>
<td>T</td>
<td>V</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>C</td>
<td>T</td>
<td>U</td>
<td>E</td>
<td>W</td>
<td>E</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>P</td>
<td>U</td>
<td>L</td>
<td>H</td>
<td>R</td>
<td>F</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Unit 17

Topic: Sounds

Teaching objectives:
• To explain what vibration is
• To demonstrate that sound is created due to vibration
• To identify the mediums through which sound can travel
• To demonstrate that the speed of vibration changes the volume and the pitch of sound

Key vocabulary: vibrations, sound waves, energy

Materials: tuning fork, rubber pad, sheet of paper, two mobile phones, a polythene sheet, a bowl, a rubber band, two paper glasses, steel clips, thread, two spoons, a trough of water, a ringing bell

Lesson 1: 40 min

Introduction: 5 min
• Ask the pupils to close their eyes for one minute and instruct them to remember the sounds they can hear. They should then quickly note down the sounds. You may guide them to use appropriate words, for example, shouting, talking, bell ringing, clattering of pencil boxes, etc.

Main teaching
• Activity: (Circus Format)
  For this activity, you need at least two periods. Try to arrange consecutive periods. Set five stations in the class with one activity on each of the table.

Station 1
Materials: a rubber pad, a tuning fork and a sheet of paper

What to do:
Take the tuning fork and strike it with a rubber pad. Bring the vibrating fork close to your ears. Do you hear any sound? Pull one end of the sheet of paper and touch the vibrating tuning fork.
to the other end of the paper. Does the paper produce any sound? Pupils should record their observations. Explain that vibration is the quick, back and forth movement of an object.

Station 2  
**Materials:** Two paper cups, two clips and a thread. (Make holes in the middle of the cups with the help of clips. Pass the thread through the hole to connect one cup to the other).

**What to do:**
One child will hold one end of the cup and the second one will hold the other end to his ear. The first child will say something in the cup. Can she be heard at the other end clearly? Repeat the experiment a few more times. Pupils should record their observations. Explain that sound can travel through the air.

Station 3  
**Materials:** two mobile phones, a bowl, rubber band, a polythene sheet and some grains of sugar

Put one mobile phone in the bowl. Wrap the bowl in a tightly stretched polythene sheet with the help of a rubber band. Spread the sugar grains on the polythene sheet.

**What to do:**
Dial the number of the mobile phone that is inside the bowl. What happens to the grains when the phone rings? Pupils should record their observations. Explain that vibrations spread out like waves and cause the sugar grains to shake.

Station 4  
**Material:** a ruler

**What to do:**
One child should hold the ruler firmly over the table’s edge, (see page 73 of the textbook), and flick the end sticking out over the table. Another child should place one ear against the surface of the table and listen carefully. The first child should strike the wooden surface again. Is the sound produced louder? Pupils should record their observations.

Station 5  
**Materials:** two troughs (one filled with water and the other one empty), two spoons

**What to do:**
Take a glass trough. One child should click the two spoons together in the empty trough. Others should listen to the sound it makes. Click the spoons again, but this time in the water-filled trough. The pupils should bring their ears close to the water’s surface and listen to the sound. Is the sound louder this time? The pupils should record their observations. Explain that sound waves can travel in water and in air. They can also travel in solids.

• Instruct the pupils to stay five minutes at each station, after which they will have to move to the other stations as soon as you ring the bell. As the pupils are very young, it is better to instruct them about all that they have to do beforehand. Also instruct them about the presentations which they have to give in front of the class in the next period.
Wind up: 5 min
• Recap all that has been learnt about the properties of sound in this lesson.

Lesson 2: 40 min

Introduction: 15 min
• Give the pupils fifteen minutes for preparing the presentation. Allocate five minutes to each group to share their observation in front of the class for one station. After the end of each presentation, the teacher can provide her/his own input, if any group faces difficulty in its presentation.

