

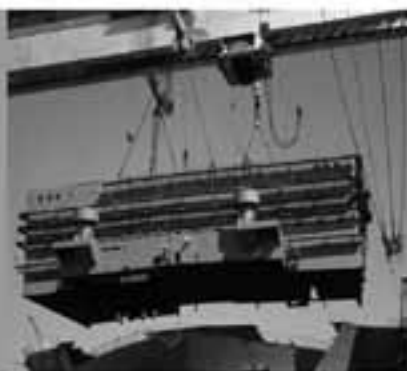
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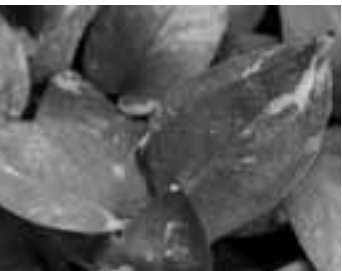
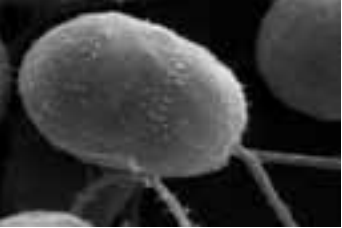
Teaching Guide

Revised Edition

Amazing Science



OXFORD
UNIVERSITY PRESS



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Introduction

Children are curious by nature and want to know about things around them. Early guidance and varied experiences do much to stimulate the development of their natural intelligence.

A teacher can play a very important role in arousing the interest of students by allowing them to discuss facts and ideas and helping them to draw conclusions from them as to why and how things happen.

The teacher can stimulate the thinking process of students by asking questions and by encouraging them to ask questions.

Experimental work enables students to test for themselves the facts that have been learnt by them, thereby making it easier for them to understand the implications of the background to their activities.

This course has been developed to provide information about the world around on which students can base their opinion, verify information, come to conclusions, and use the knowledge thus gained in their everyday life. It will help in maintaining the curiosity and enthusiasm of students who have just started studying science. Concepts developed at this stage will be of use in their studies at an advanced level later. It will help them to develop a better outlook on life.

About the Pupil's Book:

This science series, now completely revised, has been written especially for children at the primary level. It provides information at a child's level of understanding and has a direct appeal for children who need interesting and easy to read material.

Keeping in view the interests, abilities, curiosities, and needs of children, it provides stimulating learning experience and offers enjoyable educational motivation, thus serving as a building block for further learning.

The keyword in science is curiosity. The material in the series is designed to awaken in a child the same urge that motivates in a scientist the desire to know the answer to a question. There is a wide range of topics that will interest and motivate the child.

Teachers will recognize that this series deals with those broad areas about which most children frequently express curiosity; that it provides answers to many questions they ask, while offering new and exciting information in many fields. It aims to create an awareness, as well as stimulate an interest in science.

The language is simple and easy to read and within the range of the students' abilities of each grade. Together, the text and illustrations motivate children to discuss, question, and explore.

The contents have been selected and presented in such a way as to capture and hold the interest of the students. The objective is to simplify complex ideas and present them in an interesting way. Every effort has been made to keep the language simple.

When it is necessary to use a specialized word, it has been gently introduced into the text. When it is not self-explanatory within the context, it has been defined. Clear and well-labelled illustrations have been included, which help to identify and clarify the topics dealt within.

Good pictures and diagrams arouse and develop interest. These make lasting impressions. They help to make the text clear. They also appeal to the child's imagination, while satisfying his/her curiosity and often provoke a favourable reaction.

Simple practicals—interesting and stimulating presentation of factual materials—offer every chance of successful learning experiences. Knowledge of problem-solving techniques so acquired can be applied in everyday life.

It is intended, through this series, to introduce children to many of the interesting and enjoyable things in science they can learn about and do for themselves. The series also intends to develop in them a quest for knowledge and an understanding of how science is shaping the world in which they live.

The role of the teacher:

It is up to the teacher to devise ways and means of reaching out to the students, so that they have a thorough knowledge of the subject without getting bored.

The teacher must use his/her own discretion in teaching a topic in a way that he/she feels appropriate depending on the academic standard of the class.

To the teacher:

With your assurance and guidance the child can sharpen his/her skills. Encourage the child to share his/her experiences. Try to relate pictures to real things. Do not rush the reading. Allow time to respond to questions and to discuss pictures or particular passages. It will enhance learning opportunities and will enable the child to interpret and explain things in his/her own way.

Method of teaching:

The following method can be employed in order to make the lesson interesting as well as informative.

The basic steps in teaching any science subject are:

- (i) locating the problem
- (ii) finding a solution by observation and experimentation
- (iii) evaluating the results
- (iv) making a hypothesis and trying to explain it

Preparation by the teacher:

Be well-prepared before coming to the class.

- (i) Read the text.
- (ii) Prepare a chart if necessary.
- (iii) Practise diagrams which have to be drawn on the board.
- (iv) Collect all material relevant to the topic.

- (v) Prepare short questions.
- (vi) Prepare homework, tests, and assignments.
- (vii) Prepare a practical demonstration.

The following may also be arranged from time to time.

- (i) Field trips
- (ii) Visits to the laboratory
- (iii) A show of slides or films
- (iv) Plan projects

The usual strategy which is easy as well as effective can be adopted:

- (i) Before starting a lesson, make a quick assessment of the previous knowledge of the students by asking them questions pertaining to the topic. Relate them to everyday observations of their surroundings or from things that they have seen or read about in books, magazines, or newspapers.
- (ii) Explain the lesson.
- (iii) Write difficult words and scientific terms on the board.
- (iv) Ask students to repeat them.
- (v) Help students to read text.
- (vi) Show materials, models, or charts.
- (vii) Make diagrams on the board.
- (viii) Perform an experiment if necessary.
- (ix) Ask students to draw diagrams in their science manuals.
- (x) Students should tackle objective questions independently.
- (xi) Ask questions from the exercises.
- (xii) Answers to questions to be written for homework.
- (xiii) The lesson should be concluded with a review of the ideas and concepts that have been developed or with the work that has been accomplished or discussed.

Conclusion:

The teacher can continue the learning process by not only encouraging and advising the students, but also by critically evaluating their work.

It is not necessary that the lesson begins with a reading of the textbook. The lesson can begin with an interesting incident or a piece of information that will hold the interest of the students and they will want to know more about the topic.

The topic should then be explained thoroughly and to check whether the students are following or not, short questions should be asked every now and then.

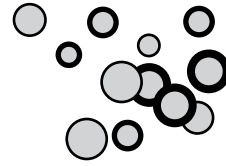
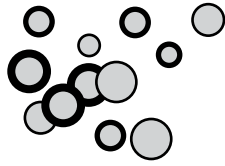
Sketches and diagrams on the board are an important aspect to the teaching of science, but too much time should not be spent on them as the students lose interest. An alternative to board drawing is a ready-made chart or one made by the teacher can be displayed in the class. The use of visual material keeps students interested as well as helps to make mental pictures which are learnt quickly and can be recalled instantly. Pupils should be encouraged to draw and can be helped by the teacher. Diagrams that are not in the text should either be copied from the board or chart, or photocopies can be made and distributed in the class.

Simple experiments can be performed in the class. If possible, children may be taken to the laboratory occasionally and be shown specimens of plants and animals, chemicals and solutions, and science apparatus, etc.

Practical work arouses interest in science. Class activities can be organized in such a way that the whole class participates either in groups or individually, depending on the type of work to be done or the amount of material available.

It is hoped that the above guidelines will enable teachers to teach science more effectively and develop in their students an interest in the subject which can be maintained throughout their academic years, and possibly in their lives as a whole.

These guidelines can only supplement and support the professional judgement of the teacher, but in no way can they serve as a substitute for it.



Classification of living things

Teaching objectives:

- to explain that there are many kinds of living things on Earth
- to explain that scientists who study living things are called 'biologists'
- to explain that biologists who study animals are called 'zoologists' and those that study plants are called 'botanists'
- to explain how to group or classify animals and plants on the basis of their characteristics
- to explain that some animals became extinct because they could not adapt to their surroundings
- to explain that scientists can study extinct animals by studying their fossils

Teaching strategy:

Ask: Why do scientists classify living things? Explain that it is the best way to keep track of them. If things are arranged in order, we know where to find them. Besides, when we group together things that are alike, in some way, we can talk about them more easily because we can give a name to each group. Scientists have worked out a plan for classifying all the kinds of animals and plants and for giving each one a name. Living things with the same characteristics or structure are grouped together and given a name. Each group has its own characteristics and no other group is exactly like it. Show the students assorted pictures of living and non-living things and of plants and animals. Ask them to sort them into different groups.

Ask: How are the plants different from each other? Discuss the structure of different kinds of plants and the characteristics of each group. **Ask:** What groups of plants have seeds? Explain that plants can be divided into two big groups: those with seeds and those without seeds. All trees and shrubs, all crop, plants and vegetables, all garden flowers and wild flowers, and all grasses and weeds are seed plants. From them we get almost all the plant food that we eat or feed to our farm animals. Show the students pictures of different kinds of plants. Discuss the characteristics of different classes of plants.

Ask: How are the animals different from each other? Discuss the different features, such as different skin coverings and colours, different shapes and sizes, the sounds they make, their way of movement, etc. **Ask:** How are they alike? Discuss the characteristics of animals.

Ask: How are animals different from plants? Discuss the characteristics of plants and the main differences between plants and animals. Show the students pictures of small animals.

Ask: Do some of the animals look alike? What do they have in common? Which animals have no legs? Which animals have wings? Explain that there are many kinds of animals. Scientists called zoologists study animals. Zoologists have created classification groupings to understand and study animals. Animals can be grouped into two large groups—those that have a backbone and those that do not. Animals with backbones are called 'vertebrates'. Those without backbones are called 'invertebrates'.

Ask: What kind of animal do they think they are, one with or without a backbone? What do the bones do for the body? What would your body look like without bones? Explain that some animals do not have backbones. They have hard shells or they have exoskeletons made up of many thin shell-like pieces to protect their bodies. Show the students pictures of a crab, a snail, or other shelled-animals. Explain that animals that have shells belong to the group of animals without backbones called ‘invertebrates’. Show the children the assorted pictures of animals. Ask them to sort them into piles of vertebrates and invertebrates. Explain that zoologists have divided the animals that have backbones into five large groups or classes of animals. Mammals are animals that have a backbone and have fur or hair on their bodies. They feed their babies on milk. Birds are animals that have a backbone and feathers. Reptiles are vertebrates that have rough scaly skin and they breathe through lungs. Amphibians are vertebrates that have smooth moist skins and breathe through lungs as adults, but breathe through gills when young. Fish are vertebrates that have fins and scales. They live in water and breathe through gills.

Ask the children to sort the pictures of vertebrates into different classes. Have the students look at pictures of invertebrates. **Ask:** How can these small animals be classified? Discuss the characteristics of the classes of invertebrates. Explain that invertebrates belong to different groups according to their characteristics.

Ask: Have you seen a dinosaur? Why don’t we see dinosaurs in forests and zoos? Discuss extinction and the conditions that caused the extinction of many animals. **Ask:** How do we know that dinosaurs and other pre-historic animals existed? Explain the formation of fossils and the information that can be obtained from fossil records of prehistoric animals and plants.

Answers to Exercises in Unit 1:

1. a) Dividing living things into groups helps us to understand how all the different living things in the world fit into a pattern.
- b) Biologists already know about more than one million different kinds of animals and more than 350,000 kinds of plants.
- c) Once inside the cell the virus uses the cell’s materials to live and reproduce. It can make hundreds of copies of itself.
- d) Protists are small living things that cannot easily be classified as animals or plants.
- e) Euglena moves about in the water by a whip-like projection called a flagellum.
- f) Bacteria belong to the group Monera.
- g) The four main groups of plants are:
 - algae and fungi
 - mosses and liverworts
 - ferns, club mosses, and horsetails
 - seed-bearing plants
- h) Fungi are made up of thin threads called ‘hyphae’.
- i) Lichens are plants that consist of fungi and algae living together.
- j) Mosses and liverworts reproduce by spores formed in capsules.

2. Fish—backbone, fins, scales, lays eggs, gills

Amphibian—backbone, damp skin, lays eggs, gills, lungs

Reptile—scales, lays eggs, lungs

Birds—backbone, lays eggs, feathers, lungs

Mammals—backbone, has live babies, hair, milk glands, lungs

<u>Animal/Plant</u>	<u>Group</u>	<u>Animal/Plant</u>	<u>Group</u>
fern	adiantum	sea weed	algae
mouse	mammal	frog	amphibian
mushroom	fungi	amoeba	protist
dolphin	mammal	pine tree	gymnosperm
beetle	insect	bacteria	monera
rose	angiosperm	robin	bird
trout	fish	moss	algae and fungi
snake	reptile	octopus	molluscs
earthworm	segmented worm	starfish	echinoderm

<u>Organisms</u>	<u>Characteristics</u>
virus	simplest living organism
protist	cannot be classified as plant or animal
bacterium	smallest living things made up only one round elongated or spiral cell
alga	green plant that usually live in water
fungus	non-green plant made up of hyphae
lichen	consist of algae and fungi living together
moss	bear tiny pear-shaped capsules that contain spores
fern	their leaves are called fronds
gymnosperm	seed-bearing, non-flowering plant
angiosperm	seed-bearing, flowering plants

5. sponge, crab, starfish, centipede

Additional Exercise:

MCQs

- (a) Scientists who study living things are called _____.
 biologists chemists geologists [**biologists**]
- (b) Dividing living things into groups is called _____.
 division classification multiplication [**classification**]
- (c) The two main divisions of living things are _____.
 non-living and living things plants and animals
 human beings and animals [**plants and animals**]
- (d) viruses are made up of _____ like those found in our bodies.
 bacteria chemicals fungi [**chemicals**]
- (e) Amoeba is a single-celled _____.
 bacterium virus protist [**protist**]
- (f) Which one of the following is a disease caused by a bacterium?
 cancer cholera common cold [**cholera**]
- (g) Scientists who study plants are called _____.
 zoologists geologists botanists [**botanists**]
- (h) Plants which are non-green and cannot make their own food are _____.
 algae fungi angiosperms [**fungi**]
- (i) Green plants that usually live in water are called _____.
 algae fungi bacteria [**algae**]
- (j) Skeletons or impressions formed by crushed bodies of dead animals in very old rocks are called _____.
 skeletons dead bodies fossils [**fossils**]

Date:

Time: 40 mins

Unit: 1 Topic: Classification of living things	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
1. Classification of living things	<ul style="list-style-type: none"> to explain what is meant by classification and how living things are classified 	<p>Students should be able to:</p> <ul style="list-style-type: none"> explain how living things are classified 	Pictures of plants and animals	<p>Reading: p 2, 3, 4 CW: Q1 (b) HW: Q1 (a)</p>
<p>Key words: classification, biologist, kingdom, feature</p> <p>Method: Introduce the lesson by asking the students to guess how many different kinds of living things exist on this planet. Explain that there are millions and millions of living things. The best way to keep track of them is by classifying them. If things are arranged in order, we know where to find them. Also, when we group together things that are alike in some way, we can talk about them more easily because we can give a name to each group.</p> <p>Scientists called biologists have worked out a plan for classifying all kinds of animals and plants and for giving each one a name. Living things with the same characteristics or structure are grouped together and given the same name. Each group has its own characteristics and no other group is exactly like it.</p> <p>Show the students assorted pictures of plants and animals. Ask them to sort them into different groups. Ask: How are these plants different from each other? Discuss the structure of different kinds of plants and the characteristics of each group.</p> <p>Ask: What group of plant has seeds? Explain that plants can be divided into two big groups: those that produce seeds and those that do not. Explain that all trees and shrubs, all crops and vegetables, all garden flowers and wild flowers and all grasses and weeds are seed plants. From them we get almost all the plant food that we eat or feed to our farm animals. Explain that scientists who study plants are called botanists. Botanists have created classification groupings to help them to understand and study plants.</p> <p>Ask: How are animals different from each other? Discuss the different features, such as different skin coverings and colours, different shapes and sizes, the sounds they make, the ways in which they move, etc. Ask: In what ways are they alike? Discuss the characteristics of animals. Show the students pictures of some small animals. Ask: Do some of these animals look alike? What do they have in common? Which animals have no legs? Which animals have wings? Explain that there are many kinds of animals. Explain that scientists who study animals are called zoologists. Zoologists have created classification groupings to help them to understand and study animals.</p> <p>Discuss the differences between plants and animals.</p>				

Date:

Time: 40 mins

Unit: 1 Topic: Classification of living things	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
2. Viruses, protists, bacteria	<ul style="list-style-type: none"> to describe the structure of microscopic organisms 	<ul style="list-style-type: none"> describe the features of microscopic organisms 	Diagrams of viruses, pictures of amoeba, paramecium, euglena, and different kinds of bacteria	Reading: p 3, 4 CW: (c) (d) HW: (e) (f)

Key words: virus, protist, bacterium, cilia, flagellum, disease

Method: Show the students diagrams of a virus. Explain that viruses are so small that they can only be seen with the help of an electron microscope. They are the smallest and simplest living things. They are composed of chemicals like those found in our bodies. They live inside the bodies of living things, where they multiply, or reproduce, and destroy healthy cells. They can make an animal or plant very ill. Discuss diseases caused by viruses.

Show the students pictures of an amoeba, a paramecium, and a euglena. Discuss the features of each and explain that protists are small living things that are neither plants nor animals.

Show the students pictures of different kinds of bacteria. **Ask:** Where do bacteria live? Explain the structure of a bacterial cell. Explain that bacteria live in the air, water, land, and inside our bodies. Not all bacteria are harmful. Some help to make vitamins, cheese, and yoghurt. Some bacteria cause diseases in plants and animals. Discuss the some bacterial diseases.

