# OUR WORLD OF SCIENCE

# Teacher Guide

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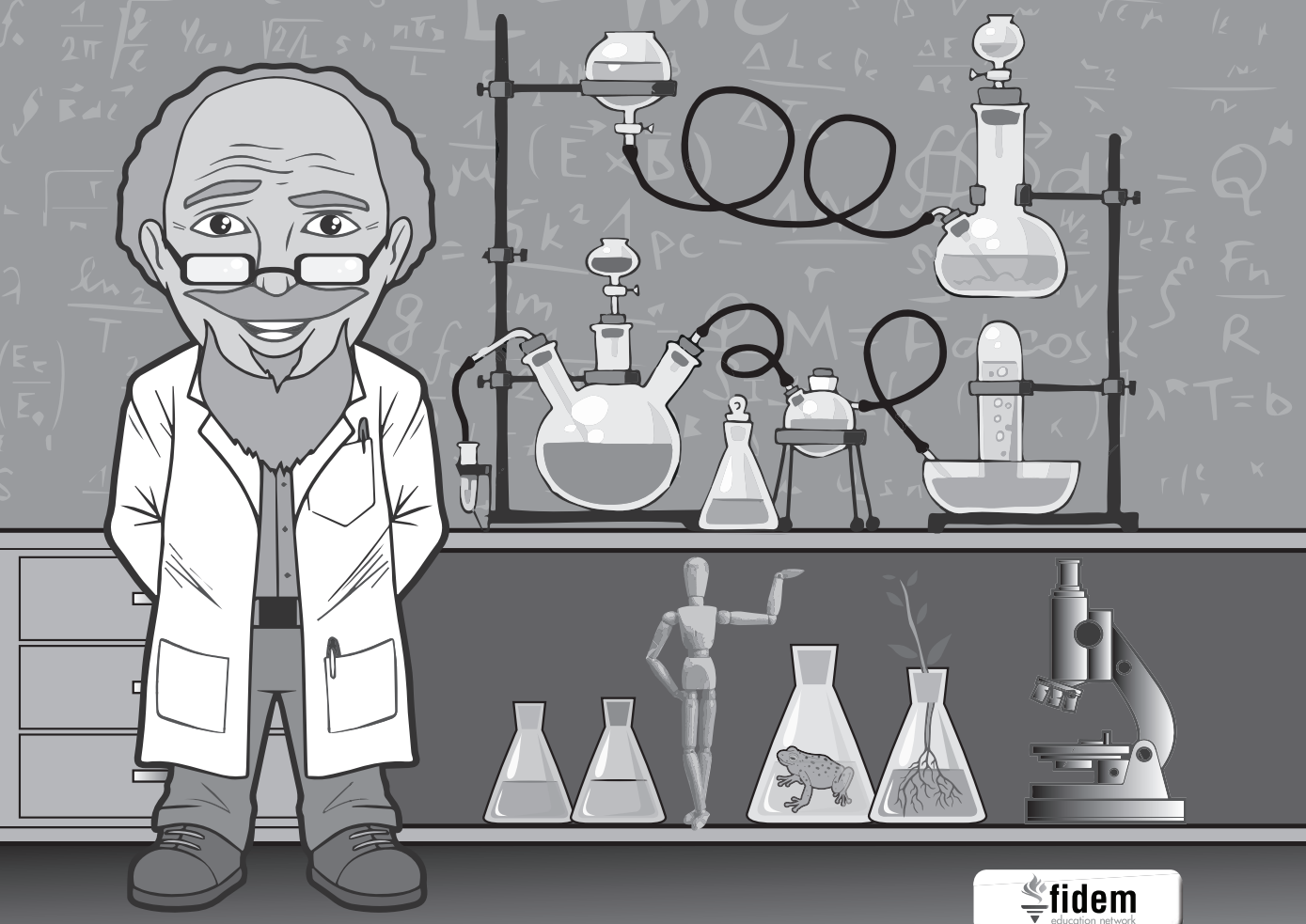

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Chapter 1

# Why Do We Study Science?

## Objectives:

By the end of the chapter, students should be able to:

- Define the term 'science' and discuss its key characteristics.
- Differentiate amongst the various basic science process skills.
- Explain what laboratories are used for and the safety measures that should be taken into account while working in a laboratory.
- Identify the laboratory apparatus and describe the usage of each equipment.
- Talk about the various fields of science as well as renowned Muslim scientists.
- Explain how the advancement in technology has brought about changes in our daily lives.

**No. of lessons:** 3

**Duration:** 40 minutes

**Resources:** Textbook, illustrations and images.

## Lesson 1

### Teaching Objectives:

To discuss the term 'science' and its key characteristics. To learn the basic science process skills.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 1 |
| 10 minutes | Warm up and Introduction:<br>Start the lesson with a discussion about what science is.<br>Allow the students to give their understanding about Science.<br>Next point for discussion can be the importance of science in daily life. After hearing the views and observations of the students turn their attention to the textbook and introduce the chapter. You may ask some students to read the first few pages aloud. |
| 25 minutes | Explanation:<br>Give the meaning of science. Talk about the key characteristics of science along with examples.<br>Explain to the students that science is a way of improving and expanding our understanding about our world and the universe<br>through observation and providing proof to verify the data collected .<br>Using the leaves activity given in the textbook, explain to the students how the science process skills starts with observing and ends with communicating ones findings. |
| 5 minutes | Conclusion:<br>Recap the main points discussed by asking questions related to the lesson.<br>Homework:<br>Tell the students to read the chapter and mark any difficulties that they come across.<br>Questions 4 on page 20 can be given for homework. |

## Lesson 2

### Teaching Objectives:

To explain the safety measures that should be taken in a laboratory.

To know the functions of different apparatus and various fields of science.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 2 |
| 5 minutes | **Recap:**<br>Recap and review the work done in the previous class. |
| 30 minutes | **Explanation:**<br>Begin the lesson by asking the students the purpose of a science laboratory. Read pages 14 and 15. Explain the function of a laboratory. Discuss the safety measures that should be taken while working in the laboratory and stress the need to follow them. Give reasons why it is necessary to observe safety rules in the laboratory.<br>Define the term 'apparatus'. Draw a chart of laboratory apparatus on the board and state the name of each item and its function with the help of a class discussion. Involve the students by dividing the class into teams and ask them to guess the names of the apparatus and the functions of the items.<br>Next, ask the students if Mathematics is a branch of science. Open the floor for discussion and list all the fields of science on the board. |
| 5 minutes | **Conclusion:**<br>Review the main points of the lesson and resolve any queries that the students may have regarding the chapter.<br>**Homework:**<br>Questions 1, 2, 3 and 5 on page 20 can be given for homework. |

## Lesson 3

### Teaching Objectives:

Discuss the different field of science.

To highlight the famous Muslim scientists. Discuss the role of technology.

