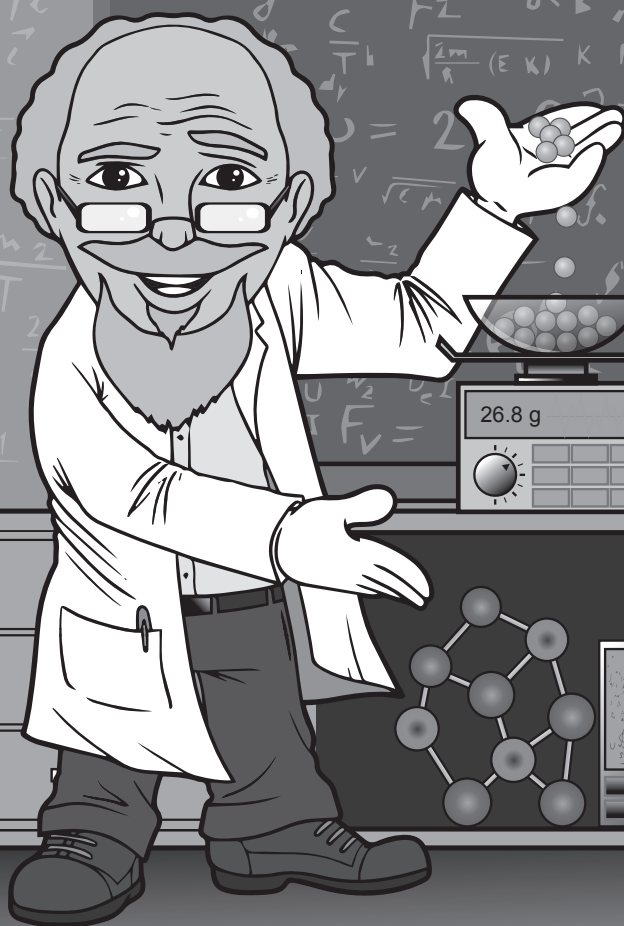


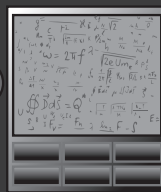
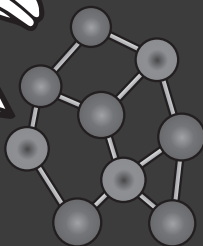
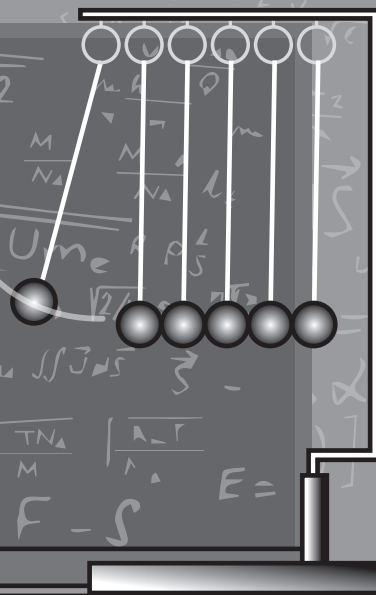
OUR WORLD OF **SCIENCE**

Teacher Guide

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Food and Digestion

Objectives:

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

- Discuss the functions of nose and tongue while having food.
- Highlight the various nutrients present in our food.
- Differentiate between a healthy/balanced and an unhealthy diet.
- Explain the digestive system along with the process of digestion.
- Talk about the common problems related to digestive system.

No. of lessons: 3

Duration: 40 minutes

Resources: Textbook, illustrations and images.



Lesson 1

Teaching Objectives:

To discuss the importance of food along with the role of tongue and nose while eating food as well as the essential nutrients present in our food.

| Time | Methodology |
|------------|---|
| 40 minutes | Lesson 1 |
| 10 minutes | <p>Warm up and Introduction:</p> <p>Begin the lesson by telling the students that they will be studying the branch of science known as Biology.</p> <p>Biology is the science that studies life, and living things that include animals, plants, fungi (e.g mushrooms), and microorganisms such as bacteria. Biology also studies how organisms react with each other and the environment.</p> <p>Next, introduce the chapter. Have a discussion on why food is important in our lives and how it acts as a fuel for the body.</p> |
| 25 minutes | <p>Explanation:</p> <p>Read the first few pages of the chapter and talk about how the olfactory receptors in the nasal passage and the nerve cells in the taste buds send messages to the brain.</p> <p>Explain the six essential nutrients in our food along with their importance.</p> |
| 5 minutes | <p>Conclusion:</p> <p>Recap the main points discussed by asking questions related to the lesson.</p> <p>Homework:</p> <p>Tell the students to read the chapter and mark any difficulties that they come across.</p> <p>Questions 2 and 3 on page 19 can be given for homework.</p> |

Lesson 2

Teaching Objectives:

To differentiate between a healthy and unhealthy diet.

| Time | Methodology |
|------------|---|
| 40 minutes | Lesson 2 |
| 5 minutes | Recap: Recap and review the work done in the previous class. |
| 30 minutes | Explanation: Read pages 12 and 13. Ask the students the purpose of a healthy diet and what a balanced diet is in their opinion. Discuss how daily consumption of fast food affects our health. List the steps that should be taken to stay healthy through a class discussion. Explain the process of digestion and how the digestive system works in great detail. It is important that students understand how the food goes from the mouth to the stomach through esophagus and is then moved into the small intestine where the digestion takes place. |
| 5 minutes | Conclusion: Review the main points of the lesson and resolve any queries that the students may have regarding the chapter. Homework: Questions 1 and 4 on pages 19 and 20 can be given for homework. |



Lesson 3

Teaching Objectives:

To highlight the common problems of a digestive system.

To assess the students on the topic of 'Food and Digestion' through class discussions and written assignments.

| Time | Methodology |
|------------|---|
| 40 minutes | Lesson 3 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 15 minutes | Discussion: Ask the students if they have heard or read about any Muslim scientists. Ask the students if they know of any problems, discomfort or disorders related to the digestive system. Discuss the common digestive problems. Explain the role and placement of the appendix in the abdomen. Tell the students that it is very important to inform an adult if they feel pain in any part of the body so that proper action can be taken. |
| 20 minutes | Conclusion: Homework: Question 5 on page 19 can be given for homework. Class activity: Work sheet to be given as a marked classwork assignment. Extended Assignment: Think quest on page 19 can be given as an extended homework assignment. |