Lesson plan

Date:

Time: 40 mins

Unit: 1 Topic: Classification of living things	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
3. The plant kingdom: algae, fungi, lichens	<ul style="list-style-type: none"> to describe the four main plant groups 	Students should be able to: <ul style="list-style-type: none"> explain the grouping of plants on the basis of their characteristics 	Pictures of algae, fungi, lichens	Reading: p 4, 5, 6 CW: Q1 (g) HW: Q1 (h) (i)
<p>Key words: botanist, algae, fungus, parasite, hypha</p> <p>Method: Show the students pictures of algae. Ask: Where do algae live? What colour are they? Can they make their own food? Discuss the characteristics of algae. Explain that algae are mostly green so they can make their own food by photosynthesis. Some algae, such as sea weeds, live in the sea.</p> <p>Show the students pictures of fungi. Ask: Where do fungi live? What colour are they? Can they make their own food? Discuss the characteristics of fungi. Explain that because they are not green, they cannot make their own food. They grow in dark damp places and get their food from dead rotting plants. They are made of thin threads called hyphae, which help to absorb food. Some fungi are parasites. Ask: What is a parasite? Explain that a parasite is an organism that takes food from living things. Discuss the diseases caused by fungi.</p> <p>Ask: What are lichens? Explain that lichens are plants that are made up of a fungus and an alga living together. The alga prepares the food and the fungus protects the alga. Discuss the structure of lichens and their habitats. Explain that lichens grow very slowly and can live for thousands of years. They can live in very dry conditions. Most lichens are sensitive to air pollution, so they are not found in places where the air is polluted.</p>				

Date:

Time: 40 mins

Unit: 1 Topic: Classification of living things	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
4. Mosses and liverworts Ferns	<ul style="list-style-type: none"> to explain the structure of mosses, liverworts, and ferns 	<ul style="list-style-type: none"> describe the characteristics of mosses and liverworts, and of ferns 	Pictures of liverworts, mosses, and ferns	<p>Reading: p 6, 7 CW: Fill in the blanks to complete the passage below.</p> <p>Ferns grow in _____, _____ places. They have tiny _____ inside their stems and leaves. Their leaves are called _____. Ferns produce _____, in special pods called _____, on the underside of the leaflets.</p> <p>HW: Q1 (j)</p>

Key words: capsule, spore, frond, leaflet, sporangia

Method: Show the students pictures of mosses and liverworts. **Ask:** Where do mosses grow? Discuss the characteristics of mosses and liverworts. **Ask:** Do mosses produce seeds and flowers? Explain that they produce spores in special capsules. The spores can grow into new plants.

Ask: Where do ferns grow? Are ferns like other plants? Explain that, like flowering plants, ferns have tiny tubes inside their stems and leaves. These tubes carry food and water. **Ask:** Do ferns produce flowers? Explain that spores are produced in sporangia on the underside of leaflets.

Date:

Time: 40 mins

Unit: 1 Topic: Classification of living things	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
5. Seed-bearing plants Gymnosperms Angiosperms	<ul style="list-style-type: none"> to describe the characteristics of seed-bearing plants 	<p>Students should be able to:</p> <ul style="list-style-type: none"> describe the structures of gymnosperms and angiosperms 	<p>Pictures of gymnosperms and angiosperms specimens of dicotyledonous and monocotyledonous seeds</p>	<p>Reading: p 7, 8 CW: Q4 HW: Write two differences between angiosperms and gymnosperms, and monocotyledonous and dicotyledonous plants</p>
<p>Key words: seed-bearing, non-flowering, needle-like leaf, cone, flowering, monocotyledon, dicotyledon, network of veins, parallel veins, fibrous root, taproot</p> <p>Method: Show the students pictures of gymnosperms. Ask: Where do gymnosperms grow? What features enable them to live in cold places? Discuss the characteristics of gymnosperms. Ask: Do gymnosperms produce flowers? Explain that they are seed-bearing plants that produce seeds in cones.</p> <p>Show the students pictures of angiosperms. Ask: Do angiosperms have flowers and seeds? Discuss the characteristics of angiosperms. Explain that they produce flowers and they make seeds inside fruits.</p> <p>Ask: What is a seed? What is a cotyledon? Show the students a bean seed and a maize grain. Discuss the difference between monocotyledonous and dicotyledonous seeds. Show the students the embryos inside the seeds. Explain that the embryo grows into a new plant. The cotyledons provide food for the growing embryo.</p>				

Date:

Time: 40 mins

Unit: 1 Topic: Classification of living things	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
6. Invertebrates	<ul style="list-style-type: none"> to discuss the characteristics of invertebrates 	<p>Students should be able to:</p> <ul style="list-style-type: none"> describe the structures of sponges, coelentrates, and worms 	<p>Pictures of sponges, jellyfish, corals, and worms</p>	<p>Reading: p 9, 10 CW: Write two characteristics of:</p> <p>Sponges</p> <p>1. _____ 2. _____</p> <p>Coelentrates</p> <p>1. _____ 2. _____</p> <p>Worms</p> <p>1. _____ 2. _____</p>

Key words: pore, ostia, hollow body, tentacle, polyp, segment

Method: Show the students pictures of sponges. Explain the characteristics of a sponge. **Ask:** Where does a sponge live? Can it swim about? Explain that sponges attach themselves to rocks or plants.

Show the students pictures of jellyfish and polyps. Discuss the characteristics of coelentrates. Explain that they are called coelentrates because they have hollow bodies. They have thin arms called tentacles with which they swim about and catch food.

Ask: Where do coelentrates live? Explain that they live in water and eat tiny plants and animals.

Show the students pictures of worms. Discuss their characteristics. Explain that some worms live inside our bodies; they are parasites. The leech is also a parasite. It sucks the blood of animals.

Date:

Time: 40 mins

Unit: 1 Topic: Classification of living things	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
7. Invertebrates: Echinoderms, Molluscs, Arthropods	<ul style="list-style-type: none"> to describe the characteristics of echinoderms, molluscs, and arthropods 	Students should be able to: <ul style="list-style-type: none"> explain the structures of echinoderms, molluscs, and arthropods 	Pictures of starfish, sea urchin, octopus, squid, cuttle fish, oyster, snail, insects, spider, scorpion	Reading: p 10, 11 CW: Q5 Write two characteristics of: Echinoderms 1. _____ 2. _____ Molluscs 1. _____ 2. _____ Arthropods 1. _____ 2. _____

Key words: spiny skin, tube feet, hard shell, jointed-feet, exoskeleton, arachnid

Method: Ask: What is a starfish? Where does a starfish live? Discuss the characteristics of echinoderms. Explain how they move about. **Ask:** Which animals have a hard shell? Discuss the characteristics of molluscs. Where do molluscs live? Explain that some molluscs, such as the snail, live on land.

Show the students pictures of insects and tell them that they belong to a group of animals that have jointed-feet. Their bodies have an outer hard covering called an exoskeleton. Insects usually have six legs. Some arthropods such as centipedes and millipedes have many feet.

Show the students pictures of a spider and a scorpion. **Ask:** How many legs does a spider have? Explain that arachnids are a class of arthropods which have eight legs.

Date:

Time: 40 mins

Unit: 1 Topic: Classification of living things	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
8. Vertebrates: prehistoric vertebrates	<ul style="list-style-type: none"> to explain the characteristics of fish, amphibians, reptiles, birds, mammals, and prehistoric vertebrates 	<ul style="list-style-type: none"> describe the characteristics of fish, amphibians, reptiles, birds, mammals describe the characteristics of prehistoric animals and suggest reasons for their extinction 	Pictures of various vertebrates, some prehistoric animals	Reading: p 11, 12 Activity: 1, 2 Project: p 13 HW: Q2, Q3
<p>Key words: gill, scale, fin, spawn, wart, mucus, lungs, feather, wing, fur, hair, bristle, baby, milk, prehistoric, extinct, hibernate, fossil</p> <p>Method: Discuss the characteristics of vertebrates with the help of pictures and specimens. Mammals are animals that have fur, hair, or bristles on their skins. They feed their babies on milk. Birds are animals that have a backbone and feathers. Reptiles are vertebrates that have rough scaly skin and breathe through lungs. Amphibians have smooth, moist skins and they breathe through lungs as adults, but through gills when young. Fish have fins and scales. They live in water and breathe through gills.</p> <p>Ask: Have you seen a dinosaur? Why do we not see dinosaurs in forests and zoos? Discuss extinction and the conditions on Earth which lead to the extinction of the dinosaurs. Ask: How do we know that dinosaurs and other prehistoric animals existed? Explain what fossils are and discuss the information that can be obtained from fossil records of prehistoric animals and plants.</p>				

Name: _____

Date: _____

Description**Name of organism**

1. The smallest and simplest living thing; lives in the bodies of other living things; causes diseases like cancer
2. A protist covered with hair-like cilia
3. A single-celled organism, surrounded by a thick cell membrane; can cause diseases like cholera, typhoid, etc.
4. An alga that lives in the sea; is of many different colours, shapes, and sizes
5. Non-green plants that grow in dark, damp places, and feed on dead, rotting plants; made up of thin threads called hyphae
6. A combination of algae and fungi living together; hardy plants that have no leaves, stems, or roots; sensitive to air pollution
7. Small, green plants that grow in moist shady places; stems are covered by tiny green leaves; reproduce by making spores in pear-shaped capsules
8. Green plants that have tiny tubes inside the stems and leaves; leaves are called fronds; make spores in sporangia on the underside of leaflets
9. Non-flowering seed-bearing plants with well-developed stems, roots, and leaves; produce seeds in cones
10. Seed-bearing flowering plants having well-developed roots, stems, leaves, and flowers

Name: _____

Date: _____

1. Name the class to which each of the following animals belongs.

Animal

Class

sponge

jellyfish

starfish

octopus

butterfly

spider

2. Choose examples of each class from these animals.

frog	snake	ostrich	rabbit	salmon
seahorse	toad	lizard	sparrow	tiger

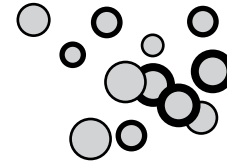
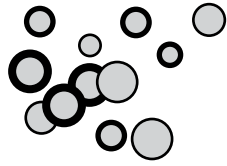
Fish

Amphibian

Reptile

Bird

Mammal



Reproduction in living things

Teaching objectives:

- to explain that living things reproduce
- to explain how animals reproduce
- to explain the importance of flowers
- to explain the structure of a flower
- to explain the functions of the parts of a flower
- to explain pollination and how it takes place
- to discuss fertilization
- to discuss how seeds and fruits are formed
- to discuss how seeds are scattered
- to discuss the structure of a seed
- to discuss how a seed germinates
- to discuss the conditions necessary for germination
- to discuss the importance of manure and fertilizers
- to discuss the relationship between crops and population growth

Teaching strategy:

Ask: How do living things continue to live? Where did you come from? Explain that all living things produce new living things of their own kind. **Ask:** How do insects reproduce? What comes out of an egg? Explain that some animals produce babies while some lay eggs.

Ask: Can a small baby look after itself? Does a fish give its babies milk? Explain that mammals feed their babies on milk and they look after them till they are strong enough to find food for themselves. Show models and charts of the life cycles of a butterfly and a cockroach. Explain the stages of the life cycles. With the help of charts and models explain the life cycles of frogs, fish, birds, and mammals. Explain that birds and mammals look after their babies till they become independent.

Bring some flowers to the class. Give each student a flower. Tell them to study the flower carefully. Tell them to touch the centre of the flower. **Ask:** What is the yellow powder on your finger? Why does a plant have flowers? Are all flowers brightly coloured? Show the students a wheat or a grass spike. Explain the importance of flowers. Tell the students to study the flower, starting from the outermost whorl. Explain the structure and function of each part, with diagrams or a chart.

Cut a longitudinal section of a flower and show the students the ovules in the ovary. **Ask:** Why are petals brightly coloured? Why do flowers have a scent and nectar? Explain pollination and how it is brought about by insects and birds. With the help of diagrams and charts, explain the growth of the pollen tube and the process of fertilization.

Ask: What is a fruit? Are tomatoes and green chillies fruits? Explain that a fruit is a part of the flower which has seeds inside. **Ask:** Where do seeds come from? Explain seed and fruit formation. **Ask:** Is pea pod a fruit? Explain dry and juicy fruits.

Ask: Why are seeds enclosed in a fruit? Explain the importance of dispersal of seeds. With actual specimens, charts, and diagrams explain the various methods of dispersal of seeds and fruits. Soak some bean seeds overnight. Distribute the seeds to the students. Tell them to open the seeds, after removing the testa. Explain the various parts with the help of a diagram and describe their functions.

Ask: Will seeds grow in the freezer? Will boiled seeds grow? Can seeds grow without water? Explain the conditions necessary for germination. Tell students to grow some seeds on moist sawdust or cotton wool. Show them the various stages of seed germination.

Ask: Can new plants grow from leaves? How can we find out? Explain that some plants are capable of producing new plants if their leaves are placed in water. Roots start to form at the base of the leaf, and then a new plant can grow. Give the students leaves from a geranium plant. Place each of the leaves in small paper cups filled with water. Leave the paper cups on a sunny window for a few weeks. Small roots will begin to grow, and new leaves will be formed. Show the students an onion bulb, a potato, a ginger rhizome, and a gladiolus corm. Show them the buds on potato and ginger. Slice the onion longitudinally. Show them the bud inside. Have the children plant some potato eyes in a pot of loose soil. Show them the sprouting plants. Explain that there are tiny plants inside the corm and bulb. Bulbs are leaves that store food in their centre. Tubers are swollen stems. The eyes on the potato are where the buds grow. If a potato is cut up and planted in the ground, each eye can produce a new potato plant.

Ask: Why do we add manure to plants? What is a fertilizer? How is manure made? Discuss the importance of adding manure and fertilizers to plants and crops. **Ask:** Why do we need to grow more crops? Explain the increasing need of food for growing populations.

Answers to Exercises in Unit 2:

1. (a) Bringing new living things of one's own kind into this world is called reproduction.
 - (b) (i) The life cycle of a butterfly has four stages. The female lays eggs. An egg hatches into a caterpillar. The caterpillar produces a fine thread and forms a shell, called a cocoon, around its body. Inside the cocoon the insect becomes a pupa. A complete butterfly forms inside the pupa. The pupa splits and the newly-formed butterfly emerges from it.
 - (ii) The life cycle of a cockroach has three stages. The female lays eggs. A tiny nymph hatches from each egg. The nymph grows to form a complete insect.
 - (iii) The female frog lays eggs. A tiny tadpole comes out of each egg. The tadpole grows to form a complete frog.
- (c) fish, frog, bird
- (d) The female stickleback fish lays eggs in a nest. The male fish looks after the eggs for 10 days. When the fry hatch, they are kept in the nest for a month. Then they leave the nest and begin to feed themselves.
- (e) Baby birds are covered with small feathers and their eyes are closed. Therefore, their parents have to look after them until they become strong enough to fly.

- (f) A mammal is an animal that gives birth to babies. It feeds its babies on the mother's milk.
 - (g) Flowers are important because they produce fruits and seeds from which new plants grow.
 - (h) Sepals protect the flower before it opens. Petals attract insects for pollination.
 - (i) A stamen has a stalk. At the tip of the stalk, there is an anther, which contains pollen.
 - (j) The parts of a carpel are stigma, style, and ovary.
 - (k) When pollen of a flower is taken to the stigma, we call it pollination.
 - (l) The joining of the male and female cells is called fertilization.
 - (m) The ovary of the flower makes the fruit and seeds.
 - (n) Seeds are scattered by wind, water, and animals. Some fruits burst open and scatter their seeds.
2. Parts of a flower: Refer to page 20 of the Pupil's Book.
 3. Stages of germination of a bean seed: Refer to page 24 of Pupil's Book.
 4. Life cycles of a butterfly and fish: Refer to pages 17 and 18 of Pupil's Book.
 5. (a) ovary (b) whorls (c) nectar (d) pollen (e) ovule
 (f) fruit (g) testa (h) cotyledons (i) germination

Additional Exercise:

MCQs

- (a) Making new living things of their own kind is called _____.
 reproduction replication reduction [*reproduction*]
- (b) A caterpillar spins a coat of silk around its body and forms a _____.
 cocoon pupa butterfly [*pupa*]
- (c) Baby fish are called _____.
 caterpillars spawn fry [*fry*]
- (d) A tadpole takes _____ months to change into a complete frog.
 2 3 4 [*3*]
- (e) Pollen is made in the _____ of a flower.
 sepal petal anther [*anther*]
- (f) Ovules are made in the _____ of a flower.
 sepal petal ovary [*ovary*]
- (g) The process by which a seed grows into a plant is called _____.
 pollination fertilization germination [*germination*]

(h) New strawberry plants grow by _____.

runners

corms

bulbs

[*runners*]

(i) A short swollen stem which stores a lot of food is called a _____.

bulb

corm

runner

[*corm*]

(j) A _____ is made up of thick overlapping leaves which contain stored food.

tuber

corm

bulb

[*bulb*]

Date:

Time: 40 mins

Unit: 2 Topic: Reproduction in living things	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
1. Reproduction in animals	<ul style="list-style-type: none"> • to explain how animals reproduce • to describe the life cycle of a butterfly 	<ul style="list-style-type: none"> • explain reproduction in animals • to describe the process of reproduction in butterflies 	Wallchart showing the life cycle of a butterfly	Reading: p 17, 18 CW: Draw the life cycle of a butterfly. Q1 (a)
<p>Key words: reproduction, caterpillar, larva, pupa, cocoon, butterfly, nymph</p> <p>Method: Ask: How do living things continue to live? Explain that all living things produce new living things of their own kind.</p> <p>Ask: How do insects reproduce? What comes out of an egg? Explain that some animals have babies, while some lay eggs.</p> <p>Show the students a wallchart of the life cycle of a butterfly. Explain the stages of the development of a butterfly.</p> <p>Discuss that in some insects, such as the cockroach or the dragonfly, the eggs do not hatch into caterpillars or larvae. They hatch into tiny incomplete insects called nymphs. A nymph has legs, compound eyes, and small wings. It grows to form a complete insect.</p>				

Date:

Time: 40 mins

Unit: 2 Topic: Reproduction in living things	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
2. Reproduction in fish Reproduction in frogs	<ul style="list-style-type: none"> to describe the life cycles of a fish and a frog 	<ul style="list-style-type: none"> describe the developmental stages in the life cycle of a fish and a frog 	Wallcharts showing the life cycles of fish and frogs	Reading: p 18 CW: 1. Draw a diagram of the life cycle of a fish. 2. Write the number of days for each stage of development of a frog: Egg to tadpole _____ days Gills start growing after _____ days. Legs begin to appear after _____ days. Tadpole changes into a complete frog after _____ days. HW: Q1 (c) (d)
<p>Key words: egg, fry, spawn, tadpole</p> <p>Method: With the help of charts explain the life cycles of a fish and a frog. Explain the developmental changes that take place.</p> <p>Ask: How long does it take for the eggs of a fish to hatch? How long does it take for a frog to develop from an egg to an adult frog? Discuss the differences in the development of a butterfly, a fish, and a frog.</p>				