Explain 'decanting' through an experiment. Assess the students on the topic of 'Why do we study Science?' through written assignments.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 3 |
| 5 minutes | **Recap:**<br>Recap and review the work done in previous class. |
| 25 minutes | **Discussion:**<br>Tell the students about the different branches of science. Highlight the fact that in this section they will study Biology which is the study of life. Ask the students if they have heard or read about any Muslim scientists. Draw their attention to page 17 and tell the students about the famous Muslim scientists and their areas of expertise.<br>Next talk about important inventions of the past century (listed on page 18).<br>Discuss the role of technology in our lives and how it has made our lives easier. Students should also understand that technology has limitations too, and they should be grateful for whatever they have been provided with by the Creator. |
| 10 minutes | **Class activity:**<br>For this experiment you will be needing the following items:<br>beakers - 1 spoonful of sand – water - spoon<br>filter paper - filter funnel<br>In a beaker, mix the water and sand together using a spoon. Keep a funnel ready with filter paper and place it on top of another beaker. Now pour the liquid and explain the process of decanting to the students. Ask them to share some decanting examples from their daily lives.<br>**Conclusion:**<br>**Homework:**<br>Worksheet can be given for homework.<br>**Follow-up Activity:** Ask the students to read about famous Muslim scientists and prepare charts for the classroom.<br>Students should increase their knowledge about important scientific inventions. Interesting charts can be made on this theme. |

## WORKSHEET 1

1. **Arrange the science process skills in the correct order.**

| | | |
|---|---|---|
| Classifying | Predicting | Making Inferences |
| Observing | Communicating | Measuring and using numbers |

a. _____ b. _____ c. _____

d. _____ e. _____ f. _____

2. **"Science can provide answers to all questions." Is this statement true or false? Give reasons to support your answer.**

3. **What is the difference between zoology and botany?**

## WORKSHEET 2

1. Write a note on the importance of Science and why we should study it.

2. Write a note on one famous Muslim scientist.

Chapter 2

# The Basic Unit of Life

**By the end of the chapter, students should be able to:**

- Define the term 'cell' and discuss the characteristics of living things.
- Differentiate between unicellular and multicellular organisms.
- Explain the functions of the main parts of a compound microscope.
- Talk about the cross section of an animal cell as well as a plant cell in detail.

**No. of lessons:** 3

**Duration:** 40 minutes

**Resources:** Textbook, illustrations and images.

## Lesson 1

### Teaching Objectives:

To discuss the characteristics of living things and non-living things.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 1 |
| 10 minutes | **Warm up and Introduction:**<br>You can begin the lesson with a discussion about living things. Encourage the students to give their input. |
| 25 minutes | **Explanation:**<br>Talk about the various characteristics of living things. Next, discuss non-living things and their main features. After this, the students can be asked to differentiate between living and non-living things. Note the main points on the blackboard,<br>Next, the six characteristics of living things given in the book can be discussed in detail. |
| 5 minutes | **Conclusion:**<br>Recap the main points discussed in the class by asking questions related to the lesson.<br>**Homework:**<br>Tell the students to read the first two pages of the chapter and mark any difficulties that they come across.<br>Worksheet 1 can be given for homework. |

## Lesson 2

### Teaching Objectives:

To explain the term 'cell' and unicellular and multicellular organisms.

Identify the main parts of a compound microscope.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 2 |
| 5 minutes | **Recap:**<br>Recap and review the work done in previous class. |
| 30 minutes | **Explanation:**<br>Read page 24, and explain the term 'cell' that it is the base of all human life. Tell the students that all living things are composed of cells.<br>Next, explain unicellular and multicellular organisms along with examples.<br>Discuss how cells can be observed with a microscope. Highlight the main parts of a compound microscope along with the function of each component. |
| 5 minutes | **Conclusion:**<br>Review the main points of the lesson and resolve any queries that the students may have regarding the units studied so far.<br>**Homework:**<br>Question 1 on page 30 can be given for homework. |

## Lesson 3

### Teaching Objectives:

To differentiate between an animal and a plant cell .

Assess the students on the topic 'The basic unit of life' through class discussions and written assignments.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 3 |
| 5 minutes | **Recap:**<br>Recap and review the work done in the previous class. |
| 25 minutes | **Discussion:**<br>Ask the students if they have any idea of how a plant cell is different from an animal cell.<br>Now read the pages 26 and 27. Discuss the cross section of a plant and an animal cell in detail.<br>Students should be able to identify the cell by looking at it. |
| 10 minutes | **Conclusion:**<br>**Homework:**<br>Questions 2, 3 and 4 can be given for homework.<br>**Extended Assignment:**<br>Build a model of an animal cell using edible or non-edible items. Each part of an animal cell should be labelled.<br>To make the cell, clay, styrofoam, chart paper, shoebox etc can be used.<br>To show the different parts, beads, uncooked pasta, buttons, etc can be used. |

## WORKSHEET 1

A. Differentiate between living and non-living things.

| Living things | Non-living things |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

B. Define the term 'cell'.

Chapter 3

# From Cells to Organisms

## Objectives:

Define the terms ‘cells’, ‘tissues’ and ‘organs’.

- Talk about the various functions of cells.
- Explain the different types of animal and plant tissues.
- Differentiate between the organs present in animals and plants
- Identify the different systems in a human body.

**No. of lessons:** 2

**Duration:** 40 minutes

**Resources:** Textbook, illustrations and image

## Lesson 1

### Teaching Objectives:

To discuss the terms 'cell' and 'tissue' along with their functions.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 1 |
| 10 minutes | **Warm up and Introduction:**<br>Start the lesson by continuing the topic of cells. You can tell the students that there are different types of cells. Ask them to name the cells that they can remember. |
| 25 minutes | **Explanation:**<br>As you proceed with the lesson, read the paragraph and explain the various cells present in the human body and plants. Discuss the functions of each cell.<br>Next, talk about the various tissues present in animals and plants. Discuss why the tissues present in animals differ from those in plants. |
| 5 minutes | **Conclusion:**<br>Recap the main points discussed by asking questions related to the lesson.<br>**Homework:**<br>Tell the students to read the chapter and mark any difficulties that they come across.<br>Questions 1 and 2 on page 39 may be given for homework. |

## Lesson 2

### Teaching Objectives:

To explain the organs and systems in a living organism and assess students on the topic 'From Cells to Organisms' through class discussions and homework assignments.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 2 |
| 5 minutes | Recap:<br>Recap and review the work done in previous class. |
| 30 minutes | Discussion:<br>Read the rest of the chapter and discuss the organs in a human body along with their functions.<br>Next, talk about the basic organs found in a plant.<br>Students should understand how certain tissues group together to form various organs<br>Tell the students that organs are linked together to form a system in the human body.<br>Identify the organs that are involved in each of the systems mentioned on page 36. |
| 5 minutes | Conclusion:<br>Homework:<br>Questions 3 and 4 on page 39 can be given for homework.<br>Class Activity:<br>Worksheet 1 can be given as a marked classwork assignment. |

## WORKSHEET 1

**A. Complete the chain given below.**

cell → _____ → organs → _____ → organisms

**B. Solve the following riddles.**

1. I am the largest organ in a human body. Who am I ?

_____

2. I am responsible for cleansing blood in a human body. Who am I ?

_____

3. I am made up of xylem and phloem cells. Who am I ?

_____

4. I am responsible for carrying oxygen in blood. Who am I ?

_____

5. I allow the body to move. Who am I ?

_____

Chapter 4

# Making and Breaking of Food

**By the end of the chapter, students should be able to:**

- Talk about how plants are not only food producers but also impact our environment.
- Define the term 'photosynthesis' and discuss the factors affecting this process.
- Explain how a starch test works in identifying photosynthesis.
- Discuss the process of respiration.
- Differentiate between the processes of photosynthesis and respiration.
- Understand the internal structure of a leaf.