WORKSHEET 1

A. State either true or false. If the statement is false, give a reason to support your answer.

1. Appendix is present in the lower left side of the abdomen.

2. Oral rehydration solutions are recommended during diarrhea.

3. The long tube that makes up all the digestive organs is known as the small intestine.

4. Breakdown of food by enzymes is called physical digestion.

5. Liver secretes bile.

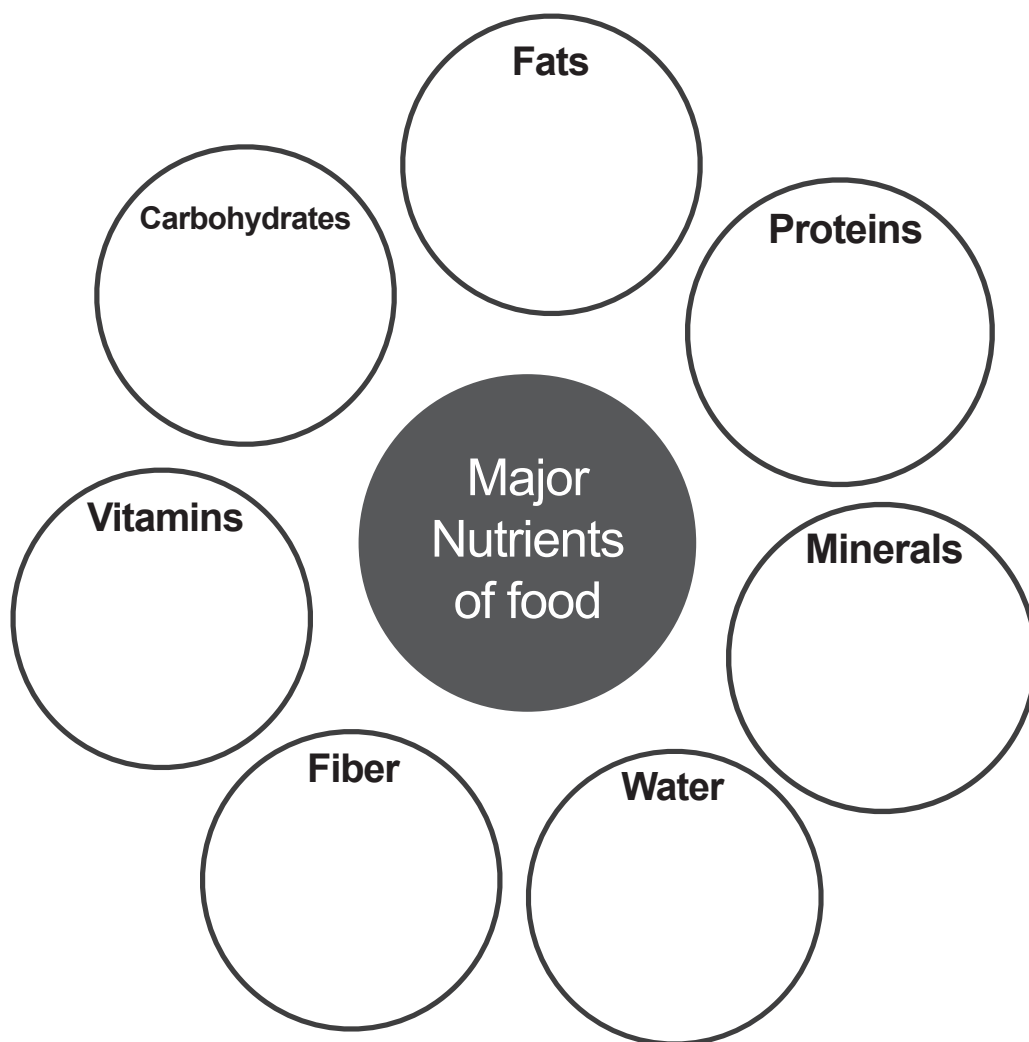
6. Minerals help the body fight diseases.

B. What is the difference between physical and chemical digestion?



WORKSHEET 2

A. Give examples for each type of nutrient.



Respiration

Objectives:

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

- Explain inhalation and exhalation.
- Distinguish between the terms breathing and respiration.
- Discuss the respiratory system and the exchange of gases during the process.
- Describe the types of respiration.
- Highlight some of the respiratory diseases affecting the air passage and lungs.

No. of lessons: 3

Duration: 40 minutes

Resources: Textbook, illustrations and images.



Lesson 1

Teaching Objectives:

To discuss the difference between breathing and respiration.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 1 |
| 10 minutes | Warm up and Introduction: Start the lesson with the importance of breathing. Talk about how breathing is more important than eating. |
| 25 minutes | Explanation: Read pages 20-22 and talk about the exchange of gases during inhalation and exhalation. Discuss how breathing is different from respiration with the help of an equation. |
| 5 minutes | Conclusion: Recap the main points discussed by asking questions related to the lesson. Homework: Tell the students to read pages 20-22, and mark any difficulties that they come across. Questions 1 and 2 on page 28 can be given for homework. |

Lesson 2

Teaching Objectives:

To explain the respiratory system and the exchange of gases.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 2 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 30 minutes | Explanation: Read the Respiratory System and discuss the three major parts of a human respiratory system in detail. Explain how air enters the air passage through our nose and reaches the alveoli. Next, talk about the role of lungs and the muscles during the process of respiration. Describe the exchange of gases during this process. |
| 5 minutes | Conclusion: Review the main points of the lesson and resolve any queries that the students may have regarding the chapter. Homework: Questions 3 and 4 on page 28 along with worksheet 1 can be given for homework. |



Lesson 3

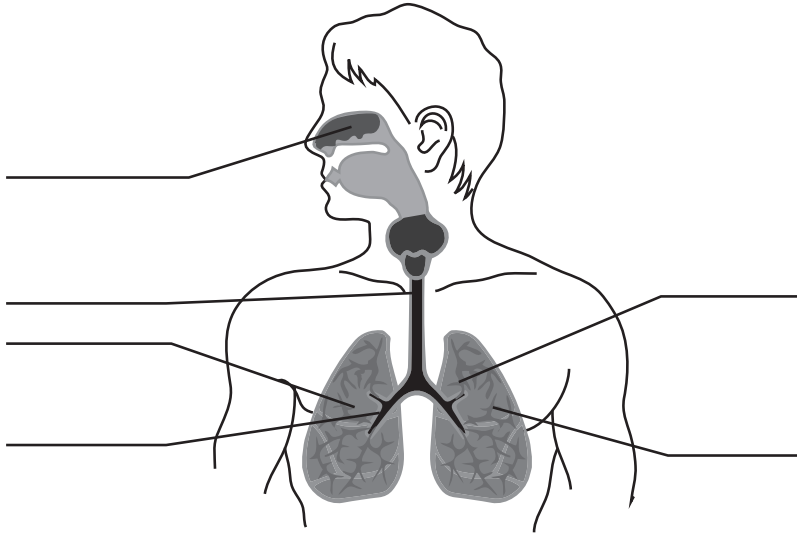
Teaching Objectives:

To highlight the types of respiration, respiratory diseases and assess students on the topic 'Respiration' through class discussions and written assignments.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 3 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 25 minutes | Discussion: Read the last pages of the chapter and discuss the differences between aerobic and anaerobic respiration. Explain some of the respiratory diseases caused by problems in the air passage and lungs and how they can be treated. |
| 10 minutes | Conclusion: Homework: Question 5 on page 28 can be given for homework. Extended Assignment: Question 6 on page 29 and worksheet 2 can be given as an assignment. |

WORKSHEET 1

A. Label the respiratory system.



B. Answer the question.

a. What is mitochondria?



WORKSHEET 2

A. Answer the questions.

a. What is a diaphragm's role in breathing?

b. Which organ in the human body can float on water?

c. Write a note on hemoglobin

Transport in Humans

Objective:

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

- Explain term 'circulatory system'.
- Discuss the importance of a circulatory system.
- Discuss the composition of the circulatory system.
- Describe the functions of the four chambers in a heart.
- Highlight the four components of blood.
- Explain the three major types of blood vessels.
- Talk about some of the diseases affecting the heart and blood vessels.

No. of lessons: 3

Duration: 40 minutes

Resources: Textbook, illustrations and images.