Lesson plan

Date:

Time: 40 mins

Unit: 2 Topic: Reproduction in living things	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
3. Reproduction in birds and mammals	<ul style="list-style-type: none"> to explain the methods of reproduction in birds and mammals 	<ul style="list-style-type: none"> describe the developmental stages in birds and mammals 	Charts and diagrams of the life cycles of birds and mammals	Reading: p 19 CW: Describe a nestling. HW: Q1 (e) (f)
<p>Key words: shell, nestling, hatch, baby</p> <p>Method: Describe the life cycles of birds and mammals with the help of charts and diagrams. Explain that birds and mammals look after their babies until they become independent.</p>				

Date:

Time: 40 mins

Unit: 2 Topic: Reproduction in living things	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
<p>4. Reproduction in plants</p> <p>Flowering plants</p>	<ul style="list-style-type: none"> • to explain the importance of flowers • to explain the structure of a flower and the function of each part • to describe pollination and fertilization • to explain the formation of seeds and fruits • to describe the scattering of seeds 	<p>Students should be able to:</p> <ul style="list-style-type: none"> • explain the importance of flowers • describe the structure of a flower and explain the function of each part • explain the formation of fruits and seeds • describe the methods by which seeds are scattered 	<p>Specimens of real flowers, fruits, and seeds</p> <p>Diagrams and wall charts of pollination and fertilization</p> <p>Different kinds of seeds and dry fruits</p>	<p>Reading: p 20, 21, 22</p> <p>CW: Q1 (g) (h) (i) (j) (m), Q2</p> <p>HW: Q1 (k) (l) (n)</p>
<p>Key words: flower, stalk, whorl, sepal, petal, stamen, anther, carpel, stigma, style, ovary, pollination, fertilization, pollen tube, seed, fruit, hair, wing, hook</p> <p>Method: Give each student a flower. Ask them to study the flowers carefully. Ask them to touch the centre of the flower.</p> <p>Ask: What is the yellow powder on your finger? Why does a plant have flowers? Are all flowers brightly coloured? Explain the structure of a flower and describe the function of each part. Cut a longitudinal section of a flower and show the students the ovules in the ovary. Ask: Why are petals brightly coloured? Why do flowers have scent and nectar? Explain the process of pollination and how it is brought about by insects and birds. With the help of diagrams and charts explain the process of fertilization. Ask: What is a fruit? Are tomatoes and green chillies fruits? Explain that a fruit is that part of the flower that contains the seeds.</p> <p>Ask: Where do seeds come from? Explain seed and fruit formation.</p> <p>Explain dry and juicy fruits with real specimens. Ask: Why are seeds enclosed in a fruit? Explain the importance of seed dispersal, and discuss the methods of seed dispersal with real specimens and charts.</p>				

Date:

Time: 40 mins

Unit: 2 Topic: Reproduction in living things	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
5. Structure of a seed Germination of a seed Kinds of germination	<ul style="list-style-type: none"> • to describe the structure of a seed • to explain how a seed germinates and the conditions necessary for germination • to compare the two kinds of germination 	<ul style="list-style-type: none"> • describe the structure of a dicot and a monocot seed • explain the functions of cotyledons • describe the process of germination of a seed and the conditions required 	Bean seeds, maize grains, petri dishes with saw dust, water	Reading: p 22, 23, 24 Activity: p 26 CW: Q3, Q5 HW: Draw diagrams to show hypogeal and epigeal germination.
<p>Key words: testa, embryo, cotyledon, plumule, radicle, cotyledon, endosperm, germination, epigeal, hypogeal</p> <p>Method: Distribute some soaked seeds to the students. Ask them to open the seeds after removing the testa. Identify the parts of the seed with the help of a diagram, and explain the function of each.</p> <p>Ask: Will seeds grow if we put them in a freezer? Will boiled seeds grow? Can seeds grow without water? Explain the conditions necessary for seeds to germinate. Ask the students to sow some bean seeds and maize grains in moist cotton wool or sawdust. Show them the various stages of germination.</p> <p>Explain the difference between epigeal and hypogeal germination. Ask the students to draw diagrams to show the various stages of germination of seeds.</p>				

Date:

Time: 40 mins

Unit: 2 Topic: Reproduction in living things	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW																
6. New plants without seeds	<ul style="list-style-type: none"> to explain that plants can grow without seeds, from other parts of plants such as leaves, stems, etc. 	<p>Students should be able to:</p> <ul style="list-style-type: none"> describe how new plants can grow from buds on the stems and leaves 	<p>Pictures and diagrams of ferns and mosses, a strawberry runner, stem cuttings, onion bulb, potato tuber, a crocus corm</p>	<p>Reading: p 24, 25 CW: Complete the table:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 80%;">Plant</th> <th style="width: 20%;">Reproductive part</th> </tr> </thead> <tbody> <tr> <td>moss</td> <td></td> </tr> <tr> <td>strawberry</td> <td></td> </tr> <tr> <td>potato</td> <td></td> </tr> <tr> <td>rose</td> <td></td> </tr> <tr> <td>ginger</td> <td></td> </tr> <tr> <td>gladiolus</td> <td></td> </tr> <tr> <td>onion</td> <td></td> </tr> </tbody> </table>	Plant	Reproductive part	moss		strawberry		potato		rose		ginger		gladiolus		onion	
Plant	Reproductive part																			
moss																				
strawberry																				
potato																				
rose																				
ginger																				
gladiolus																				
onion																				

Key words spore, capsule, runner, tuber, eye, cutting, rhizome, corm, bulb

Method: Ask: Can new plants grow from leaves? How can we find out? Explain that some plants are capable of producing new plants if their leaves are placed in water: roots start to grow from the base of the leaf and then a new plant will grow from it.

Give the students leaves of a geranium plant. Ask them to place the leaves in small paper cups filled with water. Leave the paper cups on a sunny window sill for a few weeks. You will see that small roots will appear and new leaves will be formed. Show the students an onion bulb, a potato tuber, a ginger rhizome, and a gladiolus corm. Show them the buds on the corm and the tuber. Slice the onion longitudinally. Show them the bud inside. Ask the students to plant some potato eyes in a pot of soil. Show them the sprouting plants after a few days. Explain that there are tiny plants inside the corm and the bulb. Explain that the leaves of the onion bulb and the potato tuber store food for the growing buds.

Name: _____

Date: _____

1. Draw the life cycle of a fish.

2. Fill in the blanks to complete the description of the life cycle of a frog:

The adult female frog lays eggs called spawn in water. After _____ days a tadpole hatches from each egg. After _____ weeks the gills of the tadpole start growing. After _____ to _____ weeks the legs begin to appear. After _____ months the tadpole grows into an adult frog.

3. Match the seeds and fruits to their method of dispersal:

Fruit/Seed**Method of dispersal**

cotton seed

hook

cocklebur

eaten by birds and animals

guava

burst open

pea

carried by sea waves

coconut

hairy wings

Name: _____

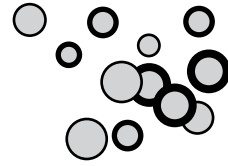
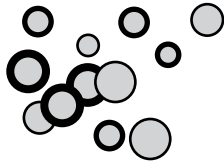
Date: _____

1. Label the bean seed.



2 a. Draw the stages of epigeal germination.

b. To germinate, a seed needs _____, _____.



A healthy body

Teaching objectives:

- to explain that we should look after our bodies
- to discuss what we should do to stay healthy
- to discuss what we should eat to stay healthy
- to explain how we become ill
- to describe bacteria and viruses
- to discuss how we can protect ourselves from diseases
- to discuss how doctors help us to fight diseases
- to discuss immunity

Teaching strategy:

Ask: Why should we keep clean? Why should we eat proper hygienic food? Why should we exercise? Explain the importance of health and what we should do to stay healthy.

Ask: How do you become ill? Explain the ways in which we catch diseases, and the importance of bacteria and viruses in spreading diseases. **Ask:** Can we protect our bodies against diseases? Explain the ways in which we can prevent most diseases. Explain how white cells help to kill germs. Explain how doctors can prevent diseases by vaccinations. Help the students to make charts and banners bearing slogans for preventing diseases.

Answers to Exercises in Unit 3:

1. (a) We should look after our bodies so that all the parts of the body work properly.
(b) To stay healthy we must:
 - i) eat a balanced diet
 - ii) exercise daily
 - iii) rest
 - vi) keep ourselves and our surroundings clean
- (c) Exercise keeps the body strong and fit. It keeps the muscles and joints healthy. It makes the blood reach every part of the body and helps the body to use up the food consumed.
- (d) Washing and bathing keeps the body free from dirt and disease. The bathroom and kitchen should be kept clean. The rubbish of the house should be kept in a covered bin. Drains around the house should be covered.
- (e) We become ill when disease, germs, and worms live inside our bodies.

- (f) Bacteria and viruses are germs. They are tiny living things that live in our bodies. They make us ill.
- (g) i) cholera ii) measles
- (h) i) Always wash your hands with soap and water before touching food.
 ii) Keep food covered to protect it from flies.
 iii) Cover cuts and scratches on the body with a plaster.
- (i) White blood cells attack and kill germs. They also produce chemical substances which can kill germs.
2. (a) true (b) false (c) true (d) false (e) false
3. Eat a balanced diet. Exercise regularly. Keep yourself clean.

Additional Exercise:

MCQs

- (a) All parts of the body _____ together so that the body functions properly.
 eat work stay [*work*]
- (b) We must eat a _____ diet for the proper growth of the body.
 fatty balanced salty [*balanced*]
- (c) Growing children need a lot of _____.
 fats sweets proteins [*proteins*]
- (d) _____ keeps your muscles and joints healthy.
 Sleeping Exercise Eating [*Exercise*]
- (e) Many diseases are caused by tiny living things called _____.
 insects worms germs [*germs*]
- (f) When people cough and sneeze germs from their bodies are pushed out into the _____.
 air water land [*air*]
- (g) The _____ blood cells protect the body from germs.
 red white blue [*white*]
- (h) Germs found in _____ and water can cause food poisoning.
 food soil air [*food*]
- (i) _____ can also help your body to fight against disease germs.
 Teachers Engineers Doctors [*Doctors*]
- (j) Vaccinations can make the body immune to many _____.
 diseases reactions bodies [*diseases*]

Date:

Time: 40 mins

Unit: 3 Topic: A healthy body	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
1. To stay healthy	<ul style="list-style-type: none"> • to describe our body as a wonderful machine • to assert that we must look after our bodies • to explain what we should do to keep healthy 	Students should be able to: <ul style="list-style-type: none"> • explain that the body is made up of many parts and how they function together • describe the ways in which we can keep our body healthy 	A chart of healthy habits	Reading: p 29, 30 CW: Q2 HW: Q1 (a) (b) (c) (d)
<p>Key words: machine, protein, balanced diet, exercise, disease, dirty</p> <p>Method: Ask: What is a machine? How is our body like a machine? Explain that each part of the body performs a certain function, just like the different parts of a machine. What work does our body do? Why is it important to look after our body? Explain that, just as a machine needs maintenance and looking after, so does the body.</p> <p>Discuss the importance of keeping our body healthy.</p> <p>Ask: What is a balanced diet? Why must we eat proteins? Discuss the importance of proteins in our diet.</p> <p>Ask: Why must we exercise daily? Explain that exercise keeps all our body parts in good working order. It also keeps our muscles and joints healthy. It helps our blood circulation. It stops us from becoming fat.</p> <p>Ask: Why must we keep our bodies clean? Explain that washing and bathing keep us free from dirt and germs.</p> <p>Ask: Why should we keep our environment clean? Discuss the importance of cleanliness and keeping the environment free from pollution.</p>				

Date:

Time: 40 mins

Unit: 3 Topic: A healthy body	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
2. How do you become ill?	<ul style="list-style-type: none"> • to explain the main reasons for becoming ill • to familiarize students with germs and the harm they can cause our bodies 	<ul style="list-style-type: none"> • list the main causes of illness • identify different kinds of bacteria and viruses that make us ill 	Diagrams of some viruses and bacteria	Reading: p 30, 31 CW: Q1 (g) HW: Q1 (e) (f) (h)
<p>Key words: microorganism, bacterium, virus, germ, worm, disease</p> <p>Method: Ask: Why do we become ill? Explain that many diseases are caused by very tiny single-cell organisms called microorganisms. Bacteria and viruses are microorganisms. A microorganism is so small that it can only be seen with the help of a microscope. They are found in the air, water, and on land. Some of them are harmful. They can cause diseases in plants and animals. Viruses are even smaller than bacteria. They can only be seen with the help of an electron microscope. Make a list of diseases caused by bacteria and viruses.</p> <p>Ask: What are worms? Explain that there are some worms which can live in our intestines. They can also make us ill.</p>				

Date:

Time: 40 mins

Unit: 3 Topic: A healthy body	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
<p>3. Infection</p> <ul style="list-style-type: none"> • to explain how germs enter the body and cause infection • to explain how we can protect ourselves from diseases and how doctors can help • to explain what immunity is 	<ul style="list-style-type: none"> • describe the ways in which germs enter our bodies and make us ill • explain the measures we can take to protect ourselves against infections • explain the body's own defence mechanism • explain how doctors can help us fight against disease-causing germs 	<p>Diagrams of white blood cells</p> <p>Pictures of people coughing and sneezing, flies on food, drinking dirty water, dirty hands, etc.</p> <p>A wallchart showing healthy habits</p>	<p>Reading: p 31, 32</p> <p>Make a poster of healthy habits and display it in the classroom.</p> <p>CW: Q1 (h) (i)</p> <p>HW: Q3</p>	
<p>Key words: infection, toxin, antibiotic, red blood cell, white blood cell, vaccination, immune</p> <p>Method. Ask: How do you become ill? What is an infection? Explain that when harmful microorganisms enter the body, they reproduce rapidly. They feed on the body cells and produce poisonous waste substances causing infection.</p> <p>Ask: How can we fight infection? Explain that the doctor gives us medicines called antibiotics to kill the germs. Also discuss ways in which we can protect ourselves from being infected by other people.</p> <p>Ask: Can the body protect itself? Explain that our white blood cells attack the germs that enter our body. They eat up the germs or they produce chemicals which can kill germs.</p> <p>Ask: Can a doctor help your body to fight against disease-carrying germs? Explain what a vaccine is. Describe the way in which a vaccine helps to make the body immune to disease-carrying germs.</p>				

Name: _____

Date: _____

1. Name four things that are necessary in order for a human to stay healthy.

_____, _____,
_____, _____.

2. Write 5 benefits of exercise.

i) _____

ii) _____

iii) _____

iv) _____

v) _____

Name: _____

Date: _____

1. Fill in the blanks to complete the information about diseases.

Many diseases are caused by _____. _____ and _____ are kinds of germs.

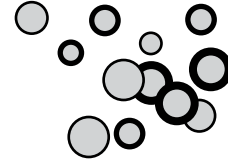
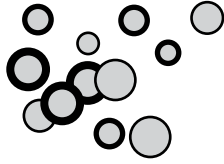
When harmful germs enter your body they _____ rapidly.

Germs produce poisonous waste substances called _____. When more cells are damaged and more toxin are produced, the body is said to have an _____. The body tries to fight the germ with the help of _____. Medicines that help to kill germs are called _____.

2. Explain the ways in which germs can enter the body.

3. Fill in the blanks to explain how doctors can help our body to fight against disease-causing germs.

A tiny amount of a _____ is injected into the body. The _____ blood cells prepare to fight against it. In this way the body is prepared to fight more _____ of this kind. The body becomes _____ to that particular germ. This kind of an injection is called a _____.



Water

Teaching objectives:

- to explain that three-fourths of the Earth is covered with water
- to explain that water exists in three states
- to explain that water finds its level due to gravity
- to describe the impurities in water
- to describe how water is supplied in towns and villages
- to explain how water is purified for drinking purposes
- to discuss the uses of water

Teaching strategy:

Show the students a relief map of the world. Explain that the blue parts are water. The ice caps at the North Pole and South Pole are frozen water. Show the students a glass with cold water and ice inside it. **Ask:** Why have water droplets formed on the outside? Where did the water come from? Explain that there is water vapour in the air. Explain that water exists in three states and that it can be changed from one form to another.

Partially fill a clear plastic bottle with water. Slowly tilt the bottle. **Ask:** Does the water fall? Explain that water keeps its level due to the force of gravity.

Ask: Which is the purest form of water? How does rainwater become dirty? Explain that as rain falls, many gases, dust particles, and germs mix with it. When it flows along the ground, it dissolves many soluble salts and soil particles. Dead plants and other insoluble particles also mix with it. **Ask:** Can we drink this water? Explain that this water has to be cleaned before we can drink it. **Ask:** Where does water come from in our houses? Is tap water fit for drinking? With the help of pictures, explain how people get water in villages. Show the students a picture of a water filtration plant. **Ask:** Can we clean dirty water? Explain that water can be purified by filtering it through clean muslin cloth and by boiling it.

Ask: What do we use water for? Explain the uses of water. Also explain the properties of polluted water. Discuss how water pollution can be reduced. **Ask:** How can we increase the amount of clean water? Discuss the increasing need for clean water for the increasing population.

Answers to Exercises in Unit 4:

1. (a) Three-fourths of the surface of the Earth is covered with water. It is found in oceans, seas, rivers, lakes and streams, and as ice caps at the poles.
(b) Water is found in three states in nature:
solid is ice, liquid is water, gas is water vapour

- (c) People in villages store river water and rainwater in pools. They also dig wells and draw up groundwater by buckets or pumps.
- (d) Drinking water is purified in a water filtration plant. Particles of soil and plant material are filtered out by passing the water through beds of sand and gravel. Chlorine gas is added to it to kill germs. Sometimes fluoride is added to it to help prevent tooth decay. It is then pumped into storage tanks and brought to our homes by underground pipes.
- (e) We use water for drinking, washing, and cooking. It is also used in factories and industries.
2. (a) springs (b) water vapour (c) ice (d) water
(e) water (f) hail (g) reservoirs (h) salt (i) goitre
3. The students will make their own drawings.