Main teaching: 20 min
• Sound is produced by vibrating objects. Sound travels from one place to another through material things (solids, liquids and gases). These things are called the ‘medium’ for the sound waves. If there is no medium around the vibrating bodies, sound waves cannot reach your ears. Also make them aware that sound waves travel in all directions; for example, when the school bell rings at the end of the break, the sound can be heard from whichever corner of the playground they happen to be.
• Encourage the pupils to distinguish between loud and soft sounds. Elicit answers from them and write them on the board. The sound of flute playing or the chirping of a bird is pleasant to hear. The sound of thunder or the blare of loud music is unpleasant to hear. The human ear cannot bear very loud sounds, as they can damage the eardrum.

Wind up: 5 min
• Conclude the lesson by asking what the class has learnt about how sound is produced and the way in which it travels.

EXERCISE (page 75)
1 A deep, low sound is produced when there is along part of the ruler protruding over the edge of the table; a high sound is produced when there is a shorter part of the ruler protruding over the edge. Make sure the ruler is held down firmly, near the table’s edge.
2 The word ‘vibrate’ means quick, to and fro movement.
3 Sound travels in waves.
4 horn, music, fire cracker, etc.

ACTIVITY (page 76)
1 and 2 These activities will help children understand that vibrations create sounds.
3 This is a fun activity and will help young learners to appreciate different sounds.
Unit 18
Topic: Light and shadow

Teaching objectives:
• To introduce the properties of light
• To explain the difference between transparent, translucent and opaque objects
• To explain that the size of a shadow depends upon the distance between a light source and an opaque object

Key vocabulary: transparent, translucent, opaque, blocked, rays, close, far

Materials: a piece of frosted glass, a piece of clear glass, a notebook, three card sheets of same size, a candle, a match box, a torch, prism, mirror, tracing paper, some plastic sheet or screen, a pencil and a glass of water

Lesson 1: 40 min

Introduction: 5 min
• Review the pupils’ knowledge of light and dark by asking questions. When is it light? When is it dark? How can we make the room bright or dark? Discuss the fact that darkness is the absence of light. Use their answers to introduce the idea of light sources. Next, ask the pupils to come up with the names of as many light sources as they can. Make a list of their ideas and show them some examples, such as torch, bulb and candle.

Main teaching: 30 min
• Read the lesson with the class. Discuss the illustrations at length.
• Demonstrate the following experiment in front of them:
  Make holes in three card sheets at the same position. Arrange them in such a way that all the three holes lie in a straight line at small distances. Burn a candle on one side. The light rays will pass through the holes. Put a screen on the other side. Let the pupils observe the experiment. Now, move one of the card sheets in such a way that all three holes do not lie in a straight line. Light will be blocked. Explain that light can only travel in straight rays.
• Shine the torch on a clear glass piece. Is the light able to pass through this clear piece of glass? Yes. So, clear glass is a transparent material.
• Light a torch and let the light rays fall on a book. The light rays will not pass through the book. The book is blocking the light rays, so it is an opaque object.
• Light the torch and let the light rays fall on a piece of frosted glass or a tracing paper. Only some light is able to pass through, so frosted glass and tracing paper are translucent objects.
• Explain that light travels very fast in straight lines called rays. Light can pass through some objects, (e.g. glass). These objects are called transparent. Light cannot pass through most solid objects (e.g book or copy). We say these objects are opaque. When some of the light can pass through an object, like tracing paper and frosted glass, we say it is translucent.

Note:
You can use the Circus Format Activity in place of teacher’s demo.
Lesson 2: 40 min

Introduction: 5 min
• Recall the things taught in the previous lesson by asking a few pertinent questions:
  a) Can light bend? How does light help us?
  b) Do you remember why some objects are called transparent, opaque and translucent?
  c) What are straight lines of light called?

Main teaching: 30 min
• You need a torch for demonstrating what makes a shadow big or small. Darken the room to the extent that shadows can form.
• Make a child stand in front of the wall. Switch on the torch, holding it close to the child. Draw the attention of the class to the size of the shadow that is cast. Explain that when an object is close to a source of light, it will block more light rays. Therefore, the shadow formed will be big.
• Now call another pupil, making her stand at the same place. Hold the torch at some distance from her. Draw the attention of the class to the size of the shadow that is cast. Explain that when an object is far away from the source of light, it will block fewer light rays. Therefore, the shadow formed will be small.
• The pupils can now do the related exercises.