**No. of lessons:** 3

**Duration:** 40 minutes

**Resources:** Textbook, illustrations and images.

## Lesson 1

### Teaching Objectives:

To discuss how plants make their own food and factors affecting the process of photosynthesis.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 1 |
| 10 minutes | **Warm up and Introduction:**<br>Start the lesson with how plants affect the environment and their importance.<br>Talk about how a food chain starts with plants. |
| 25 minutes | **Explanation:**<br>Talk about the process of photosynthesis.<br>Discuss the importance of chlorophyll and how light, carbon dioxide and temperature affect the process of photosynthesis. |
| 5 minutes | **Conclusion:**<br>Recap the main points discussed by asking questions related to the lesson.<br>**Homework:**<br>Tell the students to read the chapter and mark any difficulties that they come across.<br>Question 1 on page 48 may be given for homework. |

## Lesson 2

### Teaching Objectives:

To explain whether a plant is photosynthesizing or not by using a starch test.

Discuss the process of respiration and the difference between photosynthesis and respiration.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 2 |
| 5 minutes | **Recap:**<br>Recap and review the work done in previous class. |
| 30 minutes | **Explanation:**<br>Read pages 42 - 44. Explain how iodine reacts with starch. Discuss the starch test experiment in detail.<br>Carry out the lab experiment given on page 43.<br>Describe the process of respiration, aerobic and anaerobic respiration.<br>Discuss how the rate of photosynthesis and respiration changes under various light conditions. |
| 5 minutes | **Conclusion:**<br>Review the main points of the lesson and resolve any queries that the students may have regarding the chapter.<br>**Homework:**<br>Questions 2 and 3 on page 48 can be given for homework. |

## Lesson 3

### Teaching Objectives:

To highlight the internal structure of a leaf.

Assess students on the topic 'Making and Breaking of Food' through class discussions and written assignments.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 3 |
| 5 minutes | **Recap:**<br>Summarize and review the work done in the previous class. |
| 25 minutes | **Discussion:**<br>Read pages 45 - 46. Discuss the importance of a leaf and its role in the production of food for the plant.<br>Describe the cross section of a leaf. Explain the functions of cuticle, epidermis, palisade mesophyll, spongy mesophyll, vascular tissue and stomata in detail. |
| 10 minutes | **Conclusion:**<br>Quiz the students on the key terms of the lesson.<br>**Homework:**<br>Question 4 on page 48 can be given for homework. |

## Class activity:

Students can collect different leaves and paste them on chart paper to make a collage in the shape of a tree.

## Group work:

Divide the class into groups. Each group should make a chart to depict the role of trees in our lives and their importance.

## Research Work:

Students should be encouraged to take interest in nature. They can collect information about various trees and plants and note it in their exercise books.

Leaves of different plants and trees can be pasted in notebooks along with the name of each.

## WORKSHEET 1

**A. Write the term that best suits the statement.**

**stomata aerobic respiration transpiration chlorophyll glucose**

1. The loss of extra water from leaves. _____
2. A form of natural sugar. _____
3. Tiny openings surrounded by a pair of guard cells. _____
4. Process during which oxygen is taken in by plants. _____
5. A green pigment inside chloroplast. _____

**A. Write the word equation for photosynthesis.**

_____

**B. Write the word equation for respiration.**

_____

C. Write a detailed note on how trees are the source of life.

## WORKSHEET 2

A. Write a note on how a leaf is a food factory for the plant

B. Write the things that are provided to us by a tree.

_____

_____ _____

_____ _____

_____ _____

Chapter 5

# Living Organisms in Their Environment

**By the end of the chapter, students should be able to:**

- Define the terms habitat, population and community.
- Know about abiotic environment and the physical factors that affect it.
- Explain biotic environment and the feeding and symbiotic relationship.
- Talk about ecology, ecosystem and the effect of human activities on the ecosystem.

**No. of lessons:** 3

**Duration:** 40 minutes

**Resources:** Textbook, illustrations and images.

## Lesson 1

### Teaching Objectives:

To discuss the terms 'habitat', 'population' and 'community'.

Explain abiotic environment and the factors affecting it.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 1 |
| 10 minutes | **Warm up and Introduction:**<br>You can begin the lesson by asking the students what they understand by the term 'environment.'<br>Encourage them to talk about different environments.<br>Next explain the term 'habitat' giving examples like forests, deserts, sea and river habitats. |
| 25 minutes | **Explanation:**<br>Read the first few pages. Explain the terms species, population and community.<br>Discuss the various factors that make up the environment.<br>Next Abiotic environment will need to be explained and the role played by physical factors such as temperature, light, water, minerals and air that affect organisms living in such an environment. |
| 5 minutes | **Conclusion:**<br>Recap the main points discussed by asking questions related to the lesson.<br>**Homework:**<br>Tell the students to read pages 50-54 and mark any difficulties that they come across.<br>Questions 1 and 2 on page 62 may be given for homework.<br>Students can be asked to collect pictures of different habitats from newspapers/magazines and bring to class. |

## Lesson 2

### Teaching Objectives:

To describe the feeding and symbiotic relationship and define the terms 'ecology' and 'ecosystem'.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 2 |
| 5 minutes | **Recap:**<br>Recap and review the work done in previous class. Show the pictures of habitats brought by the students and discuss them. |
| 30 minutes | **Explanation:**<br>Read the pages on Biotic Environment and discuss the feeding relationship in detail.<br>Students should be able to differentiate between producer-consumer and predator-prey relationship along with examples.<br>Now discuss the three types of symbiotic relationships along with the terms ecology and ecosystem. |
| 5 minutes | **Conclusion:**<br>Review the main points of the lesson and resolve any queries that the students may have regarding the chapter.<br>**Homework:**<br>Questions 3 and 4 on page 62 can be given for homework.<br>Tell the students to paste the pictures of habitats in their notebooks. |

## Lesson 3

### Teaching Objectives:

To explain the human impact on the ecosystem and assess the students on the topic 'Living organisms in their environment' through class discussions and written assignments.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 3 |
| 5 minutes | Recap:<br>Recap and review the work done in previous class. |
| 25 minutes | Discussion:<br>Discuss how human activities are adversely affecting the ecosystem. Ask students to give real life examples.<br>Now read the remaining chapter and talk about endangered and extinct species in Pakistan.<br>List ways of protecting the endangered species. |
| 10 minutes | Conclusion:<br>Quiz the students on the chapter they have studied.<br>Homework:<br>Students can do research work on extinct animals for presentations.<br>Ideas for Class activity: Charts<br>Students can prepare various charts related to the chapter, like:<br>Endangered animals<br>Save the Forests<br>Save the Planet<br>Protect the Environment<br>The charts can be displayed around the school. |

## TIPS FOR TEACHERS

**Presentations:** Students should prepare presentations to give in class on various topics that they have studied.

**Field trips:** In order to create awareness about the environment, field trips can be organized to

**Talks:** Experts related to the protection and preservation of wildlife can be asked to give talks in the school to increase knowledge and awareness among students.

## WORKSHEET 1

A. Draw a picture of each habitat and write a short note about it.

| Desert Habitat | Ocean Habitat |
|---|---|
| Forest Habitat | Mountain Habitat |

## WORKSHEET 2

A. Write a note on the importance of water.

B. Draw and label a food chain consisting of primary, secondary and tertiary consumers as well as a decomposer.

## WORKSHEET 3

A. Draw/ paste pictures of endangered animal in Pakistan. Write a short note below each picture

| GREEN TURTLE | MARKHOR |
|---|---|
| INDUS DOLPHIN | BLUE WHALE |

Chapter 6

# Elements, Mixtures and Compounds

**By the end of the chapter, students should be able to:**

- Define the terms ‘matter’, ‘elements’, ‘compounds’, ‘substance’ and ‘mixture’.
- Explain the periodic table and classification of elements according to their properties.
- Differentiate between metals and nonmetals as well as compounds and mixtures.
- List the uses of metals and nonmetals.