Additional Exercise:

MCQs

- (a) Three-fourths of the surface of the Earth is covered with _____.
water land air [*water*]
- (b) Water is found at the North and South Pole in the form of _____.
water water vapour ice caps [*ice caps*]
- (c) Water in our homes comes from huge stores called _____.
reservoirs springs wells [*reservoirs*]
- (d) Air contains water in the form of _____.
ice water vapour steam [*water vapour*]
- (e) Natural water found close to cities and farms contains harmful chemicals and _____.
germs animals fish [*germs*]
- (f) As rain falls through the air many _____ dissolve in it.
gases solids liquids [*gases*]
- (g) When a river flows along it carries with it mud and _____ particles.
clay rocks stones [*clay*]
- (h) _____ from farms and house contains a lot of bacteria.
Chemicals Acids Sewage [*Sewage*]
- (i) Spring water has a chemical called _____ which helps prevent tooth decay.
chlorine iodine fluorine [*fluorine*]
- (j) _____ water has the highest amount of dissolved and suspended impurities.
Spring Sea River [*Sea*]

Date:

Time: 40 mins

Unit: 4 Topic: Water	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
1. Water	<ul style="list-style-type: none"> • to explain where water is found on Earth • to explain the states of water • to describe the uses of water • to explain the impurities in water 	<p>Students should be able to:</p> <ul style="list-style-type: none"> • explain that $\frac{3}{4}$ of the surface of the Earth is covered with water • describe the states in which water is found • identify the uses of water • identify the impurities that can be found in drinking water 	<p>Pie chart of the Earth showing amounts of land and water</p> <p>Wallchart of the states of water, pictures of the uses of water</p> <p>Picture of a water filtration plant</p>	<p>Reading: p 35, 36</p> <p>Activity: 1</p> <p>CW: Q1 (a) (b)</p> <p>HW: Q1 (c)</p>
<p>Key words: ocean, sea, river, lake, stream, ice cap, ground water, well, water vapour, suspended particle, mud, clay, reservoir</p> <p>Method: Show the students a relief map of the world. Explain that the parts coloured blue represent areas of water. The ice caps at the North and South Poles are frozen water.</p> <p>Show the students a glass of cold water. Ask: Why have water droplets formed on the outside? Explain that it is the water vapour in the air.</p> <p>Ask: Which is the purest form of water? How does rainwater get dirty? Explain that as rain falls, many gases, dust particles, and germs mix with it. When it flows along the ground it dissolves many soluble salts and soil particles. Dead plants and other insoluble particles also mix with it. Ask: Can we drink this water? Explain that this water has to be cleaned before we can drink it.</p> <p>Ask: From where does water come into our houses? Is tap water fit for drinking? With the help of pictures, explain how people in villages get water. Show the students pictures of a water filtration plant. Ask: Can we clean dirty water? Explain that water can be filtered by passing it through a muslin cloth, and by boiling it.</p> <p>Ask: How do we use water? Explain the uses of water. Discuss the importance of clean drinking water.</p>				

Date:

Time: 40 mins

Unit: 4 Topic: Water	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
2. Sources of water	<ul style="list-style-type: none"> to describe the sources of natural water 	Students should be able to: <ul style="list-style-type: none"> identify natural sources of water and the properties of such water 	Pictures of rainwater, river water, spring water, sea water, drinking water	Reading: p 37, 38, 39 Activity: 2, 3 CW: Q2, Q3 HW: Q1 (c) (d)
<p>Key words: rain, acid rain, sulphur dioxide, river, sewage, bacterium, mineral, spring, goitre, iodine, sea, suspended impurity, sodium chloride, calcium, magnesium, gravity, level</p> <p>Method: Sometimes harmful gases such as sulphur dioxide dissolve in it to form acid rain. Discuss the harmful effects of acid rain.</p> <p>Ask: Can we drink river water? Explain that as a river flows along it carries with it mud, clay, sewage, factory waste, etc. It contains a lot of bacteria and harmful chemicals. It must be cleaned before we can drink it.</p> <p>Discuss how a spring is formed. Explain that spring water is quite pure. It may contain some useful chemicals such as flourine and iodine.</p> <p>Ask: Which water contains the most dissolved and suspended impurities? Explain that sea water contains all the impurities carried by rivers. It contains a lot of salt. It is not fit for drinking.</p> <p>Discuss the properties of drinking water.</p> <p>Ask: How are rivers, lakes, and seas formed? Explain that water finds its own level. It always runs downhill and settles at the lowest level it can reach.</p>				

Name: _____

Date: _____

1. Draw a pie chart to show how much of the Earth is covered with water.

2. Write the names of the places where water is found:

o _____ n

s _____ a

r _____ r

l _____ e

s _____ m

w _____ l

w _____ re _____ v _____

Name: _____

Date: _____

Draw lines to match the source of water with the impurities found in it.

Source of water

rain

river

spring

sea

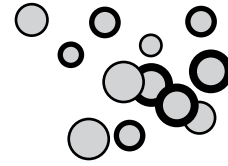
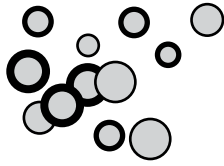
Impurities

clay, mud, factory, farm, and household waste

purest form of water

dissolved and suspended impurities, salts of sodium, calcium, magnesium, and iodine

oxygen, carbon dioxide, nitrogen, sulphur dioxide, dust, bacteria



Environmental pollution

Teaching objectives:

- to explain that the increasing population is having a harmful effect on the Earth
- to discuss the harmful effects of cutting down trees
- to describe an environment
- to describe how the environment affects the development and growth of animals and plants
- to explain what is meant by pollution
- to explain how man is polluting the environment
- to describe the kinds of pollution (air, water, land, and noise)
- to describe the harmful effects of pollution
- to discuss the ways in which pollution can be controlled
- to discuss how wild animals are becoming rare

Teaching strategy:

Ask: How many people live in your house? How many students are there in the class? Calculate how many people are related to you? Do more people live in cities or villages? Is there more traffic in a town or a city? Is there a park in your locality? Do you get clean drinking water? Where do you throw your garbage? Do you get sick often? Do you have a garden in your house? Show the students a picture of a busy street and a peaceful village. Explain the increase of population in the world. Explain that more people come to cities to find work. More homes, food, clothes, transport, etc. are needed. We need more resources, more industries, and more roads and buildings. All these things are having a bad effect on our planet.

Ask: How are plants useful for us? Explain the uses of plants. **Ask:** What are the harmful effects of cutting trees? Explain its bad effects on animals, soil, and climate. **Ask:** Where do you live? From where do you buy things? Is your area thickly populated? How do you come to school? Explain the meaning of environment and its effect on living organisms. **Ask:** Where do you throw garbage? Where does the dirty water from your house go? Should you throw rubbish in the street? Explain the meaning of pollution and pollutant.

Ask: Do you like loud noises when you are resting or sleeping? Do you play the radio on with full volume in the house? Should you honk horns near a school or a hospital? Explain noise pollution and its harmful effects. **Ask:** Why do we need fresh air? How does the air become polluted? Explain air pollutants and their harmful effects. **Ask:** Is spring water pure? How is a river formed? Is river water pure? Explain water pollution and its harmful effects. Explain the pollution of oceans and its harmful effects on water animals. **Ask:** What do farmers do when they need more land to grow crops? What do

farmers use to grow more crops? How do farmers get rid of weeds and pests? Explain the use of chemicals and their harmful effects.

Ask: Can we control pollution? Make a list of all the suggestions given by the students. Help the students to make a project on causes of pollution. Tell students to make banners with slogans such as: Stop cutting down trees. Use lead-free petrol. No oil spills, please. Save wildlife. Save the trees. Show children how to recycle paper by the method given at the end of the lesson. Tell them to make cards. Have a speech contest in class on pollution.

Answers to Exercises in Unit 5:

1. (a) The Earth gives us air, food, water, and materials for making clothes and building houses.
 - (b) Cutting down of trees, emission of smoke and fumes, disposal of waste materials, making new harmful chemicals, and oil spillage, etc. have a very bad effect on the Earth.
 - (c) Plants take in carbon dioxide and give out oxygen, which animals and people use for breathing. They produce food from simple new substances and feed all the other living things.
 - (d) Trees provide food as well as homes for many animals. They prevent the soil from drying up. They also affect the rainfall of an area. They provide pulp for making paper and timber for making furniture and houses, etc.
 - (e) i) The natural world that surrounds a living thing is called its environment.
ii) The contamination or defiling of an environment by unwanted and harmful things is called pollution.
iii) Anything which contaminates the environment is called a pollutant.
 - (f) The different types of pollution are air pollution, water pollution, land pollution, and noise pollution.
 - (g) Harmful gases, smoke and chemicals from factory chimneys, and carbon dioxide from burning wood, oil, gas, and coal can cause air pollution.
 - (h) When a river passes through a town or a farm, chemicals from factories and dirty water from houses and farmyards flow into it.
 - (i) If an oil tanker leaks in the sea, it is called an oil spill. This spilt oil forms a layer on top of water and thus kills fish, seabirds, and other animals.
2. (a) 6 (b) oxygen (c) soil (d) noise
(e) Fumes (f) acid (g) ozone (h) Carbon dioxide
(i) sewage (j) weeds

Date:

Time: 40 mins

Unit: 5 Topic: Environmental pollution	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
1. Environmental pollution	<ul style="list-style-type: none"> • to discuss the negative effects of unabated population increase • to explain the importance of plants for life on Earth 	<ul style="list-style-type: none"> • describe the problems caused by over-population • explain the importance of trees in helping to keep the environment in balance 	Pictures of human population, the harmful effects of cutting down trees, the usefulness of trees	Reading: p 42, 43 Activity: 1 CW: Q1 (a) (b) HW: Q1 (c) (d)
<p>Key words: air, food, water, material, crop, factory, shelter, rainfall</p> <p>Method: Ask: How many people live in your house? Do more people live in villages or cities? Is there more traffic in a town or a city? Is there a park in your locality? Do you get clean drinking water? Where do you throw your rubbish? Do you have a garden in your house? Do you often get sick? Show the students pictures of a busy street and a peaceful village. Explain that the population of the world is increasing and that more people come to cities to find work. More homes, food, clothes, transport, etc. are needed. We need more resources, more industries, and more roads and buildings. All these things are having a bad effect on our planet. Explain the meaning of environment and the effects of changes to the environment on living organisms. Ask: How are plants useful to us? Explain the uses of trees.</p> <p>What are the harmful effects of cutting down trees? Explain the harmful effects on animals, the soil, and the climate.</p>				

Date:

Time: 40 mins

Unit: 5 Topic: Environmental pollution	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
2. Environment and pollution	<ul style="list-style-type: none"> • to explain what pollution means • to explain different types of pollution and their causes 	<ul style="list-style-type: none"> • explain what is meant by pollution • explain the causes and effects of pollution 	Pictures of non-biodegradable pollutants such as plastics, air, water, land, and causes of noise pollution	Reading: p 43, 44, 45 Activity: 2 CW: Q1 (e) (f) HW: Q1 (g) (h) (i)

Key words: environment, pollution, pollutant, biodegradable, non-biodegradable

Method: Ask: Where do you throw your rubbish? Where does the dirty water from your house go? Should you throw rubbish in the street? Explain the meanings of *pollution* and *pollutant*. Discuss different pollutants and their effects on the environment.

Ask: Do you like to hear loud noises when you are resting or sleeping? Do you listen to the radio or the television with the volume full on in the house? Should you sound car horns near a school or a hospital? Explain noise pollution and its harmful effects.

Ask: Why do we need fresh air? How does the air become polluted? Discuss air pollutants and their harmful effects.

Ask: Is spring water pure? How is a river formed? Is river water pure? Explain water pollution and its harmful effects. Discuss the pollution of sea water and its harmful effects on water animals.

Ask: What do farmers do when they need more land to grow crops? What do farmers use to grow more crops? How do farmers get rid of weeds and pests? Explain the uses of chemicals and their harmful effects.

Date:

Time: 40 mins

Unit: 5 Topic: Environmental pollution	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
<p>3. Pollution causes changes in weather</p>	<ul style="list-style-type: none"> to explain how pollution causes changes in weather to discuss some ways to control pollution 	<ul style="list-style-type: none"> explain the harmful effects of pollution suggest some ways to control pollution 	<p>Diagram of the greenhouse effect</p>	<p>Reading: p 46, 47, 48 Activity: 3 CW: Fill in the blanks with the correct words to complete the text. Burning fuels release _____ gas into the air. Plants use this gas to make their _____. When _____ are cut down, the amount of this gas increases. It prevents the heat from the _____ from escaping into space. Keeping the Earth warm in this way is called the _____ effect. HW: Q2</p>
<p>Key words: ozone layer, ultraviolet rays, CFC, greenhouse effect</p> <p>Method: Show the students a diagram of the Earth's atmosphere. Point out the ozone layer. Explain that the ozone layer protects the Earth from the harmful ultraviolet rays of the Sun. Air pollution is causing the ozone layer to become thinner in places. As a result, the Earth is getting warmer. Discuss the greenhouse effect and its harmful effects on the Earth.</p> <p>Discuss ways in which pollution can be controlled. Also discuss how man is playing a role in destroying plants and animals for fun, for food, for building houses and roads. We must realize that we have to coexist with the flora and fauna on Earth and our own existence will be jeopardized if we do not look after these.</p>				

Name: _____

Date: _____

1. Identify some of the harmful effects of pollution on:

a. the weather _____

b. ice caps _____

c. river life _____

d. sea life _____

e. the atmosphere _____

2. Fill in the blanks to explain the importance of plants for life on Earth.

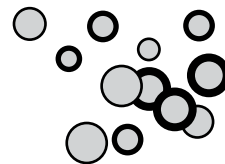
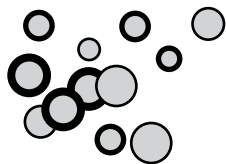
Plants provide _____ for humans and animals. Plants use _____ gas to make their food. Plants give out _____,

which all living things use for breathing, as a by-product of photosynthesis.

_____ provide food and shelter for many animals. The

_____ of plants hold the soil particles together and prevent the soil from drying up and being carried away by _____ and water.

Trees also affect the _____ of an area by absorbing the water from the soil and evaporating it from their leaves.



Matter

Teaching objectives:

- to explain that everything in the universe is matter
- to explain that matter exists in three states, namely solid, liquid, and gas
- to explain that there are spaces between the particles of matter and that the three states of matter depend on the size of the spaces and the forces of attraction that exist between the particles
- to explain the nature of solids, liquids, and gases
- to explain the meaning of melting and boiling points
- to explain the effects of heating and cooling on solids, liquids, and gases
- to explain how expansion and contraction takes place and their application in everyday life
- to explain the types of changes that occur in matter

Teaching strategy:

Ask: What is everything around us made of? Explain matter and its three states using examples of ice, sand, stones, air, milk, etc. **Ask:** Have you seen a beam of light coming in a dark room through the chink in the curtains? Perform an experiment by adding a drop of blue ink to water in a glass. Show that after a while water turns blue. **Ask:** Why does the water turn blue? Explain the movement of particles of matter. Introduce Robert Brown and his discovery of Brownian Motion.

Take some ice cubes in a beaker and shake it. Explain that the cubes are hard and solid. Heat the beaker. The ice melts to form water. **Ask:** What has happened? Heat the water for a while until it dries up. **Ask:** What happened to the water? Explain the three states of matter and the behaviour of particles when matter is heated. Perform simple experiments to explain the changes in the states of matter.

Do experiments in the laboratory to demonstrate melting and boiling points. Explain, by melting a solid or heating a liquid in the laboratory, how a thermometer is used to read the changes in temperature.

Ask: What happens to mothballs if they are kept in clothes hanging in a cupboard for a while? Explain the process of sublimation. Demonstrate it by performing an experiment.

Ask: Why does a glass tumbler crack when it is filled with ice? Why does milk boil over if it is left unattended on the stove? Why does a balloon burst if it is heated over a flame? Explain the effects of expansion and contraction in everyday life. **Ask:** Can we get ice after it has melted to water?

Summarize the lesson.

Answers to Exercises in Unit 6:

1. (a) Matter is anything which has weight and volume and occupies space.
- (b) Matter is made up of very tiny particles which have spaces between them. These particles keep moving and bumping into each other all the time.
- (c) Matter is found in three different states: solid, liquid, and gas. These three states are due to the amount of space present between the particles.

The particles of a solid are very tightly packed because the spaces between them are very small. The forces with which the particles pull each other are very strong and their movement is very limited. Therefore, solids have a fixed volume and shape and they cannot be compressed, like rock, wood, and ice.

The particles in a liquid are very close together, but the forces of attraction between them are weak. There are spaces between the particles which allow movement to a certain extent. Liquids have a fixed volume but no fixed shape. They take up the shape of the vessel in which they are kept. They can flow but they cannot be compressed as in water, milk, and oil.

The particles of a gas are very far apart so they can move about freely. Therefore, a gas has no fixed volume or shape. There are no forces of attraction between the particles and so gases can spread easily. Due to large spaces between the particles, gases can be compressed as in air, oxygen, and hydrogen.

- (d) The particles of matter are always moving. It can be proved by the following experiment. Sprinkle some pollen grains on the surface of warm water in a dish. The pollen grains will appear to be dancing on the surface of water. The particles of warm water move about and bump into the pollen grains and make them jump about.
 - (e) The mixing of particles is called diffusion. Put a drop of red ink into a beaker containing water. The red colour of the ink will spread evenly in water, making it pink. The particles of ink fill the spaces between the water particles and so the water appears pink.
2. (a) solid, liquid, gas (b) melts (c) gas
(d) evaporation (e) sublimation
 3. (a) water
(b) bigger than in a liquid or solid
(c) it has a fixed volume and shape
(d) they have large spaces between the particles
(e) sublimation
 4. (a) Brownian motion was discovered by Robert Brown.
(b) Particles in a gas are very far apart.
(c) When a liquid changes into a gas, the process is called evaporation.
(d) A gas can be pressed because its particles are very far from each other.
(e) If a substance is heated, its particles will move away from each other.

