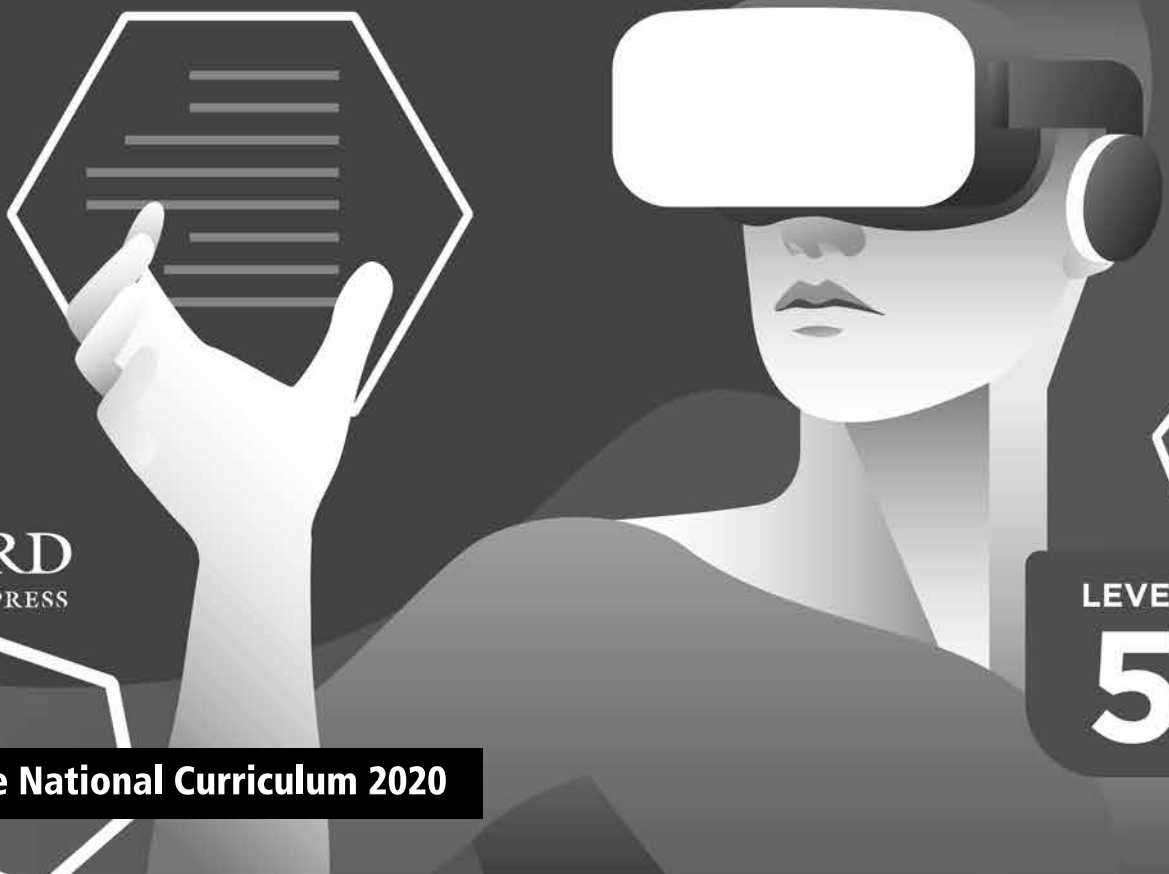
THIRD EDITION

NEW OXFORD PRIMARY SCIENCE

Teaching Guide



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LEVEL
5

Based on Single National Curriculum 2020

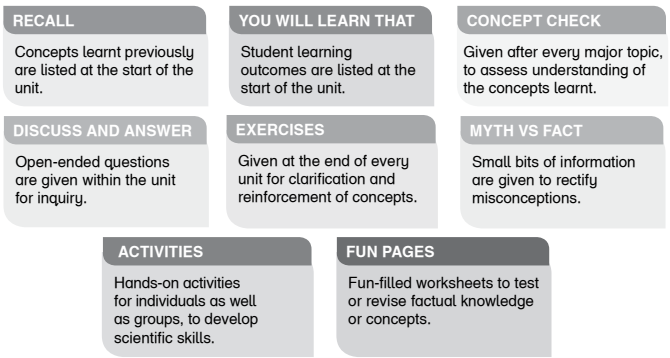
Title verso

Contents

Introduction

This teaching guide consists of a scheme of work, worksheets, answers to questions in the book, sample assessment paper, and lesson plans. It is designed to support delivery of the National Curriculum effectively. It provides the teachers with teaching strategies to make learning student-centred, with simple and clear instructions for the teachers.

The following key features of the book have been integrated into the lesson plans, making it easier for the teacher to teach the lessons:



The PDF version of this teaching guide (available online at OUP website) allows teachers to adapt and modify lessons to suit the diverse needs of their students. As a result, teachers can focus their efforts on maximising the learning of their students.

A progression map is given to enable department heads and coordinators to plan for the progression of students' learning.

Scheme of work

The division of the syllabus (units) into two terms has been provided. A detailed scheme of work has also been provided according to which the teachers can plan their lessons over the terms. The scheme of work is flexible and adaptable to teachers' needs and school requirements.