**No. of lessons:** 3

**Duration:** 40 minutes

**Resources:** Textbook, illustrations and images.

## Lesson 1

### Teaching Objectives:

To discuss the terms ‘matter’, ‘elements’, ‘compounds’, ‘substance’ and ‘mixture’ with examples.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 1 |
| 10 minutes | **Warm up and Introduction:**<br>Start the lesson by telling the students that today they will begin the first chapter of Chemistry. It is the science of composition, properties, reactions and structure of matter.<br>Explain the term ‘matter’ and the physical states of matter. |
| 25 minutes | **Explanation:**<br>Read the first few pages and explain elements and compounds along with examples.<br>Now talk about substance and how mixtures can be homogeneous and heterogeneous.<br>Tell the students about symbols of elements and write some of them on the board. |
| 5 minutes | **Conclusion:**<br>Recap the main points discussed by asking questions related to the lesson.<br>**Homework:**<br>Tell the students to read pages 64-66 and mark any difficulties that they come across.<br>Question 1 on page 74 can be given for homework. |

## Lesson 2

### Teaching Objectives:

To explain the classification of elements in a periodic table and the differences between metals and nonmetals.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 2 |
| 5 minutes | Recap:<br>Recap and review the work done in previous class. |
| 30 minutes | Explanation:<br>Read pages 67-69 explaining each paragraph as you go along.<br>Introduce the Periodic Table and tell them how elements are arranged in it.<br>Explain the terms 'periods' and 'groups'. Students need to know the reasons behind the classification of elements.<br>Talk about noble gases, their properties and how they are arranged in a periodic table according to their properties.<br>Now talk about how elements are divided into metals and nonmetals; the differences between them and their usage along with daily life examples. |
| 5 minutes | Conclusion:<br>Review the main points of the lesson and resolve any queries that the students may have regarding the chapter.<br>Homework:<br>Questions 2, 3 and 4 on page 75 can be given for homework. |

## Lesson 3

### Teaching Objectives:

To distinguish between compounds and mixtures along with examples and assess the students on the topic 'Elements, Mixtures and Compounds' through class discussions and written assignments.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 3 |
| 5 minutes | **Recap:**<br>Recap and review the work done in previous class. |
| 25 minutes | **Discussion:**<br>Read the next pages and discuss compounds and mixtures in detail.<br>Students should understand the differences between these two terms along with examples.<br>Introduce chemical formulas of some compounds and write them on the blackboard. |
| 10 minutes | **Conclusion**<br>**Homework:**<br>Questions 5, 6 and 7 on page 75 can be given for homework.<br>**Class activity:**<br>Worksheet 1 can be given as a classwork assignment.<br>**Extended assignment:**<br>Ask the students to find five interesting facts about the periodic table and list them in their note books. |

## WORKSHEET 1

**A. Solve the following riddles:**

a. I am a metal made by combining two or more elements. Who am I?

_____

b. I am the basic unit of any matter. Who am I?

_____

c. I am known as the father of the periodic table. Who am I?

_____

d. I am used to make the filament of bulbs. Who am I?

_____

e. I am a nonmetal liquid at room temperature. Who am I?

_____

f. I am formed when carbon and insufficient oxygen are chemically combined. Who am I?

_____

g. I have the properties of metals as well as non-metals. Who am I?

_____

**B. State the chemical formula of the following compounds:**

a. Glucose: _____

b. Water: _____

c. Sodium chloride: _____

d. Carbon dioxide: _____

## WORKSHEET 2

A. Write the difference between metals and non-metals.

| METAL | NON-METAL |
| --- | --- |
| | |

Chapter 7

# Solution and Suspension

Objectives:

- Talk about the arrangement of particles in solids, liquids and gases.
- Explain the differences between a solution and a suspension.
- Understand the concept of solubility and the factors affecting it.
- Distinguish between a diluted and concentrated solution.

No. of lessons: 2

Duration: 40 minutes

Resources: Textbook, illustrations and images.

## Lesson 1

### Teaching Objectives:

To discuss how the particle model explains the arrangement of particles in solids, liquids and gases and how solutions are formed.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 1 |
| 10 minutes | **Warm up and Introduction:**<br>Before coming to the main lesson, ask the students some basic questions related to Matter; for example in how many forms it exists and to name the states of matter. Ask them to give examples of each. |
| 25 minutes | **Explanation:**<br>Begin the lesson by telling the students that matter is composed of tiny particles. The arrangement of particles in each state of matter is different.<br>Draw the arrangement of particles in each state on the board and explain how the properties differ.<br>Read pages 76-79. Talk about the two common mixtures namely solution and suspension.<br>Discuss the components of a solution along with daily life examples.<br>Students need to understand what a homogenous mixture is. |
| 5 minutes | **Conclusion:**<br>Do question 1 on page 85 orally with the students.<br>**Homework:**<br>Worksheet 1 and question 2 on page 85 may be given for homework. |

## Lesson 2

### Teaching Objectives:

To distinguish between solutions and suspensions.

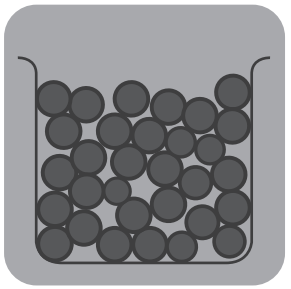
Describe solubility and the strength of solutions.

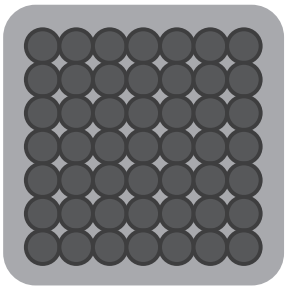
Assess students on the topic 'Solution and Suspension' through class discussions and assignments.

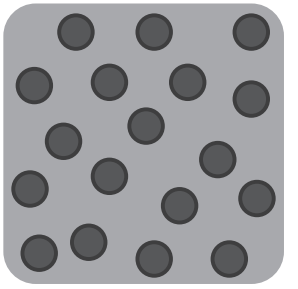
| Time | Methodology |
|---|---|
| 40 minutes | Lesson 2 |
| 5 minutes | **Recap:**<br>Recap and review the work done in the previous class. |
| 30 minutes | **Discussion:**<br>Complete the reading of the chapter. Explain 'suspension' along with daily life examples.<br>Discuss the properties of a heterogeneous mixture.<br>Explain the concept of solubility and the factors that affect it.<br>Distinguish between diluted and concentrated solutions. |
| 5 minutes | **Conclusion:**<br>Discuss question 4 on page 85 with the students. Seek answers from them<br>**Homework:**<br>Questions 3, 5 and 6 on page 85 may be given for homework. |

## WORKSHEET 1

A. Identify the state of matter by looking at the arrangement of the particles given below:







_____ _____ _____

B. Write true or false

a. Solute will always be a solid. _____

b. Solvent will always be a liquid. _____

c. Light passes through a homogenous solution. _____

d. The substance that dissolves is the solvent. _____

C. Explain the following terms:

1. solvent _____

2. solution _____

3. suspension _____

4. mixture _____

## WORKSHEET 2

A. What is known as the universal solvent and why? Answer the following:

1. What is known as the universal solvent?

B. What is an aqueous solution?

C. What is the difference between a homogenous solution and a heterogeneous solution?

## WORKSHEET 3

A. Sort the mixtures given below into solutions, suspensions or colloids. Add more examples in each column.

jelly sugar water
air oil milk

| | Solution | Suspension | Colloid |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |

B. Solve the following:

1. solute + solvent = _____

2. gas/liquid + insoluble solid particles = _____

Chapter 8

# Separating Mixtures

**Objectives:**

- Describe the various processes of separating mixtures.
- Explain the process of filtration along with daily life examples.
- Talk about rapid and slow evaporation.
- Understand how a saturated liquid solution is turned into solid.
- Describe how liquids are obtained from a solution
- Discuss the method for checking the quality of dyes.