Wind up: 5 min
Summarize what they have learnt about light by writing the following statements on the board:
   a) Light can only travel in straight lines.
   b) We cannot see without light.
   c) Light cannot bend around things.
   d) Shadows are cast when light is blocked by an object.
   e) Light cannot pass through opaque objects. It can pass through transparent objects. Some light can pass through translucent objects.
   f) Light travels very fast and it is a form of energy.
   g) The biggest source of light is the Sun.
Note: Warn them never to look directly at the Sun.

EXERCISE (page 79)

1 a) Light travels in straight lines.
   b) Light cannot bend round corners.
2 Straight lines of light are called rays.
3 Shadows are formed when light is blocked.
4 Answers will vary.
Note: Always guide the pupils to answer in complete sentences.
Unit 1
Our body

Cut out the bones and paste them in the correct places to make the skeleton.
Unit 4
Life cycles

A Order the steps of the life cycle of a butterfly by numbering them correctly.

The adult butterfly comes out of the chrysalis.

The caterpillar forms itself into a pupa chrysalis.

A butterfly begins life as an egg.

Finally, the butterfly flaps its wings and is ready to fly.

The egg hatches and a caterpillar comes out.

B Fill in the blanks by using the words in the box.

stages die life cycle copies

All animals have a _____________. A cycle is something that happens over and over again. In time, all living things become old and _____________. But they can make ____________ of themselves by having young ones. The life cycle of an animal is all the ____________ in its life.

C Draw and label the life cycle of the frog.
Unit 6
Seeds, fruits and flowers

A Label the parts of a flower.

B Guess who I am.
1. I protect the bud. ________________
2. I am a sweet liquid present in flowers. ________________
3. I contain the pollen. ________________
4. I am the brightly coloured outer part of the flower. ________________

C Draw a plant and label the shoot and the root.
Unit 10

The Moon

Label and colour the picture below.

Write what you know about the Moon.
Unit 11
Seasons

Study the pictures below and write about the season shown in each one.

**spring**

- ____________________________________________________________________
- ____________________________________________________________________
- ____________________________________________________________________

**summer**

- ____________________________________________________________________
- ____________________________________________________________________
- ____________________________________________________________________

**autumn**

- ____________________________________________________________________
- ____________________________________________________________________
- ____________________________________________________________________

**winter**

- ____________________________________________________________________
- ____________________________________________________________________
- ____________________________________________________________________
Unit 12
Water

1. Write ways in which water is wasted.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

2. Write ways in which water can be saved.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________
Unit 15
Electricity

Here are some rules to remember.

Be careful around electricity power poles and wires when you play!

If you see a dangerous situation, tell an adult.

Electricity and water do not mix!

Metal is a conductor of electricity and can be dangerous!

Stay away from electricity substations!

Can you think of any other safety rules that you should remember?
Unit 16
Simple machines

Search and circle the words in the puzzle below.

<table>
<thead>
<tr>
<th>SCREW</th>
<th>FORCE</th>
<th>PULL</th>
<th>PUSH</th>
<th>WORK</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>W</td>
<td>X</td>
<td>O</td>
<td>W</td>
</tr>
<tr>
<td>K</td>
<td>O</td>
<td>T</td>
<td>Q</td>
<td>E</td>
</tr>
<tr>
<td>A</td>
<td>R</td>
<td>L</td>
<td>R</td>
<td>D</td>
</tr>
<tr>
<td>X</td>
<td>K</td>
<td>B</td>
<td>O</td>
<td>G</td>
</tr>
<tr>
<td>L</td>
<td>C</td>
<td>T</td>
<td>U</td>
<td>E</td>
</tr>
<tr>
<td>E</td>
<td>P</td>
<td>U</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>F</td>
<td>O</td>
<td>R</td>
<td>C</td>
<td>E</td>
</tr>
<tr>
<td>Y</td>
<td>S</td>
<td>S</td>
<td>M</td>
<td>P</td>
</tr>
<tr>
<td>P</td>
<td>U</td>
<td>S</td>
<td>H</td>
<td>F</td>
</tr>
<tr>
<td>S</td>
<td>A</td>
<td>L</td>
<td>S</td>
<td>C</td>
</tr>
</tbody>
</table>

© Oxford University Press 2011: this worksheet may be reproduced for class solely for the purchaser’s institute