Lesson 1

Teaching Objectives:

To discuss the circulatory system and its composition.

| Time | Methodology |
|------------|---|
| 40 minutes | Lesson 1 |
| 10 minutes | Warm up and Introduction: Begin the lesson by discussing the Transport System of the body. |
| 25 minutes | Explanation: Read pages 30-33 and explain the circulatory system with the help of a diagram. Talk about how cells get nutrients and oxygen, and get rid of the toxic products. Discuss how a human heart is a muscular organ, protected in a rib cage and enclosed in a pericardium. |
| 5 minutes | Conclusion: Recap the main points discussed by asking questions related to the lesson. Homework: Tell the students to read the pages at home and mark any difficulties that they come across. Worksheet 1 can be given for homework. |

Lesson 2

Teaching Objectives:

To explain the chambers of a human heart and components of blood.

| Time | Methodology |
|------------|---|
| 40 minutes | Lesson 2 |
| 5 minutes | Recap: Review the work done in previous class and discuss the importance of the circulatory system. |
| 30 minutes | Explanation: Read pages 34-36. Highlight the main points and distinguish between atria and ventricles in detail. Explain the functions of the right atrium, left atrium, right ventricle and left ventricle. Next, talk about the role of hemoglobin and discuss the various components of blood along with the functions of blood. |
| 5 minutes | Conclusion: Review the main points of the lesson and resolve any queries that the students may have regarding the chapter. Homework: Worksheet 2 can be given for homework. |



Lesson 3

Teaching Objectives:

To highlight the major types of blood vessels, diseases affecting the heart and assess students on the topic 'Transport in Humans' through class discussions and written assignments.

| Time | Methodology |
|------------|---|
| 40 minutes | Lesson 3 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 25 minutes | Discussion: Read pages 37-39. Explain the differences between the arteries, veins and capillaries. Describe some of the diseases affecting a human heart and blood vessels. Now discuss how they can be prevented. |
| 10 minutes | Conclusion: Homework: Exercises 1, 2 and 3 on pages 41 and 42 can be given for homework. Extended Assignment: Exercises 4 and 5 on pages 42 and 43 can be given as an assignment. |

WORKSHEET 1

A. State the colour of blood for each of the following:

- i. Starfish _____
- ii. Crabs _____
- iii. Earthworms _____
- iv. Leeches _____

B. What is the importance of plasma in the blood?

C. Name the diseases of the heart and how they can be prevented.



WORKSHEET 2

A. Distinguish between the following:

i. right atrium and right ventricle

ii. left atrium and left ventricle

iii. red and white blood cells

B. Write any three functions of the blood.

C. Define the term "coagulation".

Transportation in Plants

Objective:

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

- Explain the transport system in plants.
- Discuss the primary components in vascular tissues.
- Understand what xylem vessels are and how they work.
- Describe the functions of phloem tissues.
- Distinguish between xylem and phloem tissues.
- Explain the water movement in plants.
- Highlight the processes of transpiration and translocation.

No. of lessons: 3

Duration: 40 minutes

Resources: Textbook, illustrations and images.



Lesson 1

Teaching Objectives:

To discuss the transport system in plants and functions of xylem tissues.

| Time | Methodology |
|------------|---|
| 40 minutes | Lesson 1 |
| 10 minutes | Warm up and Introduction: Start the lesson by telling the students about the transportation of food, water and minerals in plants. Distinguish between the root and shoot system. |
| 25 minutes | Explanation: Define the term vascular tissues. Talk about the two primary components in vascular tissues and the structure of xylem. Discuss the different names of xylem according to its placement and how the natural forces help xylem move materials upwards. |
| 5 minutes | Conclusion: Recap the main points discussed by asking questions related to the lesson. Homework: Tell the students to read the first few pages and mark any difficulties that they come across. Worksheet 1 can be given for homework. |

Lesson 2

Teaching Objectives:

To explain the cellular elements in a phloem tissue and the differences between xylem and phloem.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 2 |
| 5 minutes | Recap: Recap and review the work done in the previous class. |
| 30 minutes | Explanation: Read pages 47- 49. Talk about the four elements that the phloem is made up of. Explain how the process of diffusion works in a plant. Now highlight the differences between xylem and phloem tissues. |
| 5 minutes | Conclusion: Review the main points of the lesson and resolve any queries that the students may have regarding the chapter. Homework: Worksheet 2 can be given for homework. |



Lesson 3

Teaching Objectives:

To highlight the water movements in plants, processes of transpiration as well as translocation. Assess the students on the topic 'Transportation in Plants' through class discussions and written assignments.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 3 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 25 minutes | Discussion: Explain the process of osmosis and how mineral salts enter the roots through active transport. Describe the processes of transpiration, translocation and explain how factors such as light, temperature, wind and humidity affect transpiration. |
| 10 minutes | Conclusion: Revise the key terms of the lesson. Homework: Exercises 1, 2 and 3 on page 54 can be given for homework. Extended Assignment: Exercise 4 along with questions 1-4 on page 55 can be given as an assignment. |

WORKSHEET 1

A. Answer the questions.

a. What are the different names of a xylem tissue.

b. How does the process of osmosis work?



WORKSHEET 2

A. Distinguish between the following:

i. Xylem and phloem

ii. Diffusion and osmosis

B. Write any two functions of lignin.

C. What is the importance of companion cells?

Cycles of Life

Objective:

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

- Define the term 'life cycle'.
- Discuss the importance of an environment and ecosystem.
- Understand how a food chain works.
- Explain the carbon and nitrogen cycle.

No. of lessons: 3

Duration: 40 minutes

Resources: Textbook, illustrations and images.



Lesson 1

Teaching Objectives:

To discuss the stages of life along with the importance of an environment and ecosystem.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 1 |
| 10 minutes | Warm up and Introduction: Start the lesson with the first stage of the human life cycle and how it reaches old age. |
| 25 minutes | Explanation: Define the term environment. Talk about the abiotic and biotic factors that make up an environment. Discuss what an ecosystem is and what it comprises of. Recap the three categories living things are classified into namely producers, consumers and decomposers. |
| 5 minutes | Conclusion: Recap the main points discussed by asking questions related to the lesson. Homework: Tell the students to read the initial pages of the chapter and mark any difficulties that they come across. Worksheet 1 can be given for homework. |

Lesson 2

Teaching Objectives:

To explain how a food chain works.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 2 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 30 minutes | Explanation: Talk about the functions of a food chain and a food web. Explain the food pyramid in detail along with examples. Ask the students what would happen had there been no decomposers. Discuss the role of decomposers and how the nutrient cycle works. |
| 5 minutes | Conclusion: Review the main points of the lesson and resolve any queries that the students may have regarding the chapter. Homework: Worksheet 2 can be given for homework. |



Lesson 3

Teaching Objectives:

To discuss the carbon cycle along with nitrogen cycle. Assess the students on the topic 'Cycles of Life' through class discussions and written assignments.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 3 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 25 minutes | Discussion: Read the chapter and discuss how the carbon cycle is important to all ecosystems as well as the food chain. Draw the carbon cycle on the board and link it to how it works during various processes such as photosynthesis, respiration, decomposition and combustion. Next, discuss the importance of nitrogen and how returns back to the air through various different processes. |
| 10 minutes | Conclusion: Revise the key terms of the chapter. Homework: Exercises 1, 2 and 3 on pages 66 and 67 can be given for homework. Extended Assignment: Exercise 4 on pages 67 and 68 can be given as an assignment. Write a note on what omnivores are along with a few examples. |

WORKSHEET 1

A. Answer the following questions

a. What is the difference between biotic and abiotic factors? Explain by using examples.

b. Arrange the stages of a life cycle in the correct order with the help of a diagram .

Puberty

Childhood

Old age

Birth

Adulthood



WORKSHEET 2

A. Answer the questions.

a. Why does a food chain start with producers?

b. What is the difference between herbivores and predators?

B. Draw and label a food chain.

Air and Air Pollution

Objective:

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

- Explain the importance of air.
- Discuss the different layers of the atmosphere.
- Talk about the composition of air.
- Understand the properties of various gases.
- Distinguish between causes and effects of air pollutants.
- Describe the consequences of acid rain and global warming.

No. of lessons: 3

Duration: 40 minutes

Resources: Textbook, illustrations and images.