**No. of lessons:** 2

**Duration:** 40 minutes

**Resources:** Textbook, illustrations and images.

## Lesson 1

### Teaching Objectives:

To highlight the different processes of separating mixtures and discuss filtration and evaporation.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 1 |
| 10 minutes | **Warm up and Introduction:**<br>Start the lesson with a recap on mixtures. Ask the students if they know of any processes used to separate the mixtures.<br>List the processes on the board. |
| 25 minutes | **Explanation:**<br>Once all the processes have been listed, link each process to a daily life example to help the students understand it better.<br>Read pages 86-89 and discuss filtration and evaporation in detail.<br>Explain key terms such as 'residue' and 'filtrate' to the students.<br>Distinguish between rapid and slow evaporation. |
| 5 minutes | **Conclusion:**<br>Recap the main points discussed by asking questions related to the lesson.<br>**Homework:**<br>Tell the students to read the first few pages and mark any difficulties that they come across.<br>Questions 2 and 3 on page 96 can be given for homework. |

## Lesson 2

### Teaching Objectives:

To explain the process of crystallization, distillation and chromatography.

To assess students on the topic 'Separating Mixtures' through class discussions and written assignments.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 2 |
| 5 minutes | **Recap:**<br>Recap and review the work done in previous class. |
| 30 minutes | **Discussion:**<br>Read the rest of the chapter and discuss how small and large crystals can be obtained through the process of crystallization.<br>Explain the difference between simple and fractional distillation.<br>Now talk about the process of chromatography which is used to test substances for purity.<br>**Classwork:**<br>Question 1 on page 96 can be done in class. |
| 5 minutes | **Conclusion:**<br>**Homework:**<br>Questions 4, 5 and 6 on page 96 can be given for homework.<br>**Extended Assignment:**<br>Worksheet 1 can be given as a marked homework assignment. |

## Class Activity:

It is suggested that in the next class students should discuss the questions raised in Think Quest on page 96.

The teacher can have a quiz based on the chapter.

## WORKSHEET 1

A. Answer the following questions.

1. Why is it not possible to separate sugar from a solution using rapid evaporation?

2. State two ways in which the process of filtration takes place in the human body.

Chapter 9

# Measurement

Objectives:

- Define physical quantities such as length, mass, time and temperature.
- Explain the importance of using The International System of Units.
- Discuss the SI units for various physical quantities.
- Apply mathematical techniques to convert one unit of measurement to another.
- Describe the various instruments used to measure physical quantities.

No. of lessons: 2

Duration: 40 minutes

Resources: Textbook, illustrations and images.

## Lesson 1

### Teaching Objectives:

To discuss physical quantities, their SI units and instruments used to measure length.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 1 |
| 10 minutes | **Warm up and Introduction:**<br>Begin the lesson by telling the students that they will now study PHYSICS which is a branch of science that deals with the study of matter and energy and the interaction between them. |
| 25 minutes | **Explanation:**<br>Read pages 98-101. Discuss the importance of measurement giving examples of daily life. Talk about the measurement of objects in the past and the latest techniques used now.<br>Explain the importance of using The International System of units for measurement know as SI.<br>Next talk about length, its SI unit, how it is measured and mathematical conversion of one unit to another. |
| 5 minutes | **Conclusion:**<br>Recap the main points discussed by asking questions related to the lesson.<br>**Homework:**<br>Tell the students to go through the pages read in class and mark any difficulties that they come across. |

## Lesson 2

### Teaching Objectives:

To introduce the terms mass, time and temperature, their SI units.

Introduce the instruments used to measure these physical quantities.

Assess the students on the topic 'Measurement' through class discussions and written assignments.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 2 |
| 5 minutes | **Recap:**<br>Recap and review the work done in previous class. |
| 30 minutes | **Discussion:**<br>Read the chapter and explain mass, time and temperature in detail.<br>Students should know the difference between mass and weight, the SI units of the physical quantities mentioned above.<br>Discuss the instruments used to measure them and mathematical conversions of units.<br>**Note:** If possible show the instruments of measurement and demonstrate how they are used.<br>If instruments are not available, pictures can also be shown to the students. |
| 5 minutes | **Conclusion:**<br>Go through the key terms covered in the lesson.<br>**Homework:**<br>Worksheet 1 can be given for homework.<br>**Class Activity:**<br>Questions 1, 2, 3, 4 and 5 on pages 108 and 109 can be used as quiz practise. |

## WORKSHEET 1

A. Answer the following questions.

1. Sara weighs 42 kgs on Earth. What will be her weight when she goes to the moon?

2. The mass of a machine is 6 kgs on Earth. What will be the mass of the same machine on the moon?

3. What is the difference between a clinical and a laboratory thermometer?

Chapter 10

# Energy

**Objectives:**

- Define the term 'energy' and describe different forms of energy.
- Explain the conversion of energy.
- Distinguish between renewable and non-renewable resources.
- Highlight ways of conserving energy.

**No. of lessons:** 2

**Duration:** 40 minutes

**Resources:** Textbook, illustrations and images.

## Lesson 1

### Teaching Objectives:

To explain the various forms and conversion of energy.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 1 |
| 10 minutes | **Warm up and Introduction:**<br>Start the lesson by defining the term energy.<br>Ask students to name the most important source of energy. |
| 25 minutes | **Explanation:**<br>Read pages 110-113. Discuss the major forms of energy namely kinetic and potential energy.<br>Students should understand the difference between the two forms.<br>List the various forms of kinetic and potential energy.<br>Explain how energy is converted from one form to the other using daily life examples. |
| 5 minutes | **Conclusion:**<br>Recap the main points discussed by asking questions related to the lesson.<br>**Homework:**<br>Tell the students to go through the pages read in class and mark any difficulties that they come across.<br>Questions 1 and 4 on page 118 can be given for homework. |

## Lesson 2

### Teaching Objectives:

To distinguish between renewable and non-renewable resources.

Discuss ways of conserving energy.