Progression chart

This shows how NOPS builds on students' prior knowledge and progresses the topics from basic to more complex across the series.

National Curriculum Alignment

Each teaching guide also includes curriculum maps for that grade. It shows where each SLO of the National Curriculum is covered in the NOPS series.

How to Use this Teaching Guide

Background information

Brief background information has been provided before the lesson plans. It outlines the scientific knowledge necessary to teach a particular unit.

Lesson plan

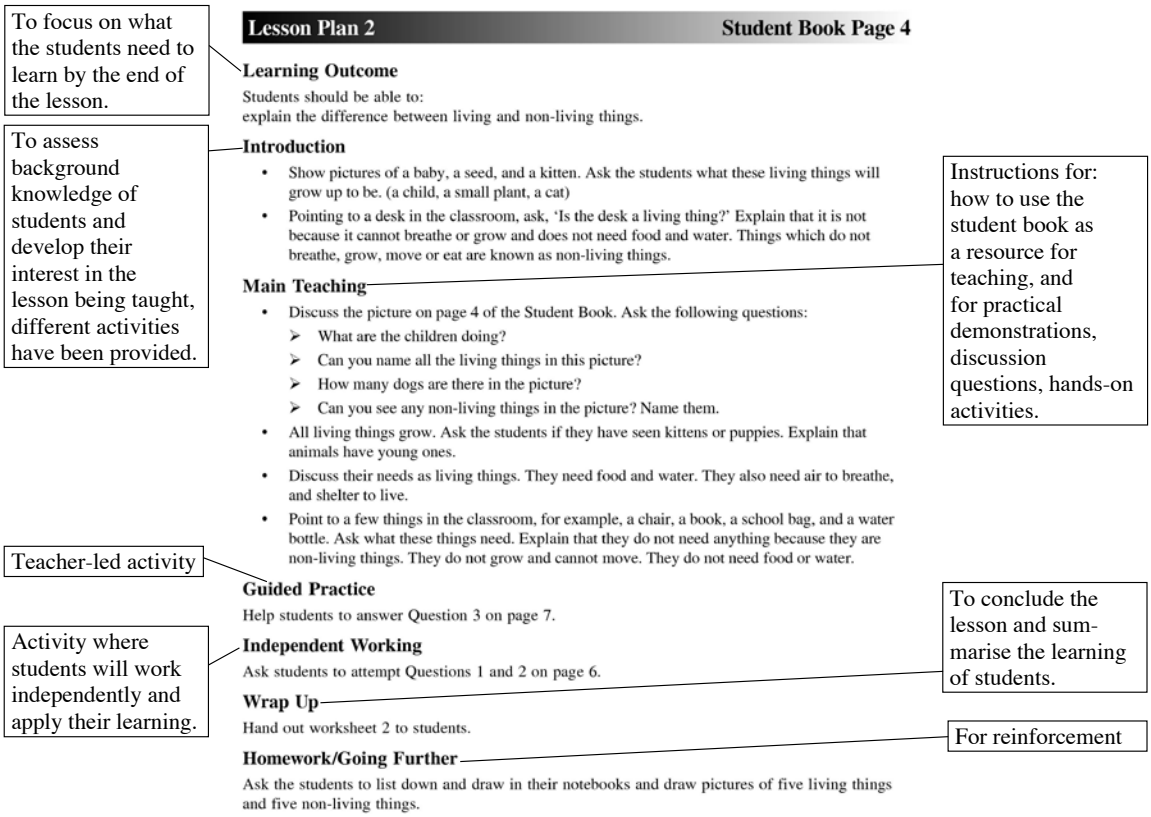
Teachers can use the provided lesson plans for each unit addressing the relevant learning outcomes as is or customise according to their class requirements. Lesson plans can be modified as per available resources.

i. **Learning outcome:** Each lesson plan is according to the lesson outcomes which are closely related to the student learning objectives from the National Curriculum.

ii. **Introduction:** Introduces the various techniques that are used in this teaching guide:

- Questions can be asked to check background knowledge or misconceptions about the concept being taught. This teaching guide gives interesting ways to encourage brainstorming and asking questions.
- For early years, pictures (flashcards) or videos can be shown to initiate introductory discussion.

- If resources are available, experiments or hands-on activities can be arranged. The teacher can ask questions before an experiment to elicit responses from students. After the results have been observed and recorded, ask what was done in the experiment and what happened. Do the results answer the questions posed at the start of the experiment? How do they explain what happened?



iii. **Main teaching:** After introducing the lesson, teachers can utilise the techniques suggested in the 'main teaching' section to lead the students through the lesson in detail. Use different techniques to make learning of the lesson as interesting for the students as possible. Demonstrations, hands-on activities, model-making, drawing diagrams, videos, field trips, reading, etc., can be used to teach the topic in detail.

iv. **Guided practice:** Activities requiring teacher guidance have been provided in this section.

v. **Independent working:** Suggestions on how to encourage students to work independently using the activities mentioned in the lesson plans.

vi. **Wrap up:** Conclude the lesson and summarise the learning of students by using wrap activities given in the lesson plans.

vii. **Worksheet:** Photocopiable worksheets have been provided with lesson plans, which can be used in the class or for homework.