Lesson 1

Teaching Objectives:

To discuss air and its composition. Learn about the properties of gases in the atmosphere.

| Time | Methodology |
|------------|---|
| 40 minutes | Lesson 1 |
| 10 minutes | Warm up and Introduction: Start the lesson by discussing the importance of air using daily life examples. |
| 25 minutes | Explanation: Read the chapter and talk about the characteristics of air and layers of the atmosphere. Describe the composition of the air by drawing the pie chart on the board. Students should understand why nitrogen is the most abundant gas in the air. Next define the term 'noble gases' and discuss the properties of various gases in the air. |
| 5 minutes | Conclusion: Recap the main points by asking questions related to the lesson. Homework: Tell the students to read the first pages of the chapter and mark any difficulties that they come across. Worksheet 1 along with question 1 on page 80 can be given for homework. |

Lesson 2

Teaching Objectives:

To explain the term 'air pollution' and its consequences.

| Time | Methodology |
|------------|---|
| 40 minutes | Lesson 2 |
| 5 minutes | Recap: Recap and review the work done in the previous class. |
| 30 minutes | Explanation: Read the chapter and talk about how pollution is not always man made. Discuss some of the air pollutants, their sources and harmful effects. Explain how these air pollutants have led to the depletion of ozone layer and production of acid rain. |
| 5 minutes | Conclusion: Review the main points of the lesson and resolve any queries that the students may have regarding the chapter. Homework: Questions 3, 4 and 6 on page 80 can be given for homework. |



Lesson 3

Teaching Objectives:

To highlight the consequences of global warming what steps should be taken to reduce air pollution. Assess students on the topic 'Air and Air Pollution' through class discussions and written assignments.

| Time | Methodology |
|------------|---|
| 40 minutes | Lesson 3 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 25 minutes | Discussion: Discuss what happens during global warming. Students should understand the greenhouse effect and why are greenhouse gases harmful. Discuss the steps that need to be undertaken in order to reduce air pollution. Ask students how air pollution can be reduced in industrial areas. |
| 10 minutes | Conclusion: Homework: Questions 1 and 3 on page 80 can be given for homework. Extended Assignment: Worksheet 2 can be given as an assignment. |

Classroom Activity:

Divide the class into groups. Each group should prepare a chart highlighting one aspect of air pollution.

The charts can be displayed around the school.

WORKSHEET 1

A. Answer the following questions

a. Why is nitrogen the most abundant gas in the air?

b. What are inert gases?

c. Name the different layers of the atmosphere.

d. What is neon used for?



WORKSHEET 2

A. Answer the following questions

a. What are CFCs?

b. Is pollution always man made? Give reasons to support your answer.

c. Where does 90% of the earth's ozone exist?

d. How can air pollution be reduced on the city roads?



Atoms and Molecules

Objectives:

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

- Define the term 'element', 'atom', 'molecule' and 'matter'.
- Discuss the various atomic theories.
- Explain the structure of an atom.
- Understand how a periodic table is used.
- Distinguish between atomic number and atomic mass.
- Describe isotopes and valency of elements.
- Talk about molecules and various chemical formulae.

No. of lessons: 3

Duration: 40 minutes

Resources: Textbook, illustrations and images.

Lesson 1

Teaching Objectives:

To discuss the various atomic theories and structure of an atom.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 1 |
| 10 minutes | Warm up and Introduction: Start the lesson by explaining that everything around us is made up of atoms using daily life examples. Introduce the terms element, atom, molecule and matter. |
| 25 minutes | Explanation: Read pages 82-85 and explain the different atomic theories of various scientists. Next tell the student about atoms, protons, electrons and neutrons. Students should understand why atoms differ and how the energy levels increase from one shell to the other around the nucleus. |
| 5 minutes | Conclusion: Recap the main points discussed by asking questions related to the lesson. Homework: Tell the students to go through the pages read in class and mark any difficulties that they come across. Worksheet 1 along with exercise 3 on page 97 can be given for homework. |



Lesson 2

Teaching Objectives:

To explain how to use/read a periodic table and the difference between atomic number and atomic mass.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 2 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 30 minutes | Explanation: Show the students the periodic table given at the end of the book. Explain how the periodic table is read using atomic numbers and atomic symbols. Discuss some of the properties of the periodic table and the arrangement of chemical elements in it. Next discuss the terms atomic number and atomic mass. Students should understand the difference between the two terms. |
| 5 minutes | Conclusion: Review the main points of the lesson and resolve any queries that the students may have regarding the chapter. Homework: Exercises 4 and 5 along with questions 1 and 2 under exercise 6 on page 98 can be given for homework. |

Lesson 3

Teaching Objectives:

To identify isotopes, understand chemical bonds along with various chemical formulae. Assess students on the topic 'Atoms and Molecules' through class discussions and written assignments.

| Time | Methodology |
|------------|---|
| 40 minutes | Lesson 3 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 25 minutes | Discussion: Read pages 90-93. Explain isotopes and the valency of various elements. Tell the students about the two main types of chemical bonds namely ionic and covalent. Students should be able to understand various chemical formulae and interpret them. |
| 10 minutes | Conclusion: Revise the key terms of the lesson. Homework: Exercises 1 and 2 on page 96 can be given for homework. Extended Assignment: Exercise 6, questions 3 and 4 can be given as an assignment. |



WORKSHEET 1

A. Answer the following questions

a. What does the Greek word 'atomos' mean?

b. What is the difference between proton and electron?

c. What is the difference between proton and neutron?

d. How many atoms are present in Uranium?



WORKSHEET 2

- A. Draw a diagram of the shell of the nucleus of an atom. Label the diagram explain the shells.



Physical and Chemical Changes

Objectives:

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

- Define physical and chemical change.
- Differentiate between physical and chemical changes.
- Explain some of the environmental physical and chemical changes.
- Understand how chemical changes be used in everyday lives.

No. of lessons: 3

Duration: 40 minutes

Resources: Textbook, illustrations and images.



Lesson 1

Teaching Objectives:

To discuss physical and chemical changes using examples.

| Time | Methodology |
|------------|---|
| 40 minutes | Lesson 1 |
| 10 minutes | Warm up and Introduction: Start the lesson by telling the students how changes take place around us all the time, be it physical or chemical. Using daily life examples, help students understand the type of change. (Use the chart given on page 101 of the textbook for reference). |
| 25 minutes | Explanation: Tell the students that physical change means changes in state of matter and not its composition. Discuss all the physical processes using daily life examples. Students should be able to differentiate between all the processes. Next explain chemical change and how it alters the form and composition of matter. |
| 5 minutes | Conclusion: Recap the main points discussed by asking questions related to the lesson. Homework: 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 explain the difference between physical and chemical change.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 2 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 30 minutes | Explanation: Tell the students how physical and chemical changes are different from each other. Discuss the difference between reversible and irreversible changes using examples. Talk about the physical and chemical changes that take place in the environment. |
| 5 minutes | Conclusion: Review the main points of the lesson and resolve any queries that the students may have regarding the chapter. Homework: Exercise 1 on page 110 along with worksheet 2 can be given for homework. |



Lesson 3

Teaching Objectives:

To talk about the applications of chemical change. Assess students on the topic 'Physical and Chemical Changes' through class discussions and written assignments.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 3 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 25 minutes | Discussion: Read pages 106-108. Explain how fertilizers and plastics are made. Discuss their advantages and disadvantages. Talk about how the harmful effects produced by fertilizers and plastics can be reduced. Invite comments and suggestions from the students. |
| 10 minutes | Conclusion: Homework: Exercises 2 and 3 on page 111 can be given for homework. Extended Assignment: Carry out an experiment of a chemical change. Mention the things that will be required for the experiment, the method used as well as the observation and outcome of the experiment you have carried out. |

WORKSHEET 1

A. Answer the following questions

1. What is the difference between:

i) Melting and boiling

ii) Condensation and sublimation

2. Why does an apple turn brown after keeping it outside for a while once it has been sliced?



WORK SHEET 2

Identify the change as chemical or physical and give a reason to support your answer for each.

| Everyday life situations | Type of change | Reasons |
|--------------------------|----------------|---------|
| Baking of bread | | |
| Melting of an ice lolly | | |
| Burning of wood | | |
| Rotting of eggs | | |
| Breaking a pencil | | |
| Breaking a cookie | | |
| Lighting a matchstick | | |

Water

Objective:

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

- Talk about the composition of water and the water cycle.
- Discuss the sources and importance of water.
- Explain how water is purified.
- Highlight some of the ways to reduce water wastage and usage.