Assess students understanding of the topic 'Energy' through class discussions and written assignments.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 2 |
| 5 minutes | **Recap:**<br>Recap and review the work done in previous class. |
| 30 minutes | **Discussion:**<br>Read the next pages till the end of the chapter. Discuss<br>renewable and non-renewable resources.<br>Explain the significance of resources and how they are used to produce energy.<br>Ask students how an energy efficient lifestyle can be achieved through conservation of energy. |
| 5 minutes | **Conclusion:**<br>Go through the key terms on page 116 with the students.<br>**Homework:**<br>Questions 2, 3 and 5 on page 118 can be given for homework.<br>**Extended Assignment:**<br>Worksheet 1 can be given as a marked assignment. |

## WORKSHEET 1

**A. State whether the energy is kinetic or potential.**

1. A light bulb which is switched off. _____
2. A moving rollercoaster. _____
3. Food being cooked on the stove. _____
4. A stretched rubber band. _____

**B. Give an example for each type of energy. The first one has been done for you.**

1. Sound energy *Drum*
2. Nuclear energy _____
3. Chemical energy _____
4. Light energy _____
5. Sound energy _____
6. Electrical energy _____

**C. Make a list of renewable and non-renewable resources.**

| Renewable resources | Non-renewable resources |
|---|---|
| | |
| | |
| | |
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| | |

## WORKSHEET 2

A. Write a note on ways to conserve energy.

Chapter 11

# Forces and Machines

## Objectives:

By the end of the chapter, students should be able to:

- Define the term 'force'.
- Explain five types of simple machines with examples.
- Understand the three groups of levers with examples.
- Explain the uses of an inclined plane and a pulley.
- Talk about how wheel and axle help move heavy objects.
- Describe the function and uses of gears.
- Discuss how simple machines are used in our daily lives.
- Explain a compound machine.

**No. of lessons:** 3

**Duration:** 40 minutes

**Resources:** Textbook, illustrations and images.

## Lesson 1

### Teaching Objectives:

To define the terms ‘force’, ‘simple machines’ and ‘lever’.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 1 |
| 10 minutes | **Warm up and Introduction:**<br>Start the lesson with properties and types of forces. Ask the students how force can be applied in different ways. |
| 25 minutes | **Explanation:**<br>Read pages 120-123. Introduce the term ‘simple machine’ along with its types.<br>Students should understand how levers are used to move heavy objects and classified into three groups depending on the positions of fulcrum, effort and force. |
| 5 minutes | **Conclusion:**<br>Recap the main points discussed by asking questions related to the lesson.<br>**Homework:**<br>Tell the students to read the chapter and mark any difficulties that they come across. Worksheet 1 can be given for homework. |

## Lesson 2

### Teaching Objectives:

To discuss the properties and functions of an inclined plane, pulley, gears, wheel and axle.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 2 |
| 5 minutes | **Recap:**<br>Recap and review the work done in previous class. |
| 30 minutes | **Explanation:**<br>Read pages 124-126. Explain each simple machine in detail.<br>Students should understand how each simple machine is used to move objects.<br>Use daily life examples to help the students understand better. |
| 5 minutes | **Conclusion:**<br>Review the main points of the lesson and resolve any queries that the students may have regarding the chapter.<br>**Homework:**<br>Questions 1, 2, 3, and 4 on page 130 and 131 can be given for homework. |

## Lesson 3

### Teaching Objectives:

To define the term 'compound machines', state the uses of simple machines and assess the students on the topic 'Forces and Machines'through class discussions and written assignments.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 3 |
| 5 minutes | Recap:<br>Recap and review the work done in previous class. |
| 25 minutes | Discussion:<br>Read the remaining chapter and talk about how simple machines are used in our daily lives.<br>Introduce the term 'compound machine' and explain how it is made with various simple machines using bicycle as an example. |
| 10 minutes | Conclusion:<br>Revise the key concepts of the lesson.<br>Homework:<br>Questions 5, 6 and 7 on page 131 can be given for homework.<br>Class activity:<br>Worksheet 2 can be given as a class activity. |

## WORKSHEET 1

**A. Fill in the blanks**

1. The turning effect of force is called 'moment of force' or _____.
2. When force is in the centre, the lever is called a _____ class lever
3. _____ is the force that pulls things down.
4. Can openers, scissors, pliers and nutcrackers are examples of _____.

**B. Answer the following questions:**

1. Describe the three groups of levers with an example for each group.

_____

_____

_____

_____

_____

_____

2. How does friction help while walking?

_____

_____

_____

_____

_____

_____

## WORKSHEET 2

**A. Answer the following questions:**

1. How can friction be reduced?

_____

_____

_____

_____

_____

_____

2. Where is the fulcrum in a broom?

_____

_____

_____

_____

_____

_____

3. List two simple machines you might find in a hospital.

_____

_____

_____

_____

_____

_____

Chapter 12

# Sound

**Objective:**

**By the end of the chapter, students should be able to:**

- Explain how the compression and expansion of particles in the air form sound waves.
- Discuss how sound is produced and how it travels.
- Describe how a human ear enables us to hear the sound produced.
- Distinguish between normal sound and noise.

**No. of lessons:** 3

**Duration:** 40 minutes

**Resources:** Textbook, illustrations and images.

## Lesson 1

### Teaching Objectives:

To discuss how human voice is produced and sound is traveled.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 1 |
| 10 minutes | **Warm up and Introduction:**<br>Start the chapter by discussing the term vibration and how it travels in the form of waves. |
| 25 minutes | **Explanation:**<br>Read pages 132-135. Talk about how voice is produced by humans. Ask the students to share some of the ways in which animals and birds produce sounds.<br>Now discuss how sound travels differently in each state of matter.<br>Students should understand how the arrangement of particles in each state of matter affects the speed of sound. |
| 5 minutes | **Conclusion:**<br>Recap the main points discussed by asking questions related to the lesson.<br>**Homework:**<br>Tell the students to read the chapter and mark any difficulties that they come across. Question 2 on page 141 can be given for homework. |

## Lesson 2

### Teaching Objectives:

To describe how a human ear works and what audible sounds are on the basis of frequency.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 2 |
| 5 minutes | **Recap:**<br>Recap and review the work done in previous class. |
| 30 minutes | **Explanation:**<br>Read pages 136-137. Highlight the important parts of a human ear that enable us to hear the sounds produced.<br>Introduce the term 'frequency', discuss its unit of measurement and how the audibility of a sound depends on it. |
| 5 minutes | **Conclusion:**<br>Review the main points of the lesson and resolve any queries that the students may have regarding the chapter.<br>**Homework:**<br>Worksheet 1 and question 3 on page 141 can be given for homework. |

## Lesson 3

### Teaching Objectives:

To explain the intensity of sound, its measurement, harmful effects of noise pollution and assess the students on the topic 'Sound' through class discussions and written assignments.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 3 |
| 5 minutes | **Recap:**<br>Recap and review the work done in previous class. |
| 25 minutes | **Discussion:**<br>Read the remaining pages of the chapter. Discuss what intensity of sound means, how it is measured and how the decibels vary for different sources of sound.<br>Now discuss what noise is, ask the students to give daily life examples for sources of noise at home and school.<br>List the harmful effects of noise pollution and ask students how it can be reduced. |
| 10 minutes | **Conclusion:**<br>Revise the key terms of the chapter.<br>**Homework:**<br>Questions 4 and 5 on page 141 can be given for homework.<br>**Class activity:**<br>Question 1 on page 141 can be given as a class activity.<br>**Extended Assignment:**<br>List 4 ways in which noise pollution can be reduced for people residing near the airport. |

## WORKSHEET 1

**A. Answer the following questions**

a. Why sound cannot travel through a vacuum?

_____

_____

_____

b. Arrange the following in order of how fast sound travels through them. Start with the fastest.

i- air ii- space iii- wood iv- juice

_____

c. Would sound travel faster in steel or wood? Give a reason to support your answer.

_____

_____

_____

d. Name the three tiny bones in a human ear.