Answers

Answers to all the questions given in exercises, fun pages, 'concept check', and 'discuss and answer' have been provided at the end of the lesson plans.

Assessment:

Sample Assessment Paper has been provided at the end of the teaching guide, based on the standard board format. The format of the sample paper can be used to design assessment papers.

Concept Check boxes given in the student book can be used for assessing learning during the class.

Curriculum mapping

strand	SNC topic/chapter	SNC sub-topic	SNC SLOs	LOCATION IN NOPS V
life science	CLASSIFICATION OF LIVING THINGS	Five Kingdom systems (Monera, Protista, Fungi, Plants, Animals)	• Describe classification of living organisms and its importance.	Unit 1
		Classification and Characteristics of Plants	• Classify the plants into two major groups (dicots and monocots) and give examples of each group.	Unit 1
		Classification and characteristics of Flowering Plants (monocot and dicot)	• Compare and contrast the structure of a dicot and a monocot plant (with respect to their seeds, leaves and flowers)..	Unit 1
		Classification and Characteristics of Animals (vertebrates and invertebrates)	• Differentiate between vertebrates and invertebrates based on their characteristics	Unit 1
			• Classify vertebrates into, fish, amphibians, reptiles, birds and mammals on the basis of their characteristics.	Unit 1
			• Classify invertebrates into five groups (sponges, worms, insects, snails, and starfish) on the basis of their characteristics.	Unit 1
		Biodiversity (Deforestation and Hunting)	Analyse some of the factors caused by Human which are affecting Biodiversity.	Unit 1
			• Suggest and write some measures for conservation of endangered species.	Unit 1
	MICROORGANISMS	Viruses, Bacteria and Fungi	• Define and describe microorganisms.	Unit 2
			• Identify the main groups of microorganisms and give examples for each.	Unit 2
		Role of microorganisms as decomposers	• Highlight the role of microorganisms in decomposition and discuss its harmful and beneficial effects.	Unit 2
		Advantages and disadvantages of microorganisms	• Recognize some common diseases of each group caused by microorganisms.	Unit 2
			• Recognize that microorganisms get transmitted into humans and spread infectious diseases.	Unit 2
			• Discuss and deduce advantages and disadvantages (any 3) of microorganisms by using some daily life examples.	Unit 2
			• Suggest preventive measure to protect themselves from these infections.	Unit 2
	FLOWERS AND SEEDS	Structure of a flower	• Examine and Describe the structure of a flower.	Unit 3
		Pollination and its types	• Define pollination and describe its types with examples.	Unit 3
		Types of reproduction in plants	• Define reproduction and differentiate between sexual and asexual reproduction in plants.	Unit 3
		Structure and germination of seed (monocot/dicot)	Describe the structure of a seed and demonstrate its germination.	Unit 3

			• Compare and contrast the structure and function of a chick pea and Maize seed.	Unit 3
		Conditions necessary for seed germination	• Illustrate the conditions necessary for seed germination.	Unit 3
		Pollution and its types	• Define pollution and its types.	Unit 4
		Causes of pollution	• Explain the main causes of water, air and land pollution	Unit 4
	ENVIRONMENTAL POLLUTION	Effects of Pollution on life (Smoke, smog, Sewage Water, Solid Wastes, Industrial Wastes)	• Explain the effects of water, air and land pollution (unclean/ toxic water, smoke, smog, excess CO2/other gases, open garbage dumps, industrial waste etc.) on the environment and life.	Unit 4
		Preventive measures to reduce Pollution	• Explain the effects of burning fossil fuels and releasing greenhouse gases in the air.	Unit 4
		Biodegradable and non-biodegradable materials	• Differentiate between biodegradable and non-biodegradable materials.	Unit 4
			• Explain the impact of non-biodegradable materials on the environment.	Unit 4
			• Investigate possibilities and suggest ways to reduce non-biodegradable materials.	Unit 4
		Physical changes observed in everyday life	• Identify observable changes in materials that do not result in new materials with different properties (e.g., dissolving, crushing aluminium can).	Unit 5
physical science		States of matter and its characteristics	• Recognize that matter can be changed from one state to another by heating or cooling (candle wax).	Unit 5
			• Describe and demonstrate the states of water (i.e., melting, freezing, boiling, evaporation, and condensation).	Unit 5
			• Identify ways of accelerating the process of dissolving materials in given amount of water and provide reasoning (i.e., increasing the temperature, stirring, and breaking the solid into smaller pieces increases the process of dissolving).	Unit 5
			• Distinguish between strong and weak concentrations of simple solutions.	Unit 5
	PHYSICAL AND CHEMICAL CHANGES OF MATTER	Chemical changes observed in everyday life	Identify observable changes in materials that make new materials with different properties (e.g., decaying, burning, rusting).	Unit 5
			• Differentiate between physical and chemical changes with examples.	Unit 5
		Sources of light	• Identify natural and artificial sources of light.	Unit 6a
			• Justify that light emerges from a source and travels in a straight line.	Unit 6a
		Luminous and non-Luminous objects	• Investigate luminous and non-luminous objects in daily life.	Unit 6
		Transparent, opaque and translucent objects	• Identify and differentiate between transparent, opaque and translucent objects in their surroundings.	Unit 6a
	LIGHT AND SOUND	Light travels in straight lines	Investigate that light travels in a straight line.	Unit 6a
		Formation of shadows	Explain the formation of shadows.	Unit 6a