No. of lessons: 3

Duration: 40 minutes

Resources: Textbook, illustrations and images.



Lesson 1

Teaching Objectives:

To discuss the composition and sources of water along with the water cycle .

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 1 |
| 10 minutes | Warm up and Introduction: Start the lesson with a discussion on the important water. Ask the students to about the use of water in our daily lives. List their responses on the blackboard |
| 25 minutes | Explanation: Read pages 112-115. Define the terms solute, solvent and polar molecule. Using daily life examples, help students understand why water is as the universal solvent. Explain the water cycle and its process in detail. Discuss the sources of water. Ask students for their input. Explain each source of water. |
| 5 minutes | Conclusion: Recap the main points discussed by asking questions related to the lesson. Homework: Tell the students to read about the water cycle and practice drawing it so that they can understand it better. Worksheet 1 be given for homework. |

Lesson 2

Teaching Objectives:

To explain the importance and purification process of water.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 2 |
| 5 minutes | Recap: Recap and review the work done so far. |
| 30 minutes | Explanation: Talk about why water is necessary for life for human beings, animals and plants. Invite students' comments and reponses . Now discuss how impurities from the water can be removed at an industrial level and at home. |
| 5 minutes | Conclusion: Review the main points of the lesson and resolve any queries that the students may have regarding the chapter. Homework: Tell the students to review the lesson and mark any difficulties that they have so that they can be discussed in the next class. |



Lesson 3

Teaching Objectives:

To talk about the desalination of sea water, reduction in water usage and wastage. Assess the students on the topic 'Water' through class discussions and written assignments.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 3 |
| 5 minutes | Recap: Recap and review the work done in the previous class. |
| 25 minutes | Discussion: Read the last page of the chapter and discuss the process of desalination. Students should understand why sea water cannot be consumed directly without undergoing the process of desalination or distillation. Talk about the steps that should be undertaken to conserve (save) water and reduce the amount of water used and wasted. |
| 10 minutes | Conclusion: Review the key term of the chapter. Homework: Worksheet 2 can be given for homework. Extended Assignment: Exercises given on page 122 and 123 can be given as a marked homework assignment. |



3. What is a hydrologic cycle?

4. Why is water known as the universal solvent?

5. Define the term polar molecule.



WORK SHEET 3

A. Draw the water cycle and label it.



Transmission of Heat Energy

Objectives:

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

- Define the term 'heat' and how it is measured.
- Differentiate between a laboratory and a clinical thermometer.
- Discuss the effects of heat on different states of matter.
- Understand how heat is transmitted through conduction, convection and radiation
- Apply the concepts of heat transmission and talk about how the temperature of a liquid is maintained in a vacuum flask.

No. of lessons: 3

Duration: 40 minutes

Resources: Textbook, illustrations and images.

Lesson 1

Teaching Objectives:

To discuss units of temperature and properties of a thermometer.

| Time | Methodology |
|------------|---|
| 40 minutes | Lesson 1 |
| 10 minutes | Warm up and Introduction: Start the lesson by explaining how transfer of heat takes place using an example of a cold water bottle which has been kept outside for a while. |
| 25 minutes | Explanation: Read pages 126 – 129. Talk about how there are various units of temperature which tell you how hot or cold something is. Tell the students about thermometers and scales to measure heat. Students should be able to convert the temperatures from one scale to another. Now talk about why there is a constriction in a clinical thermometer. Discuss the differences between a laboratory and a clinical thermometer. |
| 5 minutes | Conclusion: Recap the main points discussed by asking questions related to the lesson. Homework: Tell the students to go through the lesson and mark any difficulties that they come across. Questions 1, 2 and 4 from exercise 3 on page 135 along with worksheet 1 can be given for homework. |



Lesson 2

Teaching Objectives:

To explain the result of heat application to the states of matter and different methods of heat transfer.

| Time | Methodology |
|------------|---|
| 40 minutes | Lesson 2 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 30 minutes | Explanation: Talk about how the particles are arranged in each state of matter and how they react differently when heat is applied to them. Discuss the difference between melting and boiling point. Explain heat is transferred using conduction, convection and radiation. Explain all three methods using daily life examples. |
| 5 minutes | Conclusion: Review the main points of the lesson and resolve any queries that the students may have regarding the chapter. Homework: Questions 3, 6 and 7 from exercise 3 on page 135 along with worksheet 2 can be given for homework. |

Lesson 3

Teaching Objectives:

To highlight the applications of heat transfer in a vacuum flask. Assess students on the topic 'Transmission of Heat Energy' through class discussions and written assignments.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 3 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 25 minutes | Discussion: Discuss how a vacuum flask is designed to prevent any form of heat transfer to take place. Draw and label the diagram on the board and explain both case situations, that is, how a hot liquid remains hot and how a cold liquid remains cold in the flask. |
| 10 minutes | Conclusion: Revise the Key Concepts of the lesson. Homework: Exercises 1 and 2 on page 135 can be given for homework. Extended Assignment: Explain how a candle uses all three forms of heat transfer. |