_____

_____

_____

e. How does sound travel from the cochlea to auditory nerves?

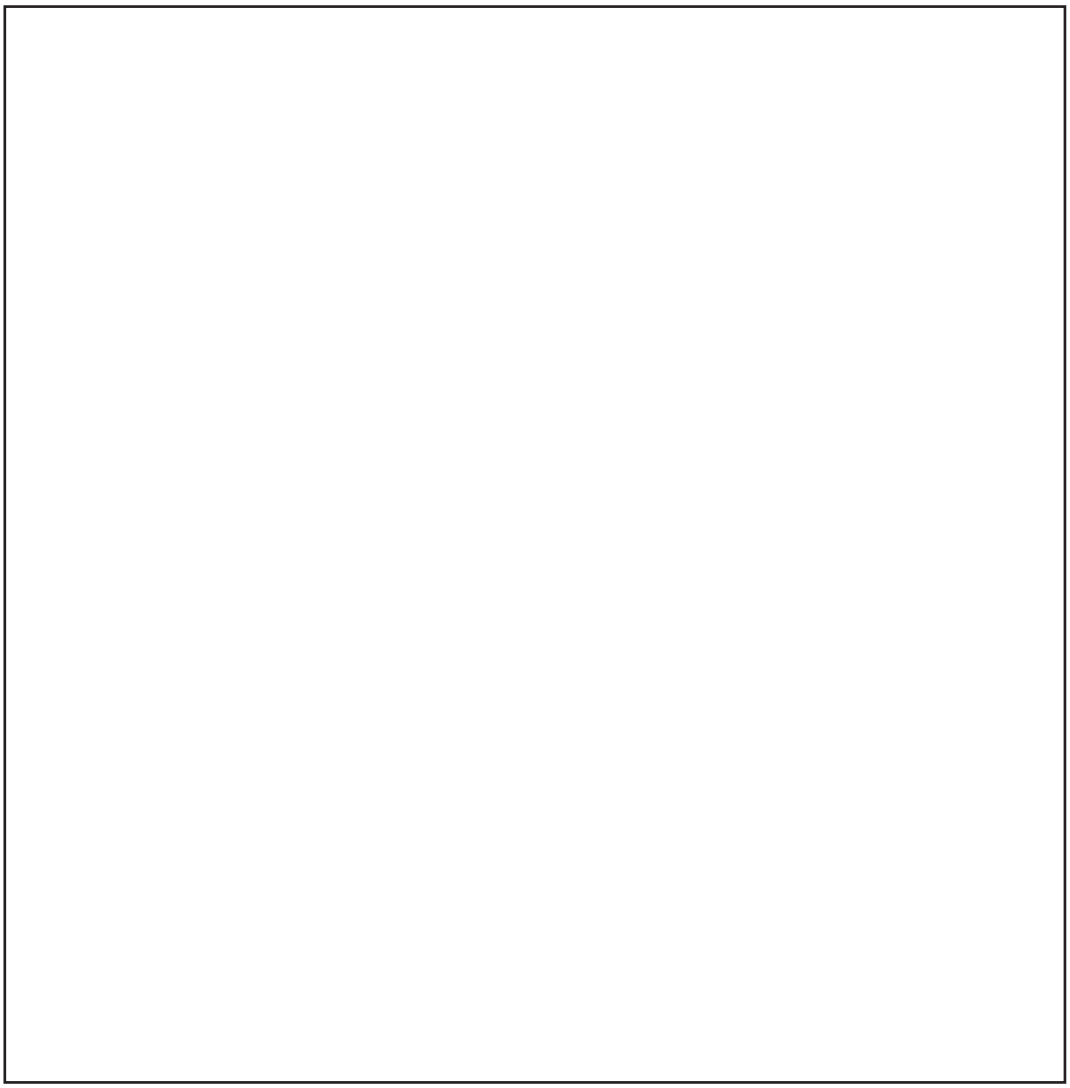
_____

_____

_____

## WORKSHEET 2

A. Draw the internal structure of the ear and label it.



Chapter 13

# Light

## Objective:

By the end of the chapter, students should be able to:

- Explain how we see things around us.
- Describe the nature of light.
- Differentiate amongst reflection, transmission and absorption of light.
- Understand the law of reflection.
- Talk about different types of reflection and how images are formed by various mirrors.
- Highlight some uses of reflection.

**No. of lessons:** 3

**Duration:** 40 minutes

**Resources:** Textbook, illustrations and images.

## Lesson 1

### Teaching Objectives:

To describe low light enables us to see and its nature.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 1 |
| 10 minutes | Warm up and Introduction:<br>Start the chapter by defining the term 'light', its importance and introduce the terms 'luminous' and 'non luminous' using examples. |
| 25 minutes | Explanation:<br>Read pages 142-144 and using the diagram, explain the students how each part of an eye plays a role in how we see things around us.<br>Discuss the nature of light and demonstrate how it travels in a straight line using a torch and an exercise book / sheet of opaque paper. |
| 5 minutes | Conclusion:<br>Recap the main points discussed by asking questions related to the lesson.<br>Homework:<br>Tell the students to do through today's lesson and mark any difficulties that they come across.<br>Questions 1 and 2 on pages 149 and 150 can be given for homework. |

## Lesson 2

### Teaching Objectives:

To differentiate amongst reflection, transmission and absorption of light and explain laws along with types of reflection.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 2 |
| 5 minutes | **Recap:**<br>Recap and review the work done in previous class. |
| 30 minutes | **Explanation:**<br>Explain how light is reflected, transmitted and absorbed. Describe the laws and types of reflection using diagrams. Students should be able to identify the incident ray, angle of incidence, angle of reflection and reflected ray. |
| 5 minutes | **Class Activity:**<br>Worksheet 1 can be given as a class activity.<br>**Conclusion:**<br>Review the main points of the lesson and resolve any queries that the students may have regarding the chapter.<br>**Homework:**<br>Questions 3, 4 and 5 on page 150 can be given for homework. |

## Lesson 3

### Teaching Objectives:

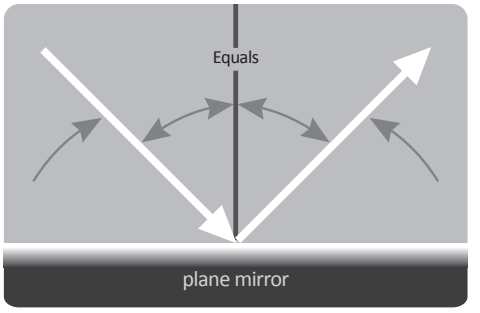
To explain the characteristics of images formed by various mirrors, uses of reflection and assess students on the topic 'Light' through class discussions and written assignments.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 3 |
| 5 minutes | **Recap:**<br>Recap and review the work done in previous class. |
| 25 minutes | **Discussion:**<br>Using a plane mirror, discuss the characteristics of a reflected image by showing the reflected image to the students.<br>Now talk about the differences between concave and convex mirrors and what they are used for.<br>Discuss the uses of reflection using daily life examples. |
| 10 minutes | **Conclusion:**<br>**Homework:**<br>Questions 6 and 7 on page 150 can be given for homework.<br>**Extended Assignment:**<br>Worksheet 2 can be given as a marked homework assignment. |