earth and space science			• Predict the location, size and shape of a shadow from a light source relative to the position of objects.	Unit 6a
		Reflection of light	• Demonstrate that shiny surfaces reflect light better than dull surfaces.	Unit 6a
		Production of sound	• Describe and demonstrate how sound is produced by a vibrating body.	Unit 6b
		Propagation of sound	• Identify variety of materials through which sound can travel.	Unit 6b
		Intensity of sound (high, low	• Identify that speed of sound differs in solids, liquids and gaseous medium.	Unit 6b
			• Define and describe the intensity of sound with examples.	Unit 6b
		Noise and its effects on human health.	• Define noise and its harmful effects on human health.	Unit 6b
		Controlling noise pollution	• Appreciate the role of human beings in reducing noise pollution.	Unit 6b
		Static electricity	• Explain the phenomenon of static electricity in everyday life.	Unit 7
		Charges and their properties	• Describe charges and their properties.	Unit 7
		Conductors and insulators	• Differentiate between conductors and insulators from daily life.	Unit 7
	ELECTRICITY AND MAGNETISM	Electric current	• Describe flow of electric current in an electric circuit.	Unit 7
		Electrical circuits and its components Fuse and its uses	• Describe and design an electric circuit and explain its components.	Unit 7
		Magnet and magnetism	• Recognize that magnets can be used to attract some metallic objects.	Unit 7
			• Describe and demonstrate that magnets have two poles and like poles repel and opposite poles attract.	Unit 7
		Properties of magnets	• Identify earth as a huge magnet and demonstrate it with an experiment.	Unit 7
		Types of magnets	• Describe the working of a magnetic compass.	Unit 7
			• Explain different types of magnets (permanent, temporary magnet and electro-magnet).	Unit 7
	STRUCTURE OF EARTH **A. Earth** **B. Soil**	Structure of Earth	• Describe the structure of the Earth (i.e., crust, mantle, and core) and the physical characteristics of these distinct parts.	Unit 8
			• Describe the sources of water on Earth.	Unit 8
		Types of soil	• Identify similarities and differences among the different types of soil.	Unit 8
		Composition and characteristics of Soil	• Investigate the composition and characteristics of different soils.	Unit 8
		Space	• Define the term ‘space’ and emphasize the need to explore it	Unit 9
			• Recognize the role of NASA (National Aeronautics and Space Administration) in space exploration.	Unit 9
	SPACE AND SATELLITES	Satellites	• Define the term ‘satellite’ and describe its importance.	Uniit 9
		Natural and artificial satellites	• Describe the natural satellites of the planets of the solar system.	Unit 9
			• Define artificial satellites and explain their importance in exploring the Earth and space.	Unit 9

STEM			• Recognize the key milestones in space technology.	Unit 9
		Types of artificial satellites and their uses	• Describe the uses of various satellites in space i.e. geostationary, weather, communication and Global Positioning System (GPS).	Unit 9
	TECHNOLOGY IN EVERYDAY LIFE	Technical model making skills out of clay, paper, reed board, reeds, packing material	• enlist and practice safety procedures while carrying out the activities	Unit 10
			• Make a model of footbridge and bookshelf	Unit 10
			• Use spirit level/water level to compare the level of different objects (table, picture, frame etc.)	Unit 10
			• Use a plumb line to install a flag pole vertically.	Unit 10
		Making Technical Devices	• Prepare LED light strings working with 12 volt battery.	Unit 10
			• Make a musical instrument from easily available resources	Unit 10
			• Make moveable van, bus and trolly.	Unit 10
		First aid and disaster management	• Use first aid box to dress a wound.	Unit 10
			• Practice shifting a person to hospital	Unit 10
			• Practice earth quake, fire and flood drill	Unit 10

Unit 1: Classification of Living Things

Lesson Plan 1 — Student Book Pages 2

Learning Objectives

All living things move, grow, feed, breathe, feel, reproduce, and produce waste matter.

Learning Outcome

Student should be able to:

- explain that all living things move, grow, feed, breathe, feel, reproduce, and produce matter.

Introduction

Show the students a ball and ask the following questions:

- Does it need food?
- Does it breathe?
- Does it grow?
- Does it reproduce?
- Does it move by itself?

Main Teaching

- Discuss the different characteristics one by one.
- Discuss growth in living things.
- Discuss how movement in living things and non-living things differ.

Guided Practice

- Divide the students into 4 groups. Place pictures of living things and non-living things on the table in front of each group.
- Draw the following table on the board and ask students to consider the items shown in pictures and answer the questions with a yes or no.

Does it breathe?	Does it grow?	Does it reproduce?	Does it move by itself?	Does it need food?

Independent Working

Ask students to write the names of five animals and their young ones in their notebooks.

Wrap Up

Students should exchange their answers with the groups

Home Work/ Going Further

Ask students to sow a seed and record its growth.

Lesson Plan 2 — Student Book Pages 3–4

Learning Objectives:

- Describe classification of living organisms and its importance.

Learning Outcomes

Students should be able to:

- define classification of living things.
- explain classification and list the five kingdoms
- explain the classification of animal kingdom into two big groups i.e., Vertebrates and Invertebrates.