WORKSHEET 1

1. Convert the following:

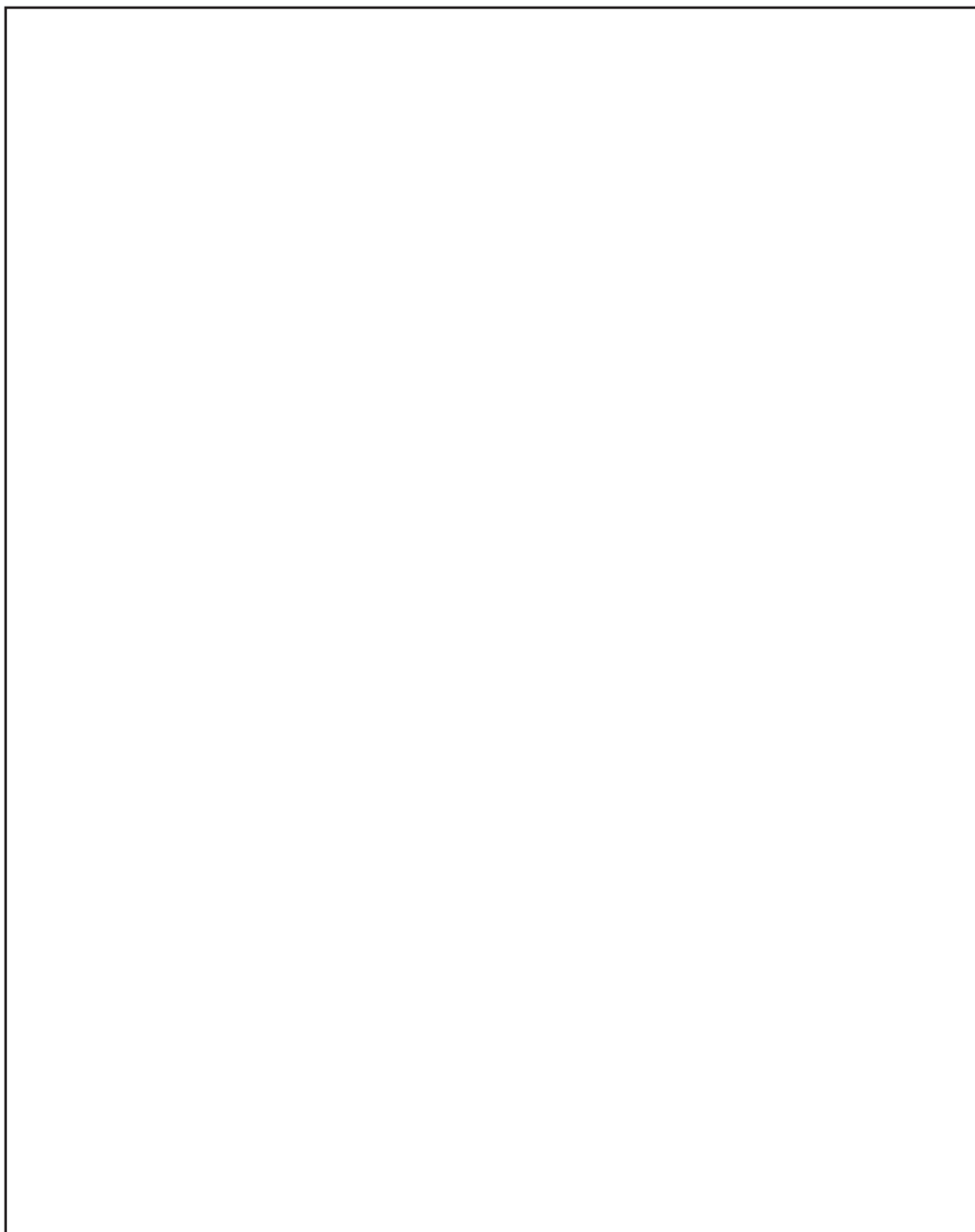
i. 58°F to Celsius = _____

ii. 98°C to Kelvin = _____

2. Why does a clinical thermometer have a constriction?

WORK SHEET 3

A. Draw a diagram of a vacuum flask and label it.



Sound Waves

Objective:

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

- Define the terms 'sound', 'vibration' and 'noise'.
- Discuss the characteristics and properties of a sound wave.
- Understand the behavior of a sound wave.
- Explain how sound travels differently in solids, liquids and gases.
- Highlight some of the sounds surrounding us in our daily lives.

No. of lessons: 3

Duration: 40 minutes

Resources: Textbook, illustrations and images.



Lesson 1

Teaching Objectives:

To discuss the terms 'sound', 'vibration' and 'noise' along with the characteristics of a sound wave.

| Time | Methodology |
|------------|---|
| 40 minutes | Lesson 1 |
| 10 minutes | Warm up and Introduction: Start the lesson by discussing sound. Highlight some of its sources at home/school or in our daily lives. |
| 25 minutes | Explanation: Read pages 136 – 140. Explain how a sound wave can be described using the characteristics such as wavelength, frequency and amplitude. Students should be able to differentiate amongst all three characteristics and understand the relationship between frequency, velocity and wavelength. |
| 5 minutes | Conclusion: Recap the main points discussed by asking questions related to the lesson. Homework: Tell the students to mark any difficulties that they come across in the lesson. Questions 1 and 2 on pages 146 and 147 along with Worksheet 1 can be given for homework. |

Lesson 2

Teaching Objectives:

To explain the properties, reflection and refraction of a sound.

| Time | Methodology |
|------------|---|
| 40 minutes | Lesson 2 |
| 5 minutes | Recap: Recap and review the work done in the previous class. Sort out and solve any difficulties that any student may have in the lesson. |
| 30 minutes | Explanation: Read pages 141 – 143. Explain how the quality of a sound is affected by its pitch, intensity and tone. Ask the students why sound reflection can be a problem during a concert and how it can be minimized. Discuss how sound refraction and diffraction take place. |
| 5 minutes | Conclusion: Review the main points of the lesson and resolve any queries that the students may have regarding the chapter. Homework: Worksheet 2 can be given for homework. |



Lesson 3

Teaching Objectives:

To discuss how sound travels in various states of matter, some of its uses. Assess students on the topic 'Sound Waves' through class discussions and written assignments.

| Time | Methodology |
|------------|---|
| 40 minutes | Lesson 3 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 25 minutes | Discussion: Read the last pages of the chapter. Give an explanation as to how the arrangement of particles in a solid, a liquid and a gas affect the speed and quality of sound. Compare the speed of sound in each state of matter. Now discuss how we use sound in our daily lives. |
| 10 minutes | Conclusion: Quiz the students on the Key Terms of the chapter. Homework: Question 3 on page 147 can be given for homework. Extended Assignment: Discuss how bats use sound to catch their prey. |

WORKSHEET 2

A. Answer the following question.

- i. Asad was in a carpeted room listening to a song. Sara was in a room with tiles and no carpet listening to the same song at the same volume. In which room would the sound be louder? Give a reason to support your answer.

B. Give an example of diffraction of sound.



Properties of Light

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

- Define the term 'shadow' and explain its formation.
- Discuss why refraction of light takes place.
- Understand the process of total internal reflection.
- Explain how white light is dispersed through a prism.

No. of lessons: 3

Duration: 40 minutes

Resources: Textbook, illustrations and images.

Lesson 1

Teaching Objectives:

To discuss the importance of light, formation of shadows and behavior of light when it travels from one medium to another.

| Time | Methodology |
|------------|---|
| 40 minutes | Lesson 1 |
| 10 minutes | <p>Warm up and Introduction:</p> <p>Start the lesson with a discussion on how light is used in daily life and how it plays a vital role in the process of photosynthesis.</p> <p>Ask the students if the lightening is seen first or thunder is heard first during a thunderstorm. Give a reason to explain why that happens.</p> |
| 25 minutes | <p>Explanation:</p> <p>Read pages 148-151. Define the term 'shadow'. Talk about how shadows are formed and the difference between umbra and penumbra.</p> <p>Discuss how and why the size of the shadow varies through the day.</p> <p>Now talk about how the refraction of light occurs when the rays travel from one medium to the other and define the term 'normal'.</p> <p>Students should understand the behavior of light when it travels from a denser medium to a less dense medium and vice versa.</p> |
| 5 minutes | <p>Conclusion:</p> <p>Recap the main points discussed by asking questions related to the lesson.</p> <p>Homework:</p> <p>Tell the students to go through the pages read in class and mark any difficulties that they come across.</p> <p>Worksheet 1 can be given for homework.</p> |



Lesson 2

Teaching Objectives:

To explain how total internal reflection works.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 2 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 30 minutes | Explanation: Read Total Internal Reflection and define the terms: angle of incidence, critical angle and reflected angle. Explain: $i < i_c$, $i = i_c$ $i > i_c$. Highlight the two important conditions which are required for total internal reflection to take place. Next explain the term 'mirage' and why it occurs. Discuss exercise 1 , 2 and 3 on pages 157 and 158 and ask the students to solve them in class as a classwork assignment. |
| 5 minutes | Conclusion: Review the main points of the lesson and resolve any queries that the students may have regarding the chapter. Homework: Worksheet 2 can be given for homework. |

Lesson 3

Teaching Objectives:

To discuss the dispersion of light through a prism. Assess students on the topic 'Properties of Light' through class discussions and written assignments.

| Time | Methodology |
|------------|---|
| 40 minutes | Lesson 3 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 25 minutes | Discussion: Read the chapter and discuss how each colour has a different wave length because of which the amount refracted by the prism for each colour varies. Define the terms spectrum and angle of deviation. Explain how a rainbow is formed as a result of the three basic properties of light, namely: refraction, dispersion and internal reflection. |
| 10 minutes | Conclusion: Revise the Key Terms of the lesson. Homework: Exercises 4 and 5 on page 158 can be given for homework. Extended Assignment: Place a pencil in a jar of water. Which property of light do you observe? Give reasons to explain your observation. |



WORKSHEET 3

A. Draw a diagram of a mirage and label it.

Electricity

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

- Define the terms 'atoms', 'protons', 'electrons' and 'current'.
- Differentiate between conductors and insulators.
- Mathematically explain an electric current.
- Explain how a simple circuit works.
- Understand the difference between series and parallel circuits.
- Talk about the effects of an electrical current.
- Highlight some of the safety practices for electricity.

No. of lessons: 3

Duration: 40 minutes

Resources: Textbook, illustrations and images.