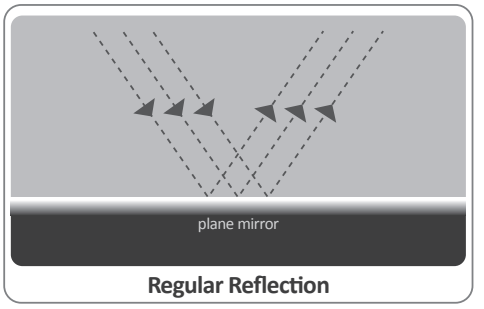
## WORKSHEET 1

### A. Label the diagrams given below:

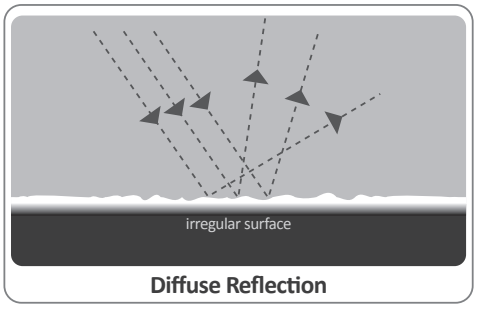
i. Law of Reflection




ii. Types of Reflection

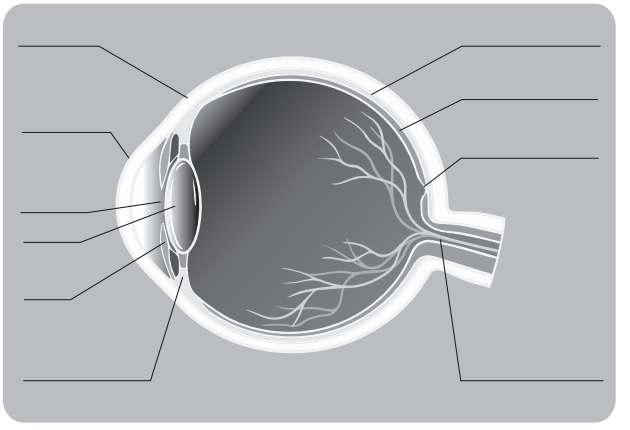



**Regular Reflection**




**Diffuse Reflection**

iii. The Human Eye



## WORKSHEET 2

**A. Answer the following questions.**

1. Which mirror is used by a dentist? Give a reason to support your answer.

_____

_____

_____

_____

_____

_____

_____

2. Why is the word ambulance written inverted on an ambulance?

_____

_____

_____

_____

_____

_____

_____

3. What colour of clothing is preferred during summers?

_____

_____

_____

_____

_____

_____

_____

Chapter 14

# Earthquakes

**Objectives:**

- Define the term 'natural disaster'.
- Describe the Earth's interior.
- Explain the causes and effects of earthquakes.
- Discuss how earthquakes are measured.
- Talk about safety measures that help reduce the intensity / damage caused by earthquakes.

**No. of lessons:** 2

**Duration:** 40 minutes

**Resources:** Textbook, illustrations and images.

## Lesson 1

### Teaching Objectives:

To define 'natural disaster', explain Earth's interior and causes of earthquakes.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 1 |
| 10 minutes | **Warm up and Introduction:**<br>Introduce the term 'natural disaster' and ask the students to identify the three main layers of the Earth. |
| 25 minutes | **Explanation:**<br>Read pages 152-154. Explain each layer in detail. Students should be able to label the diagram of an Earth's interior.<br><br>Discuss the plane tectonic theory and how it causes an earthquake.<br><br>Now that the students know about the interior structure of the Earth, it will be easier for them to understand how the movement of plates causes an earthquake. |
| 5 minutes | **Conclusion:**<br>Recap the main points discussed by asking questions related to the lesson.<br><br>**Homework:**<br>Tell the students to go through the lesson and mark any difficulties that they come across.<br>Questions 2 and 3 on page 160 can be given for homework. |

## Lesson 2

### Teaching Objectives:

To describe the effects of earthquakes, how they are measured and assess students on the topic' Earthquakes' through class discussions and written assignments.

| Time | Methodology |
|---|---|
| 40 minutes | Lesson 2 |
| 5 minutes | **Recap:**<br>Recap and review the work done in previous class. |
| 30 minutes | **Discussion:**<br>Read the remaining chapter and discuss the effects of an earthquake and what precautionary measures should be taken in case an earthquake occurs.<br>Now talk about how earthquakes are measured and what does the value on the Richter scale indicate. |
| 5 minutes | **Conclusion:**<br>**Homework:**<br>Worksheet 1 along with questions 4 and 5 on page 160 can be given for homework.<br>**Class Activity:**<br>Question 1 on page 159 can be given as a quiz during class. |

## WORKSHEET 1

1. How can the damage due to an earthquake be reduced in the following places:

i. schools

_____

_____

_____

_____

_____

_____

ii. rural areas

_____

_____

_____

_____

_____

_____

iii. urban areas

_____

_____

_____

_____

_____

_____

2. What does the magnitude of 7 on a Richter scale indicate?

3. What is the highest recorded earthquake?

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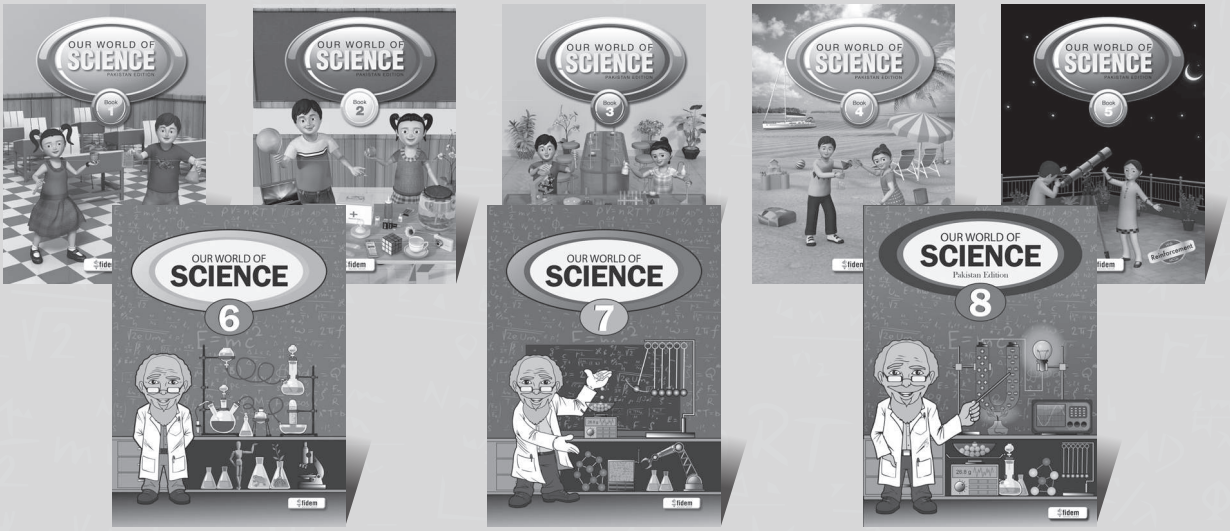
OUR WORLD OF
# SCIENCE
## Teacher Guide

### About the series

'Our World of Science' 6-8 is a continuation of our Primary Series. This series shows gradual progression at each class level by reinforcing the previous level concepts in more detail. Each topic is divided into sub topics and activities. This helps to build a broader and a more analytical approach towards understanding modern science.

The main focus of this series is to enable and empower our young learners to make enquiries and carry out scientific experiments, while encouraging them to apply the same concepts in their daily lives.




ISBN 978-969-9705-65-6

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