Introduction

- Show pictures of some living things such as a cat a lizard, a small plant, seashells, a fish, a spider, a crocodile, etc. Hold up each picture and ask students to identify each and give few of its characteristics; write these on the board. Stop after a dozen examples and explain that you have a long list of living organisms. Ask students to help classify them into groups.

Main Teaching

- Explain the term classify (sort into group of things that are lookalike) and its importance. It helps to make the study of things more systematic and organized, and therefore easier.
- Explain that living organisms have specific characteristics that allow their classification into specific groups
- Discuss we can learn characteristics of all members of a group by examining only one member.
- Ask students to read page no. 3 and 4 of the student book and then discuss the content.
- Write the names of the five kingdoms on the board and draw a flow chart to explain how to classify animals, giving two examples each.
- Explain the term vertebrates and invertebrates. Instruct students to take any one of the pictures they studied earlier(you should have collected them and stored them in a box) and classify the organism shown.
- Recall the terms cold- blooded and warm- blooded and give examples.
- Show pictures of animals that have backbones, for example, cat, catfish, frog, snake, and which do not have a backbone, for example, earthworm, mosquito, butterfly, and spider.

Guided Practice

- Choose students and ask them to think about a specific animal and its characteristics. When ready, they announce one by one ,'I am thinking of an animal'. The other students can then ask yes-no questions about the characteristics of the animal in an effort to identify the animals.

  Students use the classification properties (lays eggs, has feathers, etc.),or just ask' Is it an amphibian?' and then use even more characteristics, such as colour, size, how it moves what it eats, where it lives, how it grows, etc., to identify the animal.

When the students have enough information, they can try to guess the animal's identity. The maximum number of questions that can be asked is 20. The student who asks the final question must make the guess.

Independent Working

Ask students to complete Concept Check on page 6.

Wrap up

Pair up students and quiz them about the characteristics of different animals.

Homework/ Guiding Further

Students should complete Activity 2 on page 17.

Lesson Plan 3 — Student Book Page 5-6

Lesson Objectives

- Classify vertebrates into fish, amphibians, reptiles, birds and mammals on the basis of their characteristics.

Learning Outcome

Students should be able to:

- Identify the five classes of vertebrates

Introduction

- Write on the board' which class do I belong to? Divide the students into groups of three. Give each group a box containing pictures of living organisms with a backbone. Tell the students to look at the pictures and then work together to determine what class the organism belongs to. After 5 minutes ask the students to return to their desks and present the observation.

Main Teaching

- Write the names of five classes (mammals , fish, birds, amphibians, reptiles) on the board and revise the importance of classification.
- Ask students to read through the table on page 5.
- Ask groups to sort pictures of different animals and classify them into different classes.
  - > mammals—bear, rabbit, cheetah
  - > fish – salmon, shark, goldfish
  - > birds—parrot, cockerel , duck
  - > amphibians—salamander , newt, frog
  - > reptiles—snake, lizard, alligator

Guided Practice

Help students to attempt Activity on page 17.

Independent Working

After groups have sorted their pictures into classes (mammals, fish, birds, amphibians, reptiles) come back together as a whole group to share the correct answer.

Wrap Up

Show the students pictures of different animals. (or write their names on the board) and ask them to classify according to the way they move:

- flying
- creeping
- swimming
- running

Homework / Going Further

Encourage students to make a bird feeder. This will provide a great way for them to observe the diversity of bird life in their own gardens.

Lesson Plan 4 — Student Book Pages 6–8

Learning Objectives

Classify invertebrates into five groups (sponges , worms, insects, snails and starfish) on the basis of characteristics.

Learning Outcomes

Students should be able to:

- explain that there are more invertebrates than vertebrates on Earth.
- explain how invertebrates are classified according to how their bodies are structured.

Introduction

Bring to the classroom a cockroach, a spider, an earthworm, a snail, a honey bee, or other invertebrates in separate jars so students can see them. Explain that these organisms are invertebrates with the help of diagrams of their internal structure.

Main teaching

- Revise the meaning of two terms vertebrates and invertebrates and then ask students to guess which group is numerous.
- State that there are more invertebrates than vertebrates on Earth. Detail how invertebrates are classified according to structure of their bodies.
- Explain that some invertebrates are harmful such as the mosquito, and others are helpful such as the honey bee. Collect students' opinions about harmful invertebrates and helpful invertebrates
- Show the class an earthworm and discuss its importance for the fertility of the soil.
- Show a picture of honeybee and explain how honey is made.
- Discuss social insects that live together in a group called colonies. Students may be surprised to learn that a single colony can contain many hundreds of same kind.

Guided Practice

Show pictures of invertebrate such as spider, snail, mosquito, earthworm , fly and honey bee. Ask students to identify each one of them and write their characteristics on board.

Independent Working

Ask students to do activity 4 on page 17.

Wrap Up

Discuss the importance of insects for the pollination of plants.

Home work/ Going Further

Ask students to complete activity 3 on page 17

Lesson Plan 5 — Student Book Pages 8–9

Learning Objectives

- Classify plants into two major groups (dicots and monocots) and give examples of each group.

Learning Outcomes

Students should be able to:

- explain that plants can be divided into flowering and non-flowering plants.