5. Solids: wood, rubber, ice, stone, glass

Liquids: water, oil, milk, petrol

Gases: air, oxygen

Additional Exercise:

MCQs

- (a) Everything in the universe is composed of _____.
 gases water matter [*matter*]
- (b) Matter is composed of very tiny particles which have _____ between them.
 air spaces atoms [*spaces*]
- (c) The particles in a solid have very small _____ between them.
 atom molecules spaces [*spaces*]
- (d) Liquids have no fixed shape but they have a fixed _____.
 size shape volume [*volume*]
- (e) Due to the _____ spaces between the particles gases can be compressed.
 large small no [*large*]
- (f) The _____ motion of particles is called Brownian motion.
 straight curved zigzag [*zigzag*]
- (g) When a substance is heated or cooled a change in its _____ occurs.
 state colour shape [*state*]
- (h) The temperature at which a liquid changes into gas is called its _____.
 melting point boiling point freezing point [*boiling point*]
- (i) The changing of a substance from a solid to vapour state is called _____.
 evaporation sublimation condensation [*sublimation*]
- (j) When a substance is cooled its particles lose energy and come closer causing a decrease in volume which is called _____.
 contraction expansion sublimation [*contraction*]

Date:

Time: 40 mins

Unit: 6 Topic: Matter	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
1. Properties of matter	<ul style="list-style-type: none"> to discuss the properties of matter 	Students should be able to: <ul style="list-style-type: none"> explain that the properties of matter are determined by the particles it is composed of 	Samples of solids, liquids, gases	Reading: p 52 CW: Q2, Q3, Q5 HW: Q1 (a) (b) (c)
<p>Key words: matter, property, state, solid, liquid, gas</p> <p>Method: Ask: What is everything around us made up of? Explain matter and its three states using examples. Discuss the properties of matter.</p>				

Lesson plan

Date:

Time: 40 mins

Unit: 6 Topic: Matter	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
2. Movement of particles in matter	<ul style="list-style-type: none"> to explain how the movement of particles in matter brings about changes in state 	<p>Students should be able to:</p> <ul style="list-style-type: none"> describe the movement of particles in matter explain how the movement of particles brings about changes in state 	Pollen grains, slide, microscope, red ink, beaker, burner, stand	<p>Reading: p 52, 53, 54 CW: Design an experiment to prove that particles move about all the time. HW: Q1 (d) (e)</p>
<p>Key words: Brownian motion, diffusion</p> <p>Method: Ask: Have you seen a beam of light coming into a dark room through a chink in the curtains? What do you see? (tiny particles suspended in air) Perform an experiment by adding a drop of red ink to water in a beaker. Leave it undisturbed for a while. Ask: Why does the water turn red? Explain the movement of particles.</p> <p>Introduce the work of the scientist Robert Brown and explain how he discovered the movement of particles, named Brownian motion after him.</p> <p>Put some ice cubes in a beaker and leave it on the table for a while. Ask: What do you see? What has happened? Heat the water till it dries up. Explain the three states of matter and how changes of state occur on heating. Explain the movement of molecules when a substance is heated. The spaces between the molecules increase due to the heat, and more and more molecules bump into each other, and a change of state occurs from solid, to liquid, to gas. The opposite happens when a liquid is cooled. The molecules lose energy. They move closer together and a change of state occurs from gas, to liquid, to solid.</p>				

Date:

Time: 40 mins

Unit: 6 Topic: Matter	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
3. Effects of heat on matter	<ul style="list-style-type: none"> to describe the effects of heat on matter 	<p>Students should be able to:</p> <ul style="list-style-type: none"> explain the meanings of the terms <i>expansion</i>, <i>contraction</i>, <i>melting</i>, <i>boiling</i>, <i>evaporation</i>, <i>condensation</i>, <i>freezing</i>, <i>liquefaction</i>, and <i>sublimation</i> define what is meant by the melting and boiling points of matter 	Ice cubes, water, burner, stand, china dish, funnel, glass tumbler, laboratory thermometer	<p>Reading: p 54, 55, 56 Activity: 1, 2, 3 CW: Name the processes defined below: increase in size due to heating _____ decrease in size due to cooling _____ changing of a solid to a liquid _____ changing of a liquid to a solid _____ changing of a liquid to a gas _____ changing of a gas to a liquid _____ changing of a solid to a gas _____ HW: Q4</p>
<p>Key words: expansion, contraction, melting, boiling, evaporation, condensation, liquefaction, sublimation, melting point, boiling point</p> <p>Method: Perform simple experiments to explain the changes in matter on heating and cooling. Explain how a change of state occurs when particles lose or gain energy. Ask: What happens to moth balls if they are kept among clothes in a cupboard? They seem to dissolve into air. Explain the process of sublimation by a simple experiment.</p> <p>Set up a simple experiment in the laboratory to determine the melting and boiling points of water.</p>				

Date:

Time: 40 mins

Unit: 6 Topic: Matter	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
4. Effects of expansion and contraction Examples of condensation and evaporation in nature	<ul style="list-style-type: none"> to explain the effects of expansion and contraction in everyday life 	Students should be able to: <ul style="list-style-type: none"> identify some practical applications of expansion and contraction in our daily lives identify where condensation and evaporation take place in nature 	Diagrams and charts of expansion and contraction, condensation, and the evaporation, and the water cycle	Reading: p 56, 57 CW: Draw a diagram of the water cycle. Mark on it the stages where evaporation and condensation take place.
<p>Key words: expansion, contraction, condensation, evaporation, fog, mist, dew, frost</p> <p>Method: Ask: Why does a glass tumbler, made of ordinary glass, crack when boiling water is poured into it? Why does it crack when very cold water is put into it?</p> <p>Explain the process of expansion and contraction. Discuss how they are used in everyday life.</p> <p>Discuss the water cycle with the help of a diagram of the water cycle. Ask: At which points in the water cycle do evaporation and condensation take place?</p> <p>Explain the formation of fog and mist due to evaporation, and the formation of dew and frost due to condensation.</p>				

Name: _____

Date: _____

1. Draw the arrangement of particles in the boxes below.



Solid



Liquid



Gas

2. Choose the correct word(s) to complete the statements:

- a. Expansion in a substance is caused when particles gain / lose energy.
- b. Contraction is caused when particles gain / lose energy.
- c. Melting is caused when particles gain / lose energy.
- d. A decrease / an increase in size or volume occurs when a substance is heated.
- e. A decrease / an increase in size or volume occurs when a substance is cooled.
- f. An increase / a decrease in volume occurs when a solid changes into a liquid.
- g. An increase / a decrease in the volume occurs when a liquid changes into a gaseous state.
- h. The change of state from a liquid to a solid is caused by heating / cooling.
- i. The change of state from a liquid to a gas is caused by heating / cooling.
- j. The change of state from a solid to a gaseous state is caused by cooling / heating.

Name: _____

Date: _____

Write 'expand' or 'contract' in the blank spaces.

- a. A glass tumbler cracks if ice is put in it because glass _____.
- b. The tyre of a bicycle bursts if it gets too hot because the air in the tube _____.
- c. Milk boils over if left on the heat because milk _____.
- d. Metal pipes burst in very cold weather because the water inside the pipes _____.
- e. A tightly fitted metal cap on a bottle can be opened by heating the cap because it _____.
- f. Overhead wires break in cold weather because they _____.
- g. Gaps are left between railway lines to prevent them bending in hot weather, because metals _____ on heating.

Assessment

Units 1–6

1. Answer the following questions:

- (a) Why have the scientists classified living things?
- (b) Describe the life cycle of i) a frog or ii) a butterfly.
- (c) How can doctors help you to fight diseases?
- (d) What is groundwater?
- (e) List three things that we can do to reduce pollution.
- (f) How does a solid melt into a liquid?

or

What is condensation?

2. Fill in the blanks:

- (a) Animals can be classified into two main groups: vertebrates and _____.
(*invertebrates*)
- (b) Birds are the only animals with _____. (*feathers*)
- (c) When living things create new living things of their own kind it is called
_____. (*reproduction*)
- (d) Flowering plants have _____ which produce fruits and seeds. (*flowers*)
- (e) Regular _____ helps your body to stay strong and fit. (*exercise*)
- (f) Growing children need to eat food that contains a lot of _____. (*proteins*)
- (g) Air contains water in the form of _____. (*water vapour*)
- (h) Ice is _____ water. (*solid*)
- (i) The natural world that surrounds a living thing is called its _____.
(*environment*)
- (j) When a substance is heated, its particles gain energy and start moving _____.
(*faster*)

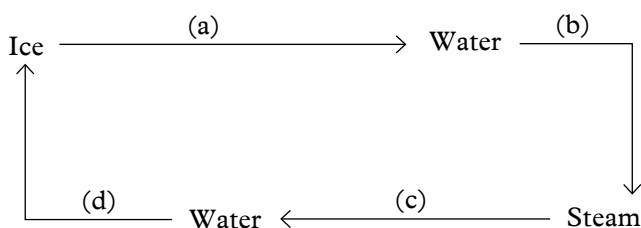
3. Match the items of the lists A and B:

A	B
petal	male cell
stamen	female part
pollen	brightly coloured
carpel	male part
ovule	sticky tip
stigma	fruit
ovary	female cell
seed coat	germination
growth of seed	embryo
baby plant in the seed	testa

4. Write **True** or **False** against each statement:

- a) Exercise makes you fat. _____
- b) Sleeping is the best exercise. _____
- c) The rubbish of the house should be thrown into the street. _____
- d) We should not use the things that a sick person has used. _____
- e) If you have a disease that can spread, stay away from people till you are better. _____

5. Write the name of the processes.



Answers

1. (a) Scientists have classified living things because it helps us to understand how all different things in the world fit into a pattern.
- (b) i) The female frog lays eggs. A tiny tadpole comes out of each egg. The tadpole grows to form a complete frog.
- ii) The female butterfly lays eggs. After a week small larve called caterpillar hatch from eggs. It produces a fine thread and forms a shell, called cocoon around its body. Inside the cocoon the insect becomes a pupa. The pupa splits and the newly formed butterfly emerges from it.

- (c) Doctors inject vaccines of different diseases in our bodies, which help our bodies to become immune to germs of different diseases.
- (d) Water that has soaked through the soil is called groundwater. It fills the spaces in the rocks, and comes out in the form of springs and wells.
- (e) Students will give their own answers
- (f) When a solid is heated, its particles begin to move faster and hit against each other. They move away from each other and the solid melts into a liquid.

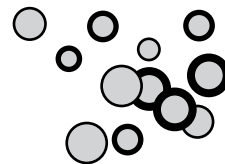
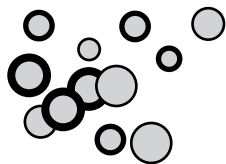
or

When water vapour in the air touches a cold surface, it changes into water droplets. This change of water vapour into liquid water is called condensation.

3.

A	B
petal	brightly coloured
stamen	male part
pollen	male cell
ovule	female cell
stigma	sticky tip
ovary	fruit
seed coat	testa
growth of seed	germination
baby plant inside the seed	embryo

- 4. (a) false (b) false (c) false (d) true (e) true
- 5. (a) melting (b) evaporation
- (c) condensation (d) freezing



Force and machines

Teaching objectives:

- to explain that we use machines all the time
- to explain that machines need force to work
- to explain that machines need energy
- to discuss the types of energy
- to describe a simple machine
- to discuss the kinds of simple machines

Teaching strategy:

Show the students a tin cutter, a bottle opener, a screwdriver, a pair of scissors, and a knife. **Ask:** What are these used for? Can you open a bottle cap with your fingers? Can you cut cloth with your hands? Explain that anything which makes our work easy is called a machine.

Ask: Can you name some machines that we use at home, in school, or on the roads? What does a machine need to work? Explain that machines need some kind of energy to make them work.

Explain the methods for reducing friction.

Ask: What do you use a knife and scissors for? How can you cut a thick log of wood? How can you lift a heavy object? Explain the uses of simple machines and how they make your work easier.

Answers to Exercises in Unit 7:

1. (a) Friction is a force that is produced when things rub against each other.
(b) Friction is partly due to tiny bumps on the surfaces which are in contact with each other and partly due to atoms in the two materials which tend to stick to each other.
(c) A lot of energy is needed to overcome the force of friction. It produces heat, which wastes a lot of energy. The moving parts of a machine wear out by rubbing against each other.

Friction helps in all kinds of motion such as walking, writing, climbing, etc. It helps vehicles to move on roads by allowing their tyres to grip the surface.

- (d) Lubricants such as oil and grease are used in machines to reduce friction. Ball bearings are used between moving parts of machines. Submarines, ships and racing cars, and aircraft are streamline shaped to move smoothly through air and water. Wheels are often used to cut down friction.

- (e) The downward pull of the Earth is called gravitational force.
- (f) Mass is the amount of material contained in an object. It is measured in kilograms. Weight is the gravitational force acting on a body. It is measured in newtons.
- (g) Newton's first law of motion states that if something has no force acting on it, it will stay still. If moving, it will keep moving at a steady speed in a straight line.
- (h) The moving parts of an object which help to make our work easier are called simple machines. The extra force that is gained by applying less effort to do more work is called the mechanical advantage of the machine.
- (i) A lever is a simple machine which helps us to use a small effort to lift a large load.
- (j) An inclined plane is a plank that can be used to pull a load along a sloping surface rather by lifting it. A wedge is two inclined planes put together which changes the direction of the force as well as increases it.
2. (a) energy. (b) rubbing (c) force (d) effort (e) friction (f) inclined plane
3. (a) It will keep still. (b) It will continue moving at a steady speed.
4. (a) useful (b) nuisance (c) useful (d) nuisance (e) useful (f) useful.

Additional Exercise:

MCQs

- (a) When two surfaces rub against each other a force called _____ is produced.
gravity friction electricity [**friction**]
- (b) Materials that can flow are called _____.
solids fluids metals [**fluids**]
- (c) Air resistance is the largest _____ force pulling against a car traveling fast on a motorway.
frictional gravitational electrical [**frictional**]
- (d) The moving parts of a machine wear out by _____ against each other.
hitting slipping rubbing [**rubbing**]
- (e) Lubricants like oil and grease are used in machines to _____ friction.
increase improve reduce [**reduce**]
- (f) Ships, cars, and aircraft are made of this shape in order to reduce drag _____.
square rectangular stream-lined [**stream-lined**]
- (g) The force with which the Earth pulls everything towards itself is called _____.
gravitational force magnetic force electrical force [**gravitational force**]

(h) The amount of material in an object is called _____.

weight

mass

energy

[*mass*]

(i) _____ is measured in newtons.

Mass

Energy

Weight

[*Weight*]

(j) The extra force that is gained by using a simple machine is called its _____.

mechanical advantage

gravitational force

force of friction

[*mechanical advantage*]

Date:

Time: 40 mins

Unit: 7 Topic: Force and machines	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
1. Inertia	<ul style="list-style-type: none"> to explain inertia 	<ul style="list-style-type: none"> explain the meaning of inertia 	A toy car, a rubber ball, a string, a glass marble Pictures of Sir Isaac Newton, a spaceship, a skydiver	Reading: p 62 Activity: 1 CW: Q3 HW: Q1 (g)
<p>Key words: Sir Isaac Newton, Law of Motion, force, gravity, inertia</p> <p>Method: Show the students a picture of Sir Isaac Newton and explain that he was a British mathematician and scientist who, among other things, worked to find explanations for the movements of the planets and various objects on Earth. He is remembered now for the Laws of Motion which he discovered and then formulated. Explain that when an object is pulled by two forces of equal size, but in opposite directions, the forces will balance each other. Newton realized that an object will only change direction or speed of travel when pulled by a force which is not balanced by other forces.</p> <p>To explain Newton's first law, give students the example of a spaceship which is moving in outer space. The spaceship has no engine to push it, and there is no force to slow it down: it just travels on and on at the same speed and in the same direction. This tendency of an object to keep going in the same direction and at the same speed is called inertia.</p>				

Date:

Time: 40 mins

Unit: 7 Topic: Force and machines	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
2. Gravitational force	<ul style="list-style-type: none"> • to explain gravity • to explain mass and weight 	<ul style="list-style-type: none"> • explain that gravity is a force • define mass and weight and explain the difference between the two 	A metal weight, a spring balance	Reading: p 63 Activity: 2 CW: Q1 (e) HW: Q1 (f)
<p>Key words: gravity, gravitational force, mass, weight, newton, gram, kilogram</p> <p>Method. Ask: What is gravity? What is the force of gravity? Explain that gravity is the name given to the force that makes things fall down rather than go up. It also keeps the planets moving in a regular pattern of orbits.</p> <p>If we want to know how much material an object contains we can measure its mass. Mass is measured in grams and kilograms.</p> <p>Weight is another name for the gravitational pull of the Earth. Since weight is a force, it is measured in newtons. We can use a spring balance to find the weight of an object.</p> <p>Hang a metal weight from the end of a spring balance, and measure the downward pull of the Earth. Explain that this pull is called gravitational force.</p> <p>Explain that on Earth each kilogram of matter weighs 10 newtons. On the Moon the same mass has a different weight, because the force of gravity of the Moon is one-sixth of that of the Earth.</p>				

Date:

Time: 40 mins

Unit: 7 Topic: Force and machines	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
<p>3. Effects of force on the motion of an object</p> <ul style="list-style-type: none"> • to explain that a force can give energy to a body • to describe how forces occur in pairs • to show that forces can be balanced or unbalanced 	<ul style="list-style-type: none"> • explain how a force can make an object start, stop, or change its motion • explain that forces occur in pairs and recognize the difference between balanced and unbalanced forces 	<p>Pictures of balanced and unbalanced forces</p>	<p>Reading: p 63, 64 CW: Explain the difference between:</p> <ol style="list-style-type: none"> 1. mass and weight 2. kilogram and newton 3. balanced force and unbalanced force 	

Key words: force, motion, balanced, unbalanced, direction

Method: Ask: What are the effects of force on the motion of an object? Explain that a force can give energy to an object, causing the object to start, stop, or change its direction.
Forces occur in pairs and can be balanced or unbalanced. Draw an acrobat standing on a tight rope. **Ask:** How does an acrobat balance himself on the rope? Explain that when an acrobat stands on a tight rope, it sags until the springiness of the rope produces enough upward force to oppose his weight. As a result, the upward force and the downward pull on the acrobat's body cancel each other out, so the acrobat stays balanced.

Ask: How do unbalanced forces cause a change in motion? Explain that unbalanced forces are not equal and opposite. Explain with the help of the tug-of-war example which demonstrates that when two unbalanced forces to are exerted in opposite directions, their combined force is equal to the difference between the two forces exerted and the motion will be in the direction of the greater force.