Lesson 1

Teaching Objectives:

To discuss how an electric current works.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 1 |
| 10 minutes | Warm up and Introduction: Start the lesson with a discussion on why electricity plays a vital role in homes, schools and hospitals. |
| 25 minutes | Explanation: Read the first two pages of the chapter. Define the terms electrons, protons and electrical current. Talk about how electricity is produced by the flow of protons and electrons. Explain how conductivity depends on conductors and insulators by giving examples for each. Discuss how an electric current can be explained mathematically. Solve some mathematical questions for better understanding of the students. |
| 5 minutes | Conclusion: Recap the main points discussed by asking questions related to the lesson. Homework: Tell the students to review the lesson and mark any difficulties that they come across. Worksheet 1 can be given for homework. |

Lesson 2

Teaching Objectives:

To explain a simple, series and parallel circuit.

| Time | Methodology |
|------------|---|
| 40 minutes | Lesson 2 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 30 minutes | Explanation: Read pages 162- 166. During the reading explain as voltage, current and resistance associated with a circuit. Highlight Ohm's Law and the mathematical equation it represents. Solve a few mathematical questions for better understanding of the students. Ask the students to differentiate between series and parallel circuit. List the advantages and disadvantages for each type of circuit. |
| 5 minutes | Conclusion: Review the main points of the lesson and resolve any queries that the students may have regarding the chapter. Homework: Worksheet 2 can be given for homework. |



Lesson 3

Teaching Objectives:

To discuss the effects of electrical current along with some of the safety measures for electricity. Assess students on the topic 'Electricity' through class discussions and written assignments.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 3 |
| 5 minutes | Recap: Recap and review the work done in previous class. Resolve any problem or difficulty that any student may have in the lesson. |
| 25 minutes | Discussion: Complete the reading of the last pages of the chapter. Explain: how the heating effect takes place when an electric current passes through a conductor; how a chemical effect takes place when an electric current is passed through a liquid; how an electric currents results in a magnetic effect. Discuss all three effects using daily life examples. Next, have a discussion on some of the safety measures that should be taken to avoid electrical shock hazard. Invite input from students. |
| 10 minutes | Conclusion: Review the Key Terms and Concepts of the chapter. Extended Assignment: Exercises 1, 2, 3 and 4 on pages 169 and 170 can be given as an assignment. |



WORKSHEET 2

A. Define the following:

a. Voltmeter

b. ohmmeter

c. multimeter

B. State Ohm's Law



WORKSHEET 3

A. Design a poster on: **SAFETY MEASURES FOR ELECTRICITY**

Earth and Its Sources of Energy

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

- Define the terms 'renewable energy' and 'non-renewable energy'.
- Discuss the importance of energy our daily lives.
- Highlight a few sources of energy.
- Explain the need of conservation of energy.

No. of lessons: 3

Duration: 40 minutes

Resources: Textbook, illustrations and images.



Lesson 1

Teaching Objectives:

To discuss renewable and non-renewable energy, consumption of energy and energy sources.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 1 |
| 10 minutes | Warm up and Introduction: Begin the lesson by introducing the term 'energy' and explaining transformation of energy. |
| 25 minutes | Explanation: Read the first few pages of the chapter. Distinguish between renewable and non-renewable resources using daily life examples to help students understand better. Discuss the consumption of energy and how energy needs have changed from the stone age to the present time. Give the example of how method of cooking food has changed over a period of time. More energy is consumed now than it was by early man. Invite students' comments and input. Discuss the sources of energy. Explain solar energy and how it can be used for heating and its conversion into electricity. Highlight the advantages of using solar energy to produce electricity. Explain how tides and wind can be utilized to generate electricity. |
| 5 minutes | Conclusion: Recap the main points discussed by asking questions related to the lesson. Homework: Worksheet 1 can be given for homework. |

Lesson 2

Teaching Objectives:

To explain how various sources can be used to generate energy.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 2 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 30 minutes | Explanation: Continuing with the previous lesson on energy sources, talk about nuclear fission reactions can be used to generate electricity whilst adversely affecting the environment. Next, explain geothermal energy and chemical energy in detail. Discuss the importance of fossil fuels and their uses. Discuss the various forms of energy in detail by listing the advantages and disadvantages of each. |
| 5 minutes | Conclusion: Review the main points of the lesson and resolve any queries that the students may have regarding the chapter. Homework: Worksheet 2 can be given for homework. |



Lesson 3

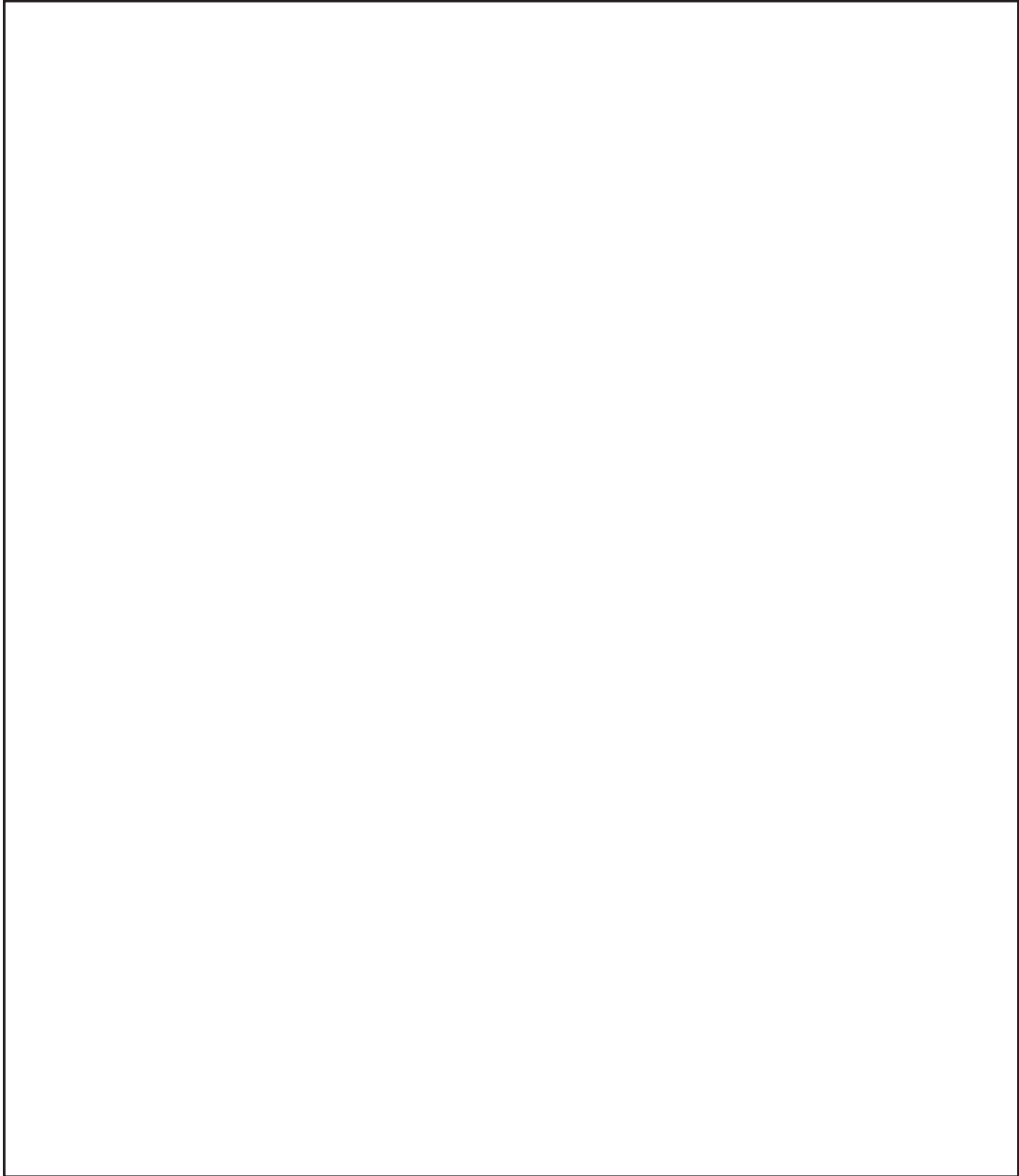
Teaching Objectives:

To discuss the conservation of energy. Assess students on the topic 'Earth and its Sources of Energy' through class discussions and written assignments.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 3 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 25 minutes | Explanation: Draw the attention of the students to the fact that non-renewable resources such as coal, oil and gas (fossil fuels) are being used up very rapidly by human beings. It is feared that a time may come when their supply will be totally finished. Another point to consider is that the use of fossil fuels is harmful for the environment. The need of the hour is that renewable resources such as water, wind and sun should be used instead to eliminate the negative environmental impact. Discuss energy crisis, its reasons and how it can be prevented. Invite students to suggest ways to save energy. Make the students aware of the fact that all countries, including Pakistan, must take measures to save their non-renewable resources. List a few ways of saving energy on the blackboard and discuss its impact on the environment. |
| 10 minutes | Conclusion: Revise the Key Terms and Key Concepts of the lesson. Homework: Exercises 1, 2, 3 and 4 on page 182 can be given for homework. Extended Assignment: Exercise 5 on page 183 can be done as an assignment. |

WORKSHEET 3

A. Design a chart on: **How to Conserve Energy**

A large, empty rectangular box with a thin black border, intended for the student to design a chart on the topic of energy conservation.

Space and Satellites



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

- Define the term 'satellite'.
- Discuss the natural and artificial satellites.
- Highlight six types of satellites orbiting the Earth.
- Explain why an artificial satellite is useful.
- Talk about Pakistan's first satellite.

No. of lessons: 3

Duration: 40 minutes

Resources: Textbook, illustrations and images.

Lesson 1

Teaching Objectives:

To differentiate between natural and artificial satellites.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 1 |
| 10 minutes | Warm up and Introduction: Start the lesson by defining the term satellite and explain the two kinds of satellites, namely natural and artificial. |
| 25 minutes | Explanation: Tell the students about Galileo and how he discovered the four moons of the planet Jupiter. Explain how moons are considered natural satellites. Remind the students that a moon does not have its own light but it reflects the light that it receives from the sun. List the different phases of the moon and the number of moons that each planet has. Now talk about how artificial satellites are used for communication, monitoring the weather, observing the Earth and the solar system. |
| 5 minutes | Conclusion: Recap the main points discussed by asking questions related to the lesson. Homework: 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 explain the three common orbits and types of satellite.

| Time | Methodology |
|------------|--|
| 40 minutes | Lesson 2 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 30 minutes | Explanation: Read the chapter and talk about the three common orbits namely the low Earth orbit, medium Earth orbit and geostationary orbit. Tell the students to note the fact that the time and altitude is different for each orbit. Next, talk about the six different types of satellites orbiting the earth. |
| 5 minutes | Conclusion: Review the main points of the lesson and resolve any queries that the students may have regarding the chapter. Homework: Worksheet 2 can be given for homework. |

Lesson 3

Teaching Objectives:

To discuss how artificial satellite is useful. Highlight Pakistan's first satellite. Assess students on the topic 'Space and Satellites' through class discussions and written assignments.

| Time | Methodology |
|------------|---|
| 40 minutes | Lesson 3 |
| 5 minutes | Recap: Recap and review the work done in previous class. |
| 25 minutes | Discussion: Discuss how artificial satellites have played an important role in navigation/communication and weather monitoring, thus allowing meteorologists to view the weather on a global scale. Tell the students to pay attention to the weather broadcast on television daily. Draw the attention of the students to the important role played by satellites in promoting cable and television networks. Next explain what happens to a satellite once it reaches the end of its useful life. Engage students in a discussion about Pakistan's first satellite. |
| 10 minutes | Conclusion: Revise the Key terms and concepts of the lesson. Homework: Exercises 1, 2 and 3 on page 195 can be given for homework. |



WORKSHEET 1

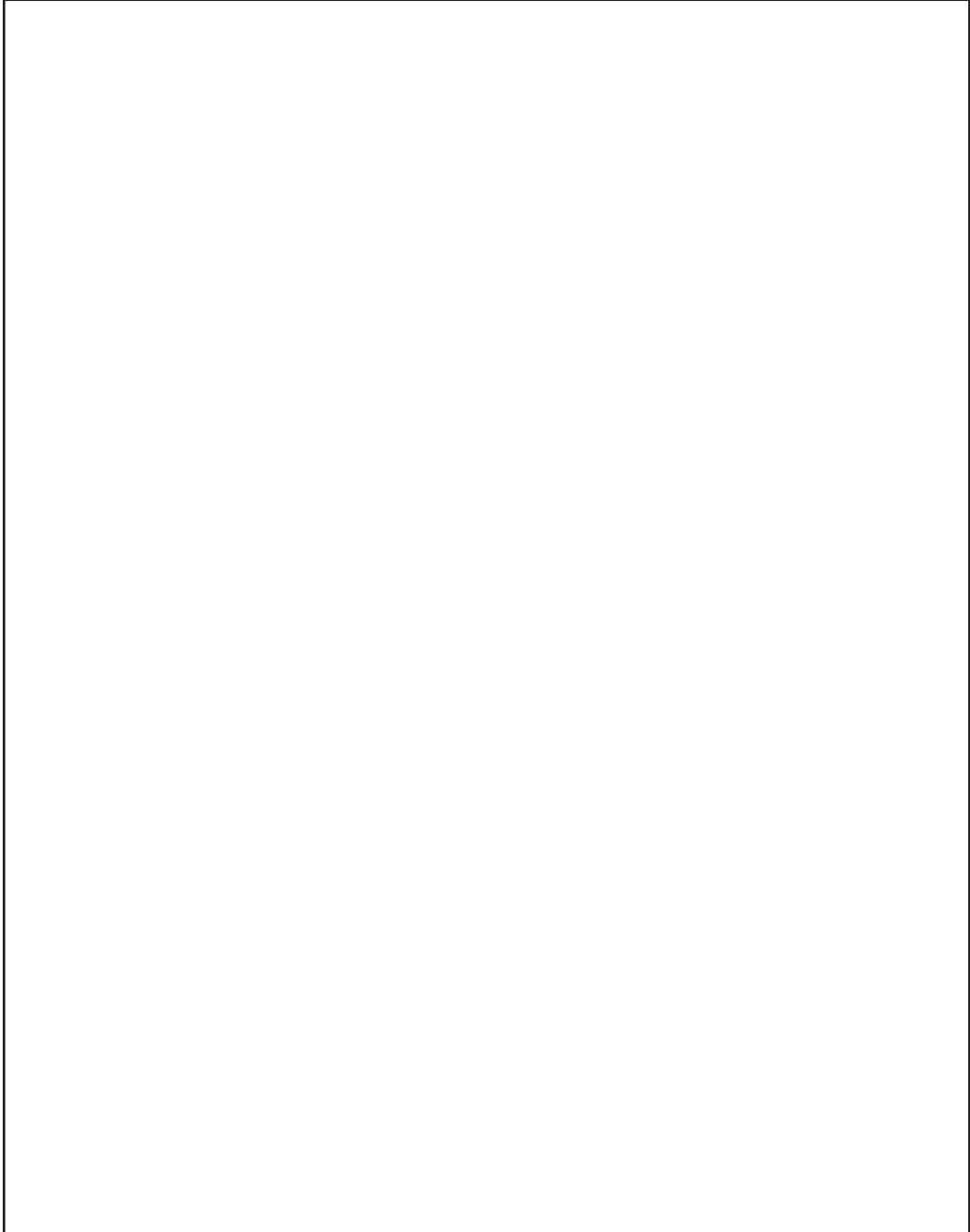
A. Write the names of the planets and the number of moons each planet has.

| Name of planet | Number of moons |
|----------------|-----------------|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

B. How does the moon shine? Explain.

WORKSHEET 2

B. Draw a diagram showing the phases of the moon.



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.