Introduction

Bring any flowering plant available in school garden and show to students.

Main teaching

Ask students to describe plants they have observed in their daily life. Lead them with questions, such as:

- Where can plants be found?
- How would you describe the plants?
- Discuss how big the plant kingdom is and it is further divided into two big groups based on characteristics of plants
- Explain gymnosperms or non-flowering plants with their features. Name various non-flowering plant classes.
- Explain flowering plants (angiosperms)
- Discuss further division of flowering plants into monocotyledons and dicotyledons based on their distinguishing features.
- Show pictures of mango plant and a papaya tree to clear the concept. (Seeds are enclosed in fruits in angiosperms).

Guided Practice

If possible, take students into the school garden to study the plants, like big and smaller plants and those with a soft stem or a hard stem. Look out for plants growing in unusual places such as between cracks in the ground or on the wall or roof. Ask students to identify and record the different plants in their notebooks.

Independent Working

Give each student a small booklet and ask them to draw a simple plant on the first page (e.g., sunflower). Identify each part of the plant (flower, leaf, etc.).

Wrap Up

Ask the students to read page 8 and 9 from student book and discuss the main points with them.

Home work/Going Further

Instruct the students to add to their plant booklet , pictures of at least 5 flowering plants and 5 non-flowering plants with their names and any other useful information about the plants. For example if the plant is a source of food.

Lesson Plan 6 — Student Book Pages 11

Learning Objectives

- Compare and contrast the structure of a dicot and a monocot plant (with respect to their seeds, leaves and flowers).

Learning Outcomes

Students should be able to :

- explain how monocotyledonous and dicotyledonous plants can be distinguished by their characteristics.

Introduction

Bring to the lesson monocot and dicot seeds of different plants and ask students to observe the differences. Encourage them to note observations such as seed colour, weight, size, and structure in their plant booklets.

Main teaching

- Introduce the idea that flowering plants are further divided into two major groups according to whether they have one or two cotyledons
- A cotyledon is a small leaf present inside a seed
- Those with cotyledon are called monocots and those with two are called dicots.
- Soak a few seeds in water and open them to show the different parts of the seeds.
- Discuss the distribution of vascular bundles in monocot and dicot plants. Show the leaves of monocot and dicot plants and ask students to discuss the differences.
- Ask students to study roots of dicot and monocot plants from page 11 of text book.
- Divide students into pairs and give each pair a magnifying glass and a monocot and dicot seed. Ask them to identify different parts of seeds.

Guided Practice

Ask students to draw monocot and dicot seeds and label on A4 paper and display on soft board.

Independent Working

Give students time to draw the internal structure of a monocot and a dicot seed in their plant books. If possible, take the students into school garden and collect leaves of dicot and monocot plants to glue and label in their plant booklet .Display the booklet in the classroom.

Wrap Up

Discuss the concept check on page 11.

Home work/ Going Further

Ask students to sow a bean seed in glass jar and note down different stages of its development in their plant booklet.

Lesson Plan 7 — Student Book Pages 11–13

Learning Objectives

- Analyse some of the factors caused by human activities, which are affecting biodiversity.
- Suggest and write some measures for conservation of endangered species.

Learning Outcomes

Students should be able to:

- explain importance of biodiversity and how it is affected by human activities.
- Share what their responsibility is towards conservation of nature.

Introduction

Ask students to name one living thing and write on the board. Introduce the the word biodiversity when you have names of a variety of living things.

Main teaching

- Explain the term 'biodiversity' with examples.
- Discuss how human actions have affected life on Earth at large.
- Explain biodegradable and non biodegradable.
- Discuss how our environment was healthy as most of the things used were biodegradable. Whereas now use of biodegradables like plastics have proven a great hazard for life on Earth.
- Give examples of 3 R's.
- Discuss extinct and endangered species with examples.
- Discuss with students measures required to save endangered species.
- Share as to how use of certain chemicals pose a threat to human as well as plant and animal life

Guided Practice

Ask students to do class activity 'Discuss and Answer' on page 13

Independent Working

Ask students to do' Concept Check' on page 13, in their notebooks.

Wrap Up

Ask students about biodiversity and discuss our responsibility towards the environment we live in.

Home work/ Going Further

Students can visit a public place like a beach or a park and write a report on its present condition and what can be their role to improve it.

Worksheet 1-1

Q1. Write names of two animals in each column:

Mammal	Amphibian	Reptile	Bird	Fish

Q2. Draw a line connecting each picture below to one of the two words.

vertebrate invertebrate





Q3. Give three characteristics of each of the following classes:

Mammal	Amphibian	Reptile	Bird	Fish

Q4. Why is the spider not an insect?

_____

_____

_____

Q5. What are the 5 animal kingdoms?

_____

_____

_____

Worksheet 1-2

Q1. List two differences between gymnosperms and angiosperms.

Gymnosperms	Angiosperms

Q2. Draw a labelled diagram of the internal structures of a monocot and a dicot seed.

Q3. Draw a labelled diagram of the internal structures of a monocot and a dicot stem.

Q4. Draw labelled diagrams of monocot and dicot flowers.