Show the student the picture on page 64 of men pushing a car. Explain that forces can be exerted in the same direction. The car will move in the direction in which it is being pushed, and the force that is being exerted will be the sum of the forces being applied by the two people.

Date:

Time: 40 mins

Unit: 7 Topic: Forces and machines	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
4. Friction	<ul style="list-style-type: none"> • to explain what friction is • to explain what causes friction • to explain the harmful effects of friction • to discuss methods to reduce friction 	<ul style="list-style-type: none"> • explain friction and its causes • describe the harmful effects of friction • suggest ways of reducing friction 	Samples of rough and smooth surfaces, pictures of skydivers, a boat, ball bearings	Reading: p 65, 66, 67, 68 CW: Q1 (a) (b) Q4 HW: Q1 (c) (d)

Key words: friction, material, water, resistance, fluid, drag force, free-fall, lubricant

Method: Ask the students to rub their hands together. **Ask:** What do you feel? Explain that when you rub your hands together they become hot due to friction. **Ask:** What is friction? Explain that there is a force which opposes the forward motion of anything. This opposing force is called friction. Roll a marble on the table. **Ask:** What happens? Will the marble stop after a while? What would happen if there was no friction? Explain that friction is a force that is produced when two surfaces rub against each other. It tries to stop the surfaces from sliding over one another. For smooth surfaces like glass, ice, etc. the force of friction is less. For rough surfaces like sandpaper, wood, and rubber, the force of friction is much greater. **Ask:** Is friction useful? Explain that friction helps all kinds of motion such as walking, writing, climbing, etc.

Ask: How is friction caused? Explain that friction is caused by tiny bumps on the surfaces in contact and also due to the atoms of the materials which tend to stick to each other.

Ask: Is there friction in liquids? Explain that friction in liquids and gases is known as resistance. The resistance experienced by swimmers, runners, cyclists, etc. is called drag force. The drag force can be overcome by making the shape of the objects moving in water and air sleek and smooth or streamlined.

Discuss how a skydiver overcomes air resistance using a parachute, and falls gently to Earth without getting hurt.

Ask: Is friction harmful? Can we reduce friction? Discuss the harmful effects of friction and the methods by which it can be reduced.

Date:

Time: 40 mins

Unit: 7 Topic: Force and machines	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
5. Simple machines	<ul style="list-style-type: none"> to familiarize students with different kinds of simple machines 	<ul style="list-style-type: none"> explain the structure and functions of simple machines 	A spoon, a can opener, a pair of scissors, a nutcracker, pictures of a see-saw, a wheel barrow, an inclined plane, an axe, a hammer	Reading: p 68, 69 CW: Q2 HW: Q1 (h) (i) (j)
<p>Key words: machine, lever, inclined plane, wedge</p> <p>Method: Show the students samples and pictures of simple machines. Ask: What is a machine? Explain that we come across big machines like washing machines, sewing machines, etc., but a spoon is also a machine. Explain that a simple machine helps to make our work easier. It helps us to do more work with less effort. Explain that machines give us a mechanical advantage. All machines are made up of one or more of these simple machines. Discuss the different types of simple machine and the work they do.</p>				

Name: _____

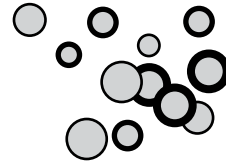
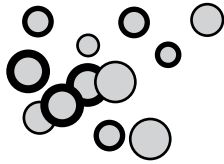
Date: _____

1. Fill in the blanks:

- a. When rough _____ rub against each other, they produce a force called friction.
- b. For smooth surfaces the force of friction is _____.
- c. For rough surfaces, the force of friction is _____.
- d. Friction helps all kinds of _____, such as walking, writing, etc.
- e. Friction is caused due to the tiny _____ on the surfaces in contact.
- f. Friction is also due to the presence of _____, which tend to stick to each other.
- g. Air _____ is the largest frictional force pushing against a fast-travelling car.
- h. Rowing a boat needs a lot of force to push it forward against the _____ resistance.
- i. The _____ experienced by swimmers, runners, cyclists, and racing car drivers is referred to as drag.
- j. The amount of drag depends upon the _____ of the object.

2. Name the type of simple machine:

Description	Machine
a. It has a long arm which can lift a heavy load by applying very little effort.	_____
b. It is a sloping surface along which a heavy load can be pulled in order to raise it.	_____
c. It is two inclined planes that increase and change the direction of the force.	_____



Light

Teaching objectives:

- to explain that light is a form of energy
- to explain that light travels in straight lines
- to describe how a shadow is formed
- to describe how eclipses are formed
- to describe a spectrum
- to explain why objects appear coloured
- to explain the kinds of colours

Teaching strategy:

Ask: What is light? Where do we get light from? What is the speed of light? Do we see lightning first or do we hear the clap of thunder? Why? Explain that light is a form of energy which travels in the form of waves. Its speed is 300,000 km per second, which is faster than the speed of sound.

Ask: Can we see around corners? Why? Explain that we cannot see around corners because light can only go straight, it cannot bend. Perform the experiment given in the book to prove that light travels in straight lines. Help the students to construct a pinhole camera and show them how it is used to make an inverted image of a distant object. Show pictures of some sources of light like the Sun, candle, fire, etc. Explain that burning gives out heat and light. Light a torch and shine it on the board. Show the students a beam of light. Explain that it is made up of many rays. Show the students a laser torch.

Ask: What is the colour of the light? Explain that a laser is a very strong ray of light of any one colour.

Light a torch and hold a book in its beam. **Ask:** What is this dark patch called? Why is it formed? Why does it appear dark? Explain how shadows are formed. Explain that light coming from a point source produces a sharp shadow called umbra. Draw a shadow with an umbra and penumbra. **Ask:** Why is the lighter shadow formed outside the dark shadow? Explain that the outer lighter shadow is called penumbra. A penumbra is formed when the light comes from a bigger source. Show the students a chart of the solar and lunar eclipses. **Ask:** What is an eclipse? How is it formed? Explain the movements of the Earth and Moon around the Sun and the formation of eclipses.

Hold a prism in the path of a beam of light coming in the room. **Ask:** What do you see on the opposite side? Explain the formation of the spectrum due to dispersion of light through a prism. **Ask:** What is a rainbow? When do you see a rainbow? How is a rainbow made? What are the colours of the rainbow? Show the students a chart of the colours of the rainbow. Explain that a rainbow is formed in the same way as light is dispersed through a prism. The raindrops act as tiny prisms which disperse sunlight to form a rainbow.

Answers to Exercises in Unit 8:

1. (a) Light is a kind of energy which travels in the form of waves.
 - (b) Sources of light are the Sun, electric bulbs, lamps, candles, and glowing as well as burning objects.
 - (c) Take three equal-sized pieces of card and make a pinhole in the centre of each. Stand them in a straight line so that the pinholes are aligned. Place a candle in line with the cards so that its flame can be seen through the pinholes. Now shift the middle card slightly and observe the flame. The flame will not be visible because light can only travel in a straight line.
 - (d) Refer to pages 76 and 77 of the Pupil's Book.
 - (e) Refer to page 74 of the Pupil's Book.
 - (f) A shadow is formed when an object is placed in the path of light, a dark patch resembling the shape of the object is formed on the side opposite the source of light.
2. (a) ray (b) laser (c) seven
(d) umbra (e) solar (f) 300,000 km per sec.
3. (a) is a form of energy. (b) is made of many rays.
(c) is composed of seven colours. (d) was invented by Al-Haitham
4. (a) 300,000 km/sec. (b) faster than sound
(c) small and inverted (d) laser
(e) 7 (f) penumbra

Additional Exercise:

MCQs

- (a) The speed of light is _____ the speed of sound.
the same as faster than slower than [*faster than*]
- (b) The bundles of energy thrown off by electrons are called _____.
photos photons photo cells [*photons*]
- (c) Light travels in _____ lines.
straight curved wavy [*straight*]
- (d) The pinhole camera was invented by a _____ scientist named Al-Haitham.
Christian Chinese Muslim [*Muslim*]
- (e) A _____ is a path of light in a particular direction.
beam ray laser [*ray*]

- (f) A _____ is a very strong ray of light, which is very narrow and has only one colour.
 beam ray laser [*laser*]
- (g) Materials that allow only some light to pass through are called _____.
 transparent translucent opaque [*translucent*]
- (h) An eclipse is a _____ formed on either the Earth or on the Moon.
 object shadow image [*shadow*]
- (i) Rays that are just beyond the violet edge of the rainbow are called _____.
 ultra violet infra red magenta [*ultra violet*]
- (j) Chlorophyll, a pigment found in the leaves of most green plants, absorbs the _____ of the spectrum.
 blue and green green and red red and blue [*red and blue*]

Date:

Time: 40 mins

Unit: 8 Topic: Light	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
1. Light	<ul style="list-style-type: none"> • to explain that we are able to see because of light • to describe light as a form of energy • to explain the characteristics of light: it travels very fast and can travel through space 	<p>Students should be able to:</p> <ul style="list-style-type: none"> • explain that we see things when light falls on them • identify the main sources of light • explain that light is a form of energy • describe the properties of light 	Diagrams and pictures of sources of light, lightning, space, a pinhole camera	Reading: p 73, 74 CW: 1 e) HW: Q1 (a) (b) (c)
<p>Key words: light, energy, speed, space, photon</p> <p>Method: Start the unit by asking the students: Can we see things in the dark? Can we see things in the light? What would the world be like without light? Explain the importance of light for plants and animals.</p> <p>Ask: Can light do useful work? Explain that light is a form of energy that helps us to do many things. It travels in the form of waves.</p> <p>Ask: During a thunderstorm, do you hear the clap of thunder first or do you see the lightning? Explain that light travels faster than sound; that is why we see the lightning first.</p> <p>Explain that light can travel through space. Discuss the nature of light. When a copper wire becomes hot, its electrons soak up energy. When they are loaded with energy they throw it off in the form of bundles called photons. These bundles of energy are light. Anything which is hot enough gives off light. Its electrons keep pouring out bundles and bundles of light.</p> <p>Make a hollow tube of a newspaper. Light a candle and place it on the desk. Ask a student to look at the flame through the tube. Bend the tube. Ask the student if s/he can see the flame. Explain that light cannot go round corners. It travels in straight lines.</p>				

Date:

Time: 40 mins

Unit: 8 Topic: Light	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
2. Forms of light	<ul style="list-style-type: none"> • to describe the forms of light • to explain what luminous and non-luminous bodies are 	<p>Students should be able to:</p> <ul style="list-style-type: none"> • describe the characteristics of a ray, a beam, a laser • explain what luminous and non-luminous bodies are 	Diagrams of a ray, a beam, laser beam, pictures of luminous and non-luminous objects	Reading: p 74, 75 CW: Q3 HW: Worksheet
<p>Key words: ray, beam, luminous, non-luminous, laser</p> <p>Method: Make a pinhole in the centre of a piece of cardboard. Shine a torch through the hole. Ask: What can you see? Make a slit in the cardboard and shine the torch through. Ask: What can you see now? Explain the difference between a ray and a beam. Show the students a toy laser light. Explain that a laser beam is a narrow beam of light of one colour only. It is used by doctors to seal cuts on the skin. It is also now being used in telephone lines and in detecting damage in underground pipes, etc. How does light help us to see things? Explain that objects reflect light and so we can see them.</p> <p>Ask: Where does light come from? Show the students pictures of the Sun, a candle, a bulb, and a fire. Explain that all bodies that give out their own light are called luminous bodies. Ask: What is moonlight? Does the Moon have its own light? Does a chair or table give out light? Explain that non-luminous bodies only reflect light that falls on them.</p>				

Lesson plan

Date:

Time: 40 mins

Unit: 8 Topic: Light	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
3. Transparent, translucent, opaque materials	<ul style="list-style-type: none"> • to explain that, unlike transparent materials, opaque materials do not allow light to pass through them • to explain how shadows are formed • to explain how eclipses occur 	Students should be able to: <ul style="list-style-type: none"> • explain how transparent, translucent, and opaque materials are different • explain how shadows are formed • explain the formation of eclipses, and the phases of the Moon 	A collection of transparent, translucent, and opaque materials, A candle Diagrams and wallcharts of the phases of the Moon and eclipses	Reading: p 75, 76, 77 Activity: 1 CW: Q2 HW: Q1 (d) (f)
<p>Key words: transparent, translucent, opaque, shadow, umbra, penumbra, phases of the Moon, eclipse, solar, lunar</p> <p>Method: Show the students different types of materials through which light can and cannot pass.</p> <p>Ask: What is a shadow? How is a shadow formed? Explain the formation of shadows with the help of diagrams and charts. Explain that the dark part of a shadow is called the umbra and the outer, lighter shadow is called the penumbra. Explain that the phases of the Moon are also shadows formed while the Moon is orbiting the Earth.</p> <p>Ask: What is a solar eclipse? What is a lunar eclipse? With the help of diagrams and charts, explain the formation of eclipses due to the rotation of the Earth and the Moon.</p>				

Date:

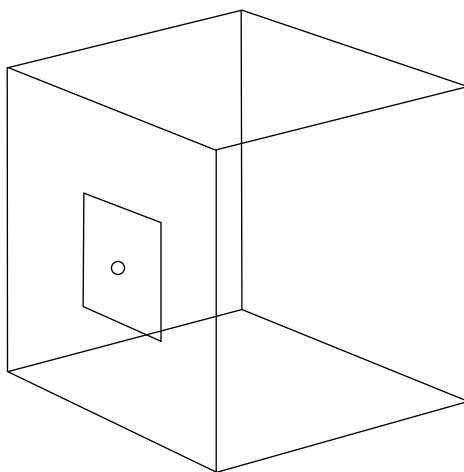
Time: 40 mins

Unit: 8 Topic: Light	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
4. Colours of light	<ul style="list-style-type: none"> • to explain that a rainbow is made of seven colours • to explain what ultraviolet and infrared rays are • to emphasize the importance of light for plant growth 	<p>Students should be able to:</p> <ul style="list-style-type: none"> • explain that white light is composed of seven colours • explain that there are other colours beyond the red and violet parts of the rainbow • explain the importance of light for plants 	<p>Pictures of a rainbow, a diagram showing photosynthesis, a prism</p>	<p>Reading: p 77 Activity: 2 CW: Q4 HW: Draw the rainbow and mark the infrared and ultraviolet bands of colour.</p>
<p>Key words: rainbow, ultraviolet, infrared, photosynthesis, chlorophyll</p> <p>Method: Show the students the spectrum formed by a prism and ask them to name the colours of the rainbow. Ask them to observe the spectrum carefully to see if they can see the infrared and the ultraviolet bands. Explain that these bands are invisible but we can feel their effect. Ultraviolet rays can cause sunburn. Infrared rays give off energy in the form of heat that keeps us warm.</p> <p>Show the students the chart of photosynthesis. Ask: How does a green plant make its own food? What is the food of the plant? Why are leaves green? Explain that green leaves use the red and blue parts of the spectrum of white light to make their food. They reflect green light, that is why the leaves appear green.</p>				

Name: _____

Date: _____

1. On the given diagram, draw rays to show how an image is formed by a pinhole camera:



2. Write the term that matches the description.

Description

Object

a. A path of light in a particular direction

b. Several rays running side by side

c. A strong narrow ray of light of one colour that gives out heat

d. Materials that allow light to pass through

e. Materials that do not allow light to pass through

f. Materials that allow some light to pass through

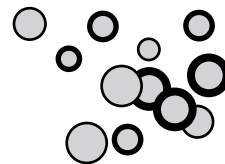
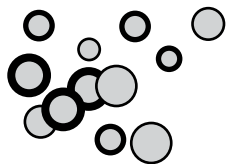
g. A dark patch formed when an opaque object is placed in the path of light

Name: _____

Date: _____

1. Draw a labelled diagram to show the parts of a shadow.

2. Draw a labelled diagram of a solar eclipse.



Electricity

Teaching objectives:

- to explain the structure of an atom
- to explain ions
- to explain static electricity
- to explain electrostatic induction
- to explain how we can test the presence of a charge
- to explain lightning
- to describe an electric circuit
- to discuss the importance of a switch
- to discuss conductors and insulators

Teaching strategy:

Ask: What is matter made up of? Draw the structure of an atom. Explain the structure of an atom. Draw two atoms and explain how ions are formed. The atom that gives away an electron becomes a positively charged ion and the atom that receives an electron becomes a negatively charged ion.

Tell a student to brush his hair vigorously with a plastic comb and bring it near bits of paper. **Ask:** Why are the papers sticking to the comb? Explain the production of static electricity and the induction of charges by rubbing. Rub a rubber balloon with a wollen cloth and hold it against the wall. **Ask:** Why does the balloon stick to the wall? Explain that rubbing produces static electricity. Take the students to the laboratory and show them a gold leaf electroscope. Demonstrate why the leaves repel each other when a charged body is brought close to the metal ball of the electroscope.

Ask: Where do you see lightning? What is lightning? Explain how rubbing of clouds produces lightning. **Ask:** Why does lightning strike high buildings and trees? Explain that charged clouds induce opposite charges on the buildings and trees. When the charge becomes high, the electrons jump from the clouds to the buildings and trees and lightning strikes. Explain the use of lightning conductors to prevent damage by lightning.

Make an electric circuit with a cell, a bulb, and wires. **Ask:** Why does the bulb light up? Explain the pathway of charged particles in an electric circuit. **Ask:** Will the bulb still glow if the cell is removed, or if the wire is detached? Explain open and closed circuits and the need for the source of electricity to push the charge. **Ask:** If a wooden strip is added to the circuit, will the bulb still glow? Why? Explain that materials that do not allow electrons to flow through them are called insulators. Metals are materials that allow electrons to flow through. They are called conductors.

Do the activities. Summarize the lesson.