Worksheet 1-3

Q1. Draw labelled diagrams of monocot and dicot roots:

Q2. Write the characteristics of the following:

a. Leaf _____

_____

b. Roots _____

_____

c. Flower _____

_____

d. Stem _____

_____

Q3. What are xylem and phloem?

_____

_____

_____

Unit 2: Microorganisms

Lesson Plan 1 — Student Book Pages 18

Learning Objectives

- Define and describe microorganisms

Learning Outcomes

Students should be able to :

- define microorganisms
- explain that microscope is required to see the microorganisms as they are too small.

Introduction

Take students to science laboratory and show some slides of microorganisms. For example: amoeba, paramecium, fungal spores.

Main Teaching

- Give a clear definition of microorganisms and relevant information.
- Explain the spread of microorganisms.
- Draw and further explain some microorganisms.
- Discuss that 'germ' is commonly used name for microorganisms.
- However not all microorganisms are harmful but some are useful too.

Guided Practice

Ask students to read the text on page 18 and read 'Do you know' for information.

Independent Working

Ask students make a list of diseases caused by microorganisms in their notebooks.

Wrap Up

- Explain the meaning of the word microorganisms and answer queries if any.

Homework/ Going Further

- Ask students to study further through internet search. A great variety would be found in water, soil and air ecosystems. Human bodies also have microorganisms.

Lesson Plan 2 — Student Book Pages 18–21

Learning Objectives

- Identify main groups of microorganisms and give example for each.

Learning Outcomes

Students should be able to:

- explain various types of microorganisms with their groups i.e., viruses, bacteria, fungi, protozoa.
- explain that all groups of microorganisms are single-celled and mostly microscopic.

Introduction

Ask students to open the student books to page number 19 and 20 and talk about various pictures given.

Main Teaching

- Explain four main kinds of microorganisms and their affects on the body.
- Talk about viruses and diseases they cause.
- Draw and explain types of bacteria and share that some are harmful and some are useful .
- Discuss Fungi. Explain their structure and some common uses. Also share that some are extremely harmful.
- Explain the group called protozoa and common disease like ‘dysentery, and ‘diarrhoea’, which is a condition very common if people do not follow good habits.

Guided Practice

Ask students to do concept check on page 20.

Independent Working

Ask students to make a list of diseases caused by microorganisms in their notebooks.

Wrap Up

Reinforce the lesson by talking about microorganisms and their groups.

Homework/ Going Further

- Ask students to study and draw shapes of different microorganisms from the book on a chart paper (A4 size) for display on soft board.

Learning Objectives

- Highlight the role of microorganisms in decomposition and discuss its harmful and beneficial effects.

Learning Outcomes

Students should be able to:

- explain role of microorganisms as useful in food industry.
- explain usefulness of microorganisms as decomposers.

Introduction

Take the students to the school garden (if possible) and ask them to look at the garden soil and compost.

Main Teaching

- Explain that many microorganisms benefit us in many ways.
- Talk about bacteria and fungi used in food industry. Recall examples of yeast and mushrooms.
- Define and explains composers and decomposition.
- With examples, talk about decomposition and its usefulness for the ecosystem (Biodegradation).
- Discuss how amounts of nutrients are increased in soil through this process.

Guided Practice

- Ask students to list at least three examples of decomposition from their discussion.

Independent Working

- Ask students to divide in two groups. Each will collect information on any one of the following and share.
  i. Yeast, as an agent of change in bread making.
  ii. Useful bacteria, in making of cheese and yoghurt.

Wrap Up

- Talk about importance of the helpful microorganisms which decompose dead and decaying matter.

Homework/ Going Further

- Ask students to look at some videos on internet showing changes in matter due to decomposition by microorganisms e.g., fungi

Lesson Plan 4 — Student Book Pages 21-22

Learning Objectives

- Recognize some common disease of each group caused by microorganisms.

Learning Outcomes

Students should be able to:

- explain 'deficiency' diseases and their prevention.
- differentiate between communicable and non- communicable diseases.

Introduction

Ask students if they have observed any elder in the family taking multivitamins or are they given any multivitamins by their parents ?

Main Teaching

- Explain that multivitamins are present in different vegetables and fruits.
- Discuss deficiency of vitamins in human body, which may lead to deficiency diseases.
- Display the chart on page 21 of Student Book and talk about it.
- Explain non-communicable diseases with reference to deficiencies of vitamins.
- Explain communicable or infectious diseases with reference to daily life.

Guided Practice

Ask students to do question 5 on page 26.

Independent Working

Ask students to attempt question 8 part 1.

Wrap Up

Explain what diseases are, and also talk about prevention of deficiency diseases.

Homework/ Going Further

- Ask students to write about the vegetables and fruits they like to eat and what different vitamins they contain.

Learning Objectives

Recognize that microorganisms get transmitted into humans and spread infectious diseases.

Learning Outcomes

Students should be able to:

- explain how diseases are spread.
- Identify ways in which the spread of diseases can be controlled.

Introduction

Place a small amount of baby powder in the palm of your hand and pretend to sneeze by blowing on it. Students can see where the baby powder spreads; help them realize the importance of covering their mouths when they sneeze. Then ask your students what happens when they sneeze. Show them the germs(baby powder) in your hands.