Answers to Exercises in Unit 9:

1. (a) An atom is made up of a central nucleus which contains positively charged particles called protons and neutral particles called neutrons. Negatively charged particles called electrons spin around the nucleus in definite paths called orbits.
 - (b) Materials that allow an electric charge to pass through them are called conductors as in metals.
 - (c) Electricity is made in a special building called a power plant. The machine that makes electricity is called a generator. A generator makes electrical energy, but it uses energy to do so. It uses running water, burning fuel, or nuclear energy to run the generator.
 - (d) An electric circuit is a pathway along which charged particles can move.
 - (e) i) A switch is a device which is used to turn a current on or off. When you turn the switch on, a small metal piece inside the switch completes the circuit and the current flows along the circuit. When you turn the switch off, the metal piece moves away from the wire and the current stops flowing.
 - ii) A fuse is made of a thin fuse wire, which has a low melting point. If a large current flows through it, the fuse wire melts and thus the circuit breaks and the electrical appliance stops working.
 - (f) The effects caused by charged particles collected in one place are called static electricity.
 - (g) If a charged particle is brought close to a neutral object it produces an opposite charge on it. This process is called electrostatic induction.
 - (h) A body can be tested for the presence of a charge by an instrument called a gold leaf electroscope.
 - (i) When clouds become highly charged due to rubbing against each other, a large number of electrons jump from one cloud to another or to the Earth. This flow of electrons produces a flash of lightning.
 - (j) In order to protect high buildings from damage due to lightning, a pointed metallic rod, called a lightning conductor, is fixed to the highest point on them. This repels any charges that may be induced in the building from the clouds.
2. (a) atoms (b) protons and neutrons (c) Electrons (d) positively
 (e) no (f) neutral (g) repel (h) induction
 (i) charged (j) lightning
3. (a) 4 (b) positive (c) neutral (d) gained (e) induction
 (f) electron (g) electrons (h) no charge (i) lightning (j) positive ion
4. (a) positive (b) negative
5. (a) positive (b) negative
6. Refer to page 82 of the Pupil's Book.
7. b

Additional Exercise:

MCQs

- (a) Every atom has a nucleus surrounded by spinning _____.
 electrons protons neutrons [*electrons*]
- (b) Electrons have a _____ charge on them.
 positive negative neutral [*negative*]
- (c) The pathway by which an electric current moves along wires is called an _____.
 electron circuit electric circuit electro-magnetic circuit [*electric circuit*]
- (d) Most electrical gadgets are fitted with a _____ to protect them from damage caused by a large current.
 fuse switch battery [*fuse*]
- (e) An electric current can be switched on and off by a _____.
 fuse switch battery [*switch*]
- (f) When two objects made of different materials are rubbed against each other, _____ may be transferred from one to the other.
 protons electrons neutrons [*electrons*]
- (g) The process by which an opposite charge is produced in a neutral object by bringing a charged object close to it is called _____.
 production induction selection [*induction*]
- (h) An instrument that can test a body for the presence of a charge is called _____.
 telescope microscope gold leaf electroscope [*gold leaf electroscope*]
- (i) The flow of electrons in the form of a streaks of light in the sky is called _____.
 lightning lighting lights [*lightning*]
- (j) A _____ conductor repels any charges that may be induced in a high building from the clouds.
 good bad lightning [*lightning*]

Date:

Time: 40 mins

Unit: 9 Topic: Electricity	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
1. Structure of an atom Current electricity	<ul style="list-style-type: none"> • to explain the structure of an atom • to define current • to explain current electricity 	<ul style="list-style-type: none"> • describe the structure of an atom and explain the type of charges on particles • describe current electricity and a simple circuit 	Diagrams of the structures of atoms Diagrams of the formation of positive and negative ions Pictures of conductors and insulators, and of a power plant	Reading: p 81, 82 CW: Q1 (a) (b) Q2 HW: Q1 (c) (d)
<p>Key words: atom, proton, electron, neutron, positive charge, negative charge</p> <p>Method. Ask: What is matter made up of? Draw the structure of an atom on the board. Explain the structure of an atom. Draw two atoms on the board and explain the formation of ions. When two atoms come close to each other, one atom gives away an electron and becomes a positively charged ion and an atom that receives the electron becomes a negatively charged ion. Explain that materials that gain electrons have a negative charge and materials that lose electrons have a positive charge.</p>				

Date:

Time: 40 mins

Unit: 9 Topic: Electricity	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
2. Switch, fuse How electricity is produced	<ul style="list-style-type: none"> • to explain how a switch and a fuse work • to explain how electricity is produced for our homes • to highlight the safety rules for using electricity 	<ul style="list-style-type: none"> • explain the importance of a switch and a fuse in a circuit • explain how electricity is supplied to homes • realize the importance of being safe around electricity 	A bulb, a battery cell, copper wires, a switch, a fuse wire	Reading: p 83, 84, 85, 86 Activity: 1, 2, 3 CW: Q3, Q4 HW: Q1 (e) (f) (g)
<p>Key words: electric circuit, electric current, battery cell, bulb, wires, switch</p> <p>Method: Set up an electric circuit and explain its components. Ask: Why does the bulb light up? Explain the pathway of the charged particles in an electric circuit. Ask: Will the bulb still glow if the battery cell is removed or the wires are detached? Why? Explain open and closed circuits and the need for a source of electricity to push the charge through the circuit. Ask: Can a circuit be turned on and off? Explain the role of the switch in controlling the flow of electricity. The switch forms a bridge in the path of the flow of electricity. Explain the working of the switch using a model.</p> <p>Ask: What is a fuse? Why do we have fuses in electric circuits? Explain that a fuse is a thin wire joined to a circuit. It melts if a strong current passes through it. It is useful because it prevents an electric appliance from burning if too much current flows through it.</p> <p>Ask: Do you know how you get electricity in your home? Do you see the wires connected to poles and one entering your house? It carries electricity all the way from the power plant to your house. Explain how electricity is generated in a power plant.</p> <p>Go over the safety rules when using electricity and make sure every student becomes aware of these.</p>				

Name: _____

Date: _____

1. Draw the following atoms:

carbon

oxygen

2. Draw an electric circuit that includes the following components:

a battery

a switch

a bulb

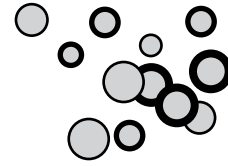
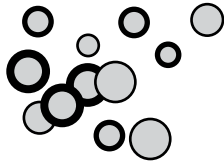
some copper wire

Name: _____

Date: _____

Complete the sentence by writing the correct word in the blank.

1. An atom is made up of a nucleus having _____ and _____.
2. When an atom gains or loses electrons it becomes a charged particle called an _____.
3. Materials through which electrons can move easily are called _____.
4. Electricity is generated in a _____ house.
5. The pathway by which an electric current moves along wires is called a _____.
6. An electric current can be turned on and off by a _____.
7. A fuse is made of thin wire that has a _____ melting point.
8. The effects caused by charged particles collected in one place are called _____.
9. A negatively charged object will _____ or pull a positively charged object towards itself.
10. The jumping of electrons from one cloud to another or from a cloud to the Earth is called _____.



Magnetism

Teaching objectives:

- to describe a magnet
- to describe the properties of a magnet
- to describe the types and shapes of magnets
- to describe magnetic force
- to explain that the force of a magnet is strongest at the poles of a magnet
- to explain how to locate the poles of a magnet
- to explain how to plot the magnetic field of a magnet
- to explain that the Earth has a magnetic field
- to explain how a piece of iron or steel can be made into a magnet
- to explain how a magnet can be demagnetized

Teaching strategy:

Ask: Have you seen a magnet? What can a magnet do? Show different types of magnets to the students. Demonstrate the poles of a magnet with the help of iron filings. Explain the method of plotting a magnetic field with the help of a compass needle. Ask the students to plot magnetic field in a laboratory. Explain the lines of magnetic force from the magnetic field that has been plotted. Demonstrate the magnetic field of the Earth by suspending a bar magnet with a string. Explain the magnetic nature of magnetic material. Demonstrate the method of making a magnet. Demonstrate the method of demagnetizing a magnet by heating it. Explain why keepers are kept with magnets when they are stored.

Answers to Exercises in Unit 10:

1. (a) Magnetism is an invisible force that can make some things move towards or away from each other.
(b) The force with which a magnet pulls iron and steel towards itself is known as its magnetic force.
(c) The area around a magnet where it exerts its magnetism is called its magnetic field. When some magnetic material is placed in a magnetic field the magnet will pull it towards itself.
(d) A compass consists of a small compass needle which is actually a small bar magnet placed inside a round metallic box with a glass top. The compass needle always points in the North-South direction because of the magnetic field of the Earth that is why it helps to find direction.

- (e) All the particles inside a magnet have a north pole and a south pole and they are arranged in such a manner that the north poles of all the particles face in the same direction, while the south poles face in the opposite direction.
- (f) When an electric current is passed through a coil of wire, it behaves like a magnet, that is, it can attract iron or steel. If a piece of soft iron is placed inside the coil, it will be magnetized and will remain so as long as the current flows in the coil. This kind of magnet is called an electromagnet.

The magnetic field around an electromagnet can be made stronger by passing a stronger current through the wire, or by increasing the number of turns in the wire.

- (g) An electric bell and a telephone.
2. (a) coal (b) at both poles (c) weak (d) an electromagnet
(e) it is beaten with a hammer
3. (a) copper (b) hard (c) two magnets (d) magnetic field
(e) at the poles (f) Earth
4. If we place a bar magnet on a sheet of white paper and sprinkle some iron filings onto the paper. The iron filings will arrange themselves around the magnet in a definite pattern of lines, which are the magnetic lines of force of the magnet. The iron filings will be clustered at each pole of the magnet. This shows that the magnetic force is strongest at the poles of a magnet.
5. Hang a bar magnet from a piece of string. It will swing around and when it stops it will be hanging in a north-south position which shows approximately the North Pole and South Pole of the Earth.
6. Refer to page 91

Additional Exercise:

MCQs

- (a) Metals that are attracted by magnets are called _____.
magnetic materials non-magnetic materials neutral materials
[*magnetic materials*]
- (b) _____ magnetic materials are easy to magnetize but lose their magnetism quickly.
Soft Hard Non [*Soft*]
- (c) The area around a magnet where it can attract magnetic materials is called _____.
attractive field magnetic field polar field [*magnetic field*]
- (d) The force of a magnet is strongest _____.
at the poles in the centre all over [*at the poles*]
- (e) A _____ is an instrument that helps us to find directions.
barometer microscope compass [*compass*]

- (f) When an electric current is passed through a coil of wire, it behaves like a _____.
 battery magnet torch [*magnet*]
- (g) A piece of soft _____ can become magnetized if it is placed inside a coil carrying a current.
 wood iron plastic [*iron*]
- (h) An electromagnet can be made stronger by passing a _____ current through it.
 weaker stronger softer [*stronger*]
- (i) An electric bell uses an _____ which is switched on and off by a contact breaker.
 electromagnet fuse switch [*electromagnet*]
- (j) Electromagnets are used to separate _____ in a scrap yard.
 wires tools metals [*metals*]

Date:

Time: 40 mins

Unit: 10 Topic: Magnetism	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
1. Magnets	<ul style="list-style-type: none"> • to define magnetism • to discuss magnetic and non-magnetic materials • to give examples of different magnetic materials • to describe the properties of a magnet 	<ul style="list-style-type: none"> • explain what magnetism means • explain that some materials are magnetic • explain the difference between hard and soft magnetic materials • describe the properties of a magnet 	Different types of magnets, an iron rod, a coil of wire, a battery cell, paper clips	Reading: p 90 CW: 1. Explain the differences between: a. magnetic and non-magnetic materials b. hard and soft magnetic materials 2. Draw a diagram to show the magnetic nature of a magnet. HW: Q1 (a) (b)
<p>Key words: magnetism, magnetic, non-magnetic, electromagnet, hard and soft magnetic material</p> <p>Method: Explain what magnetism means. Show the students different kinds of magnets. Ask: Do you know what a magnet is? Explain that a magnet is an object that can attract objects made of, or containing, iron. Ask: Do you know what magnets are made of? Explain hard and soft magnetic materials.</p> <p>Make an electromagnet with a coil of wire wound round an iron rod. Attach it to a battery cell. Bring it close to some paper clips. Ask: Does the magnet attract the paper clips? Explain what an electromagnet is.</p> <p>Show the students a bar magnet. Ask: What do you think will happen if we cut this magnet in half? What will happen if we cut the halves into smaller pieces? Explain that all the particles inside a magnet have a north pole and a south pole. They are arranged in such a way that all the north poles of the particles face in the same direction and all the south poles face in the opposite direction. When a magnet is cut in half, the small magnets retain their magnetic properties and each half becomes a magnet with a north pole and a south pole.</p>				

Date:

Time: 40 mins

Unit: 10 Topic: Magnetism	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
2. Magnetic field	<ul style="list-style-type: none"> • to describe a magnetic field • to mark the poles of a magnet • to explain that the force of a magnet is strongest at the poles • to describe the construction and working of a compass • to discuss the magnetic field of the Earth 	<p>Students should be able to:</p> <ul style="list-style-type: none"> • describe the force of a magnet • explain that magnetic force can act through non-magnetic materials • explain that the magnetic force of a magnet is strongest at the poles • explain the construction and working of a compass • explain the magnetic field of the Earth 	A bar magnet, steel pins, toothpicks, wooden ruler, an eraser, an iron nail, a thin card, a compass, a length of string	<p>Reading: p 91, 92</p> <p>Activity: p 92</p> <p>CW: Q2, Q3, Q4, Q5, Q6</p> <p>HW: Q1 (c) (d) (e)</p>

Key words: magnetic force, non-magnetic material, attract, repel, demagnetize

Method: Try to pick up steel pins, paper clips, and toothpicks with a bar magnet. **Ask:** Why does the magnet pick up the pins and not the toothpicks? Explain that magnets have a magnetic force. A magnet can attract some metals such as iron, steel, nickel, and cobalt.

Ask: Can a magnet attract steel pins through a piece of thin card. Perform the experiment to demonstrate that magnetic force can act through non-magnetic materials. Bring a magnet close to a pile of paper clips. **Ask:** Which part of the magnet holds the most pins? Explain that the poles are the strongest part of a magnet.

Perform activity 1. Explain that the area around a magnet in which it is effective is called its magnetic field. If a steel pin is placed in the magnetic field of a magnet, it will be pulled towards the magnet.

Suspend a bar magnet from a length of string. Swing the magnet and observe its direction as it stops. Explain that the magnet points to the north-south position of the Earth.

Show the students a compass. **Ask:** What is a compass used for? Explain that the small needle inside the compass is a magnet. It always points to the geographical north of the Earth. Explain how a compass is used in cars, planes, ships, etc. to find direction. Suspend a bar magnet from a length of string and give it a twist. Let it come to rest. **Ask:** What is the position of the magnet? Where is the North end of the magnet? Explain that there is an imaginary magnet inside the Earth, and the bar magnet is pointing towards it.

Ask: Do you have a magnet inside you? Explain that some animals including whales, dolphins, birds, humans, and most insects have some kind of magnetic material which helps them to find their way even when they cannot see.

Date:

Time: 40 mins

Unit: 10 Topic: Magnetism	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
3. How to make magnets Uses of magnets	<ul style="list-style-type: none"> • to explain how to make magnets • to explain how to demagnetize a magnet • to identify the uses of magnets 	Students should be able to: <ul style="list-style-type: none"> • explain the ways in which magnets can be made • explain the ways in which magnets can be demagnetized • describe how magnetism can be used to make useful appliances 	Diagrams of magnetizing by stroking with a magnet, an electro-magnet, a loud speaker, pictures of a crane sorting scrap, model of an electric door bell, a telephone	Reading : p 92, 93 Activity: 1, 2 CW: Q1 (e) (f) HW: Worksheet

Name: _____

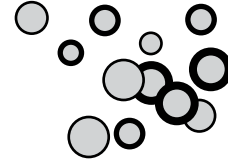
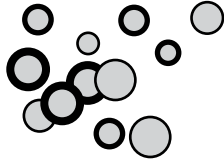
Date: _____

1. Fill in the blanks to complete the sentences below.

- a. Metals that are attracted by magnets are called _____.
- b. _____ magnetic materials are difficult to magnetize.
- c. _____ magnetic materials are easy to magnetize.
- d. _____ have strong magnetic fields but they lose their magnetism as soon as the current is switched off.
- e. If you cut a magnet in half, you will have _____ magnets.
- f. The area around a magnet in which its effect is felt is called its _____.
- g. Magnetic force is strongest at the _____ of a magnet.
- h. A _____ is an instrument used to find directions.
- i. A compass needle always points in the _____ / _____ direction.
- j. The Earth has a _____ magnetic field around it.

2. Fill in the blanks to explain what an electromagnet is.

When an electric current is passed through a _____ of wire, the _____ behaves like a magnet. If a piece of _____ is placed inside the coil, it will be _____, and will remain so as long as the _____ flows in the coil. This kind of a magnet is called an _____.



Soil

Teaching objectives:

- to define rocks
- to explain where rocks come from
- to describe the types of rocks
- to describe the formation of rocks
- to describe the layers of soil and their importance

Teaching strategy:

Place different types of materials such as sand, clay, mud, stone, slate, coal, etc. on the table. **Ask:** Which of these are rocks.? Explain that all these are different types of rocks. Explain where rocks come from. Show the students pictures of different types of rocks. Also show them actual specimens of rocks such as slate, chalk, marble, etc.

Ask: What is soil? What is soil made of? Explain the composition of soil. Put some garden soil in a measuring cylinder, stir it and allow the layers to settle. Then explain the composition of soil. **Ask:** What do you think happens to soil when a river rushes down a slope? Explain the erosion of soil by various agents and the harmful effects of erosion.

Ask: What kind of soil is found in deserts and marshy places? Do plants grow in such soils? Why? Explain the various types of soil in relation to the size of its particles. Explain the aeration and drainage of different kinds of soils. Explain why plants cannot grow in clay and sandy soils. Explain loam to be the best kind of soil and why. **Ask:** Why is garden soil dark in colour? Why do plants grow well in garden soil? Perform the experiment given in the textbook to test the composition of garden soil. Perform an experiment to prove that soil contains air. Perform an experiment to prove that soil contains water. Perform an experiment to prove soil contains micro-organisms. Explain the layers of soil and the structure and composition of each layer. Explain why plants and animals can live in the top layer of the soil.

Ask: What manure is? Why does a gardener use manure in the soil? Do you know how manure is made? Explain what humus is. Explain the formation of manure and the importance of the process of decay of plants for recycling of elements in the soil. Explain the advantages of humus in the soil. **Ask:** Have you heard of urea? What do you think it is? How is it used? Explain the importance of fertilizers for the healthy growth of plants.

Answers to Exercises in Unit 11:

1. (a) Soil is the outer layer of the crust of the Earth. It is a mixture of small pieces of rocks, air, minerals, salts, water, humus, and microbes.
 - (b) The components of soil are rocks and stones, air, water, microbes, and living organisms.
 - (c) Soil microbes are useful because they breakdown dead plants and animal bodies to form humus which returns minerals and other useful substances to the soil.
 - (d) Humus is the dead and decaying remains of plants. It binds large particles of sand so that they are not easily blown away by wind or washed away by flowing water. It helps to loosen up the small clay particles so that the water present between them is drained away and more air can circulate in it. It releases important minerals in the soil, which are needed by plants for their healthy growth. It helps to keep the soil in good condition for the healthy growth of plants.
 - (e) If a piece of land is denuded of its plant cover, i.e. by chopping down of trees, etc. then the land becomes bare. The top layer of this bare soil can easily be washed away by rainwater.
 - (f) Different types of soil are:

Clay Soil: This type of soil is made up of tiny particles which stick to each other. There are very few air spaces so water is trapped between them. This type of soil is called heavy soil because it has a lot of water and very little air. It also has a large amount of minerals. Plants and animals cannot live in such a soil because they cannot breathe in it.

Sandy Soil: This type of soil is made up of bigger particles which have large spaces between them so water and air can freely circulate in them. Water drains very quickly from it and takes away most of the minerals with it. Therefore, this type of soil is also called *hungry soil*. Plants and animals cannot live in such a soil because there is no water or minerals for their healthy growth.

Loam: This soil contains a mixture of large and small particles as well as a lot of minerals due to the presence of humus. It is the best type of soil for the healthy growth of plants and animals because it contains air, water, and minerals.
 - (g) It is the best type of soil because it contains air, water, and minerals.
 - (h) The removal of the fertile top layer of soil is called erosion. It is harmful because no plants can grow in that area.
2. (a) is the outer layer of the Earth's crust. (f) has poor drainage.
 - (b) provides oxygen for respiration. (g) is hungry soil.
 - (c) is absorbed by plant roots. (h) is the best type of soil for plants.
 - (d) breakdown dead organisms. (i) is an organic fertilizer.
 - (e) is the removal of the topsoil. (j) is a chemical fertilizer.
3. (a) Rocks and stones in soil hold the roots of plant firmly.
 - (b) Air provides oxygen for the respiration of roots and other living organisms in the soil.
 - (c) The removal of the top layer of soil by wind and water is called erosion.
 - (d) Water breaks rocks to form sand particles.

- (e) A sandy soil has large airspaces in it.
 (f) Clay soil is heavy soil.
 (g) Loam is the best type of soil for the growth of plants.
 (h) Humus is the dead and decaying remains of living organisms.
 (i) Topsoil is the fertile top layer of soil.

Additional Exercise:

MCQs

- (a) The outer layer of the crust of the Earth is called _____.
 top soil sub soil core [*top soil*]
- (b) Air and water are present in the _____ between the soil particles.
 atoms molecules spaces [*spaces*]
- (c) Plants absorb water and _____ from the soil by their roots.
 sand mineral salts clay [*mineral salts*]
- (d) Micro-organisms in the soil break down dead plants and animals to form _____.
 clay sand humus [*humus*]
- (e) Earthworms and some insects make holes in the soil which allow _____ to pass through.
 air sand clay [*air*]
- (f) The breaking down of rocks by the action of wind, temperature changes, chemicals, etc. is called _____.
 breaking weathering cracking [*weathering*]
- (g) Clay soil is called a heavy soil because it has _____.
 a lot of water and lots of air a lot of water and very little air
 very little water and lots of air [*lots of water and very little air*]
- (h) _____ soil is called a hungry soil because as water drains away from it takes away the minerals with it.
 Sandy Clay Mixed [*Sandy*]
- (i) The best type of soil for the healthy growth of plants is _____.
 a sandy soil clay soil loam [*loam*]
- (j) The removal of the fertile top layer of the soil is called _____.
 erosion corrosion weathering [*erosion*]

Date:

Time: 40 mins

Unit: 11 Topic: Soil	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
1. Composition of soil	<ul style="list-style-type: none"> • to describe what soil is made up of • to explain the importance of the components of soil 	<ul style="list-style-type: none"> • describe the composition of soil • explain the usefulness of each component 	A sample of garden soil, a measuring cylinder, some water, a stirrer, evaporating dish, a balance, a burner, a stand	Reading: p 97, 98 Activities: p 97, 98, 102 CW: Q1 (a) HW: Q1 (b) (c)
<p>Key words: soil, layer, rock, stone, air, water, mineral salts, microbe, living organism</p> <p>Method: Show the students a sample of garden soil. Ask: What is soil made up of? Explain the various components of soil. Put the garden soil in a measuring cylinder, stir it and allow the layers to settle. Explain the composition of soil. Discuss the importance of each component for plants and animals.</p>				

Date:

Time: 40 mins

Unit: 11 Topic: Soil	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
2. Formation of soil	<ul style="list-style-type: none"> • to explain how soil is formed • to identify different types of soil 	<p>Students should be able to:</p> <ul style="list-style-type: none"> • describe how soil is formed • explain the composition of different kinds of soil and their importance 	A wallchart of weathering, samples of clay, sand, and loam, funnels, cylinders	<p>Reading: p 98, 99, 100 Activity: p 100 CW: Q2 HW: Q1 (d) (f) (g)</p>
<p>Key words: weathering, clay, sand, loam, humus, drainage</p> <p>Method: Ask: What do you think happens when river water rushes down a slope? Explain the process of weathering and erosion of soil by various agents such as snow, ice, water, wind, etc.</p> <p>Ask: What kind of soil is found in deserts? In marshy places? Do plants grow in such soils? Why?</p> <p>Explain the various types of soil. Discuss the size of the particles in relation to aeration and drainage. Explain that plants cannot grow in clay and sandy soils. Ask: What is loam? Discuss why loam is the best type of soil for the healthy growth of plants.</p> <p>Ask: What is manure? What is a fertilizer? Why does a gardener put manure in the soil? Explain the formation of humus and the importance of the decay of plants for the recycling of elements in the soil.</p> <p>Explain the advantages of humus in the soil.</p> <p>Perform the experiment on p 100 to explain the drainage of different kinds of soils in relation to particle size. Explain the importance of water for plants. Discuss which is the best kind of soil for plant growth.</p>				

Date:

Time: 40 mins

Unit: 11 Topic: Soil	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
3. Layers of soil Fertilizers	<ul style="list-style-type: none"> • to identify the layers of soil • to identify kinds of fertilizers 	<p>Students should be able to:</p> <ul style="list-style-type: none"> • describe the layers of soil • explain why soil becomes infertile • explain the uses of different kinds of fertilizers 	<p>Diagrams of the layers of soil Pictures of soil erosion Samples of different kinds of fertilizers</p>	<p>Reading: p 100, 101 CW: Q3 HW: Q1 (c) (h)</p>
<p>Key words: top soil, subsoil, erosion, fertilizer, organic, inorganic, urea</p> <p>Method: Show the students a diagram of the section of the soil. Ask: In which layer do you find plants and animals? Explain that the top soil is dark brown due to the presence of humus. It is rich in minerals and many plants and animals can live in it.</p> <p>Ask: What is subsoil? Explain that this is the lighter coloured layer of the soil. It is rich in minerals but it contains no humus so very few animals and plants can live in it.</p> <p>Ask: What would happen if the topsoil layer was removed? Discuss weathering and erosion with the help of diagrams and pictures. Explain that plant roots hold the soil particles together. If trees and plants are cut down or burnt, or eaten by animals, the land becomes bare and the soil can easily be blown or washed away by wind or water. The removal of the topsoil is called erosion.</p> <p>Ask: What do plants need in order to grow strong and healthy? Discuss the use of fertilizers. Explain that as plants grow, they use up the minerals present in the soil, so we need to add fertilizers to the soil to replace them.</p> <p>Discuss the types of fertilizers that can be used. Organic fertilizer or manure is made from animal waste, dried blood, and bones of animals. Compost is made from decaying plants.</p> <p>Inorganic fertilizers are chemical fertilizers made in factories. They contain most of the minerals that plants need for healthy growth, but adding too much fertilizer can prove harmful. Urea is a commonly used fertilizer.</p>				

Name: _____

Date: _____

1. Label the diagram of the composition of soil.



2. Explain the function(s) of the following components of soil.

rocks/stones _____

air _____

water _____

microbes _____

microorganisms _____

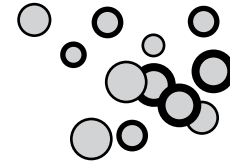
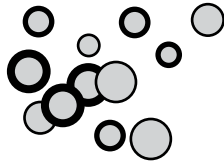
humus _____

Name: _____

Date: _____

Fill in the table to show the properties of different types of soil:

Soil	Particles in it	Amount of water	Amount of air	Amount of minerals	Drainage
clay soil					
sandy soil					
loam					



Space, stars, and planets

Teaching objectives:

- to describe space
- to describe how stars are formed
- to describe the components of the Solar System

Teaching strategy:

Ask: What is the sky? Why does the sky appear blue? What is space? Does space have an atmosphere? Explain what space is and that it contains dangerous rays and particles travelling at high speed. Show the students charts of space and heavenly bodies. **Ask:** What is a star made of? How do you think a star is made? Explain how a star is made from nebula by the pull of gravity.

Ask: What do you see in the sky on a moonless night? Explain about the Milky Way galaxy. **Ask:** What is a planet? What is a Moon? What is a star? What is the difference between a star, a planet, and a Moon? Explain that a star is a mass of hot, glowing gases. The planets and moons only reflect sunlight.

Ask: Can you name the planets of the Solar System? Draw the Solar System on the board and name the planets in order of their distances from the Sun. Give a brief description of each planet. Draw the Sun on the board. Mark its distance from the Earth and its dimensions. Also, write its inner and outer surface temperature. Explain that heat and light is produced by it, due to the fusion of hydrogen atoms to form helium gas, which produces a lot of energy.

Answers to Exercises in Unit 12:

- (a) Nebulae are great clouds of gas and dust in space.
 - (b) Stars are formed in the nebulae. The force of gravity pulls gas and dust particles together into a tight mass. Its temperature rises and it gives off energy in the form of heat and light.
 - (c) An island of stars spinning through space is called a galaxy.
 - (d) Bodies that go around the Sun are called planets.
 - (e) The Sun, all the planets, and their moons make up the Solar System.
 - (f) Scientists think that the planets and moons are made from the same gas cloud that formed the Sun.
 - (g) An asteroid is a lump of rocky material in space.
- (a) Space is the area outside the Earth's atmosphere.
 - (b) There is no air in space.
 - (c) Great clouds of gas and dust in space are called nebulae.

- (d) The force of gravity pulls gas and dust particles to make stars.
 (e) A band of stars in the sky on a dark night is called the Milky Way.
 (f) An island of stars in the sky on a dark night is called a galaxy.
 (g) Bodies that go around the Sun are called planets.
 (h) The Earth is a planet.
 (i) A lump of rocky material in space is called an asteroid.
3. (a) 330,000 (b) 1,384,000 (c) 149 million (d) 14,000,000°C (e) 6000°C
 (f) Mercury (g) Venus (h) Earth (i) Mars (j) Jupiter
 (k) Saturn (l) Uranus (m) -200°C (n) Jupiter (o) Jupiter

Additional Exercise:

MCQs

- (a) Space is the area beyond the Earth's _____.
 hemisphere biosphere atmosphere [*atmosphere*]
- (b) Great clouds of gas and dust in space are called _____.
 stars nebulae meteors [*nebulae*]
- (c) Stars are formed in the _____.
 planets comets nebulae [*nebulae*]
- (d) An island of stars spinning through space is called a _____.
 galaxy gulf continent [*galaxy*]
- (e) Heavenly bodies that go around the Sun are called _____.
 stars comets planets [*planets*]
- (f) A rocky lump of material in space is called _____.
 a planet a star an asteroid [*an asteroid*]
- (g) _____ are wandering lumps of ice and dust in space.
 Stars Meteors Comets [*Comets*]
- (h) A piece of rock which falls from space into the upper layers of the atmosphere is called _____.
 a meteor a meteorite a comet [*a meteor*]
- (i) Pieces of rock which do not burn up completely before falling to the ground are called _____.
 comets meteors meteorites [*meteorites*]
- (j) The Sun is _____ times bigger than the Earth.
 220,000 330,000 440,000 [*330,000*]

Lesson plan

Date:

Time: 40 mins

Unit: 12 Topic: Space, stars, and planets	Teaching objectives	Learning outcomes	Resources/Materials	Activities/CW/HW
1. Space	<ul style="list-style-type: none"> • to describe space • to explain nebulae and stars 	<p>Students should be able to:</p> <ul style="list-style-type: none"> • explain what constitutes space • explain the formation of nebulae and stars 	Pictures and charts of space, stars, nebulae	Reading: p 104 CW: Q2
<p>Key words: space, nebulae, star, Milky Way</p> <p>Method: Ask: What is space? Does space have an atmosphere? Explain what space is. It has no atmosphere, but it contains dangerous rays and particles that travel through it at high speeds.</p> <p>Show the students charts of space and heavenly bodies.</p> <p>Ask: What is a star made of? How do you think a star is made? Explain that stars are formed in the nebulae by the pull of gravity.</p> <p>Ask: What do you see in the sky on a moonless night. Explain what the Milky Way galaxy is.</p>				

Date:

Time: 40 mins

Unit: 12 Topic: Space, stars, and planets	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
2. The Solar System	<ul style="list-style-type: none"> • to explain what planets and moons are • to describe how the Solar System was formed • to explain that there are other bodies in the solar system 	<ul style="list-style-type: none"> • explain that planets are bodies that move around the Sun in specific paths called orbits • explain that moons are smaller bodies that orbit planets • identify asteroids, comets, meteors, and meteorites 	Pictures of the Solar System, planets, moons, asteroids, comets, meteors, and meteorites	Reading: p 105, 106, 107 CW: Q1 (d) (e) (f) (g)
<p>Key words: planet, orbit, moon, Solar System, asteroid, comet, meteor, meteorite</p> <p>Method: Ask: What is a planet? a moon? What is the difference between a star, a planet, and a moon? Explain that a star is a mass of hot glowing gases. The planets and moons only reflect light. Explain that asteroids, comets, meteors, and meteorites are bodies in space which are going round the Solar System. Describe their properties and ask the students to write their characteristics in tabular form.</p>				

Date:

Time: 40 mins

Unit: 12 Topic: Space, stars, and planets	Teaching objectives	Learning outcomes Students should be able to:	Resources/Materials	Activities/CW/HW
3. The Solar System	<ul style="list-style-type: none"> to discuss the components of the Solar System 	<ul style="list-style-type: none"> explain what the Solar System is composed of describe the planets of the Solar System 	Pictures and charts of the planets and the Solar System	Reading: p 107, 108 Activity: Find information about the planets of the Solar System and make a chart. CW: Q2 HW: Q3
<p>Key words: Sun, planet, moon, ring</p> <p>Method: Ask: Can you name the planets of the Solar System? Draw a diagram of the Solar System on the board and write the names of the planets. Describe each planet briefly. Draw the Sun on the board. Mark its distance from the Earth, write its diameter and its inner and outer surface temperatures. Explain that the heat and light of the Sun are produced by the fusion of hydrogen atoms to form helium gas which produces a lot of energy.</p>				

Name: _____

Date: _____

1. Draw lines to match the descriptions to the objects in space.

Description	Object in space
i. Area beyond the atmosphere; full of dangerous rays; no air	moon
ii. Great cloud of gas and dust in space	planet
iii. An island of stars spinning in space	space
iv. Bodies that move around the Sun in fixed paths called orbits	meteor
v. Small bodies going round the planets	asteroids
vi. Lump of rocky material in space	comets
vii. Wandering lump of ice and dust in space with a glowing head and a tail	galaxy
viii. Piece of rock which heats up and begins to glow when it falls from space into the upper layers of the atmosphere	nebulae

2. Write some facts about the Sun in the second column.

Size	
Diameter	
Distance from the Earth	
Temperature on the surface	
Temperature in the centre	

Assessment

Units 7–12

1. Answer the following questions:

- What is friction? How is it useful to us?
- What is the difference between transparent, translucent, and opaque materials?
- What is lightning?
- What is a magnetic field? What will happen to materials like iron and steel if they are placed in the magnetic field?
- What is soil erosion? How can soil erosion be controlled?
- What are meteors?

2. Fill in the blanks:

- There is _____ between your hands when you rub them together. (*friction*)
- Light travels very fast in the form of _____. (*waves*)
- Bodies that have their own light are called _____. (*luminous*)
- Electricity is made in a special building called _____. (*power plant*)
- The pathway by which an electric current moves along the wires is called an _____. (*electric circuit*)
- A _____ is an instrument which is used to find directions. (*compass*)
- The Earth is like a huge bar _____ with a weak magnetic field around it. (*magnet*)
- _____ break down dead plants and animal to form humus. (*Micro-organisms*)
- Inorganic fertilizers are chemically made in _____. (*factories*)
- Bodies that move around the Sun are called _____. (*planets*)

3. Label the fulcrum in the following:





4. What will happen in each of the following circuits?

a) _____

b) _____



5. Name the types of magnets:

(a) _____

(b) _____

(c) _____

(d) _____

(e) _____

Answers

1. a) Friction is a force that is produced when things rub against each other.

Friction helps in all kinds of motion such as walking, writing, climbing, etc. It helps vehicles to move on roads, by allowing their tyres to grip the surface.

b) Transparent materials allow all the light to pass through. Translucent materials allow some light to pass through. Opaque materials do not allow any light to pass through.

c) When clouds become highly charged due to rubbing against each other, a large number of electrons jump from one cloud to another or to the Earth. This flow of electrons produces a flash of lightning.

d) The area around a magnet in which it is effective is called its magnetic field. If a magnetic material such as iron or steel is placed in the magnetic field, the magnet will pull it towards itself.

- e) If the top layer of the soil is washed away by rainwater or wind, no plants can grow in the remaining soil. The removal of the fertile top layer of soil is called erosion

Plant roots help to hold soil particles together. Trees, plants, and grass should be planted to prevent erosion.

- f) A meteor is a piece of rock, which falls from space into the upper layers of the atmosphere. When it rubs against the air at great speed, it heats up due to friction and begins to glow. It burns up very quickly and turns to dust.

4. Electric current will flow through b) and not through a).

5. a) horseshoe magnet b) U-shaped magnet c) rod magnet
d) bar magnet e) electromagnet