Main Teaching

- Read aloud about microorganisms and disease on student book page 22. Recall communicable and non-communicable diseases.
- Discuss the ways diseases are spread. For example, some diseases can be passed on through infected food and water.
- Describe how harmful microorganism reproduces rapidly when they enter the body. They feed on the body cells and produce poisonous waste substance causing infection.
- Use charts to show how various diseases are spread. For example, how malaria is spread , by drawing pictures and writing labels for: mosquito eggs, larvae breeding in stagnant water, adults flying off, female mosquito biting a person, the person developing malarial fever.
- Show news items from newspaper, magazine, or internet about cholera/or typhoid and explain that these diseases are spread through infected food and water. Educate students to avoid consuming food and water that has been left in the open for sometime as bacteria and fungi can land on it and quickly breed in the food.
- Ask the students if they have ever been absent due to illness and listen to their ideas about the causes and symptoms of their illnesses'
- Show tetra packs, tin cans and other food packaging. Look at the list of contents and point out the word 'preservative' (s) and give a brief explanation. Discuss the importance of food packaging.

Guided Practice

Slice an apple and blanch it to kill any germs that may be on it already. Before students have washed their hands , let each handle a small slice of apple then ask them to wash their hands using a proper technique and handle another slice of apple. Put each slice in a labeled plastic bag. After about five days, have students observe and draw both slices in their science notebooks.

Ask students to write observations addressing the following points:

- Is there any differences between the slices?
- What are the reasons for the differences?

Independent Working

Draw charts to show how various diseases are spread. Students can display their posters in the school corridor.

Wrap Up

Show a photograph of Louis Pasteur and discuss his achievements.

Do question 4 on page 26.

Homework/ Going Further

Students should be able to make an eye-catching poster about 'Healthy Eating Habits'.

Worksheet 2-1

Q1. Complete the following table:

Microorganisms	Disease
Bacteria	
	Influenza , chickenpox, cold, measles, mumps, hepatitis.
Protozoa	
	Ringworm and athlete's foot

Q2. Give reasons why:

a. eating too many sweets should be avoided.

_____

_____

_____

b. we should drink two glasses of milk daily.

_____

_____

_____

Q3. Say whether each sentence is true or false.

a. Mosquito bite can spread diseases. _____

b. Deficiency diseases cannot be prevented by eating relevant foods. _____

c. Cholera and typhoid are spread through infected food and water. _____

d. Communicable or infectious diseases do not spread from person to person.
_____

e. To pasteurize milk it is first heated to 10°C and then cooled quickly.
_____

Unit 3: Flowers and Seeds

Lesson Plan 1 — Student Book Pages 28–30

Learning Objectives
- examine and describe the structure of a flower.
- define pollination and describe its types with examples.

Learning Outcomes
Students should be able to:
- recognize various parts of a flower (petal , sepal , pistil, stamen).
- define pollination.
- explain the types of pollination

Introduction
Bring a flower to the class and show to students its various parts (e.g. China rose)

Main Teaching
- Explain the structure of a flower with the help of a diagram (page 28).
- Discuss the functions of various parts of a flower.
- Define pollination and explain the process of pollination with the help of a diagram (page 29).
- Discuss self-pollination and cross pollination (diagrams and page 29).
- Explain various means of cross pollination (insect, wind)

Guided Practice
Ask students to do question 2 of Excercise and facilitate them when and where required.

Independent Working
Take the students to the school garden and ask them to look at flowers and observe their parts.

Wrap Up
Talk about the lesson taught emphasizing upon functions of a flower in a plant as to how they contribute in the process of seed production.

Homework/ Going Further
Ask students to do question 5 on page 35

Lesson Plan 2 — Student Book Pages 30–32

Learning Objectives
- Define reproduction and differentiate between sexual and asexual reproduction in plants.

Learning Outcomes
Students should be able to :
- explain reproduction
- differentiate between asexual and sexual reproduction in plants.
- explain the process of fertilisation in plants

Introduction
Ask students how some plants propagate without producing flowers (e.g., money plant)

Main Teaching
- Explain reproduction in plants.
- Discuss types of reproduction.
- Talk about asexual reproduction and further explain that some plants reproduce without sexual reproduction. For example, new plants grow from underground stems (eyes of potato tuber). Show a potato tuber having roots.
- Explain reproduction in flowering plants .Draw diagrams or use charts to facilitate.
- Discuss the process of fertilisation and introduce new terms while talking about the process in plants.

Guided Practice
Ask students to read the text on page 28-31 and help where needed.

Independent Working
Ask students to do concept check on page 32.

Wrap Up
Talk about the lesson concisely. If students have any query, explain with example

Homework/ Going Further
Ask students to visit a nearby park with their parents. Identify plants as flowering and non-flowering plants and write in their plant booklet.

Lesson Plan 3 — Student Book Page 32

Learning Objectives
- Describe the structure of a seed.
- Compare and contrast the structure of and the functions of chickpea and maize seeds.

Learning Outcomes
Students should be able to:
- Describe structure of the seed and differentiate between a dicot and a monocot seed.

Introduction
- Describe the structure of a seed.
- Bring to the lesson, seeds of different monocot and dicot plants. Ask students to make observations on their plant booklet. Encourage them to note observations such as the seed colour, weight, and size.

Main Teaching
- Explain the idea that flowering plants are further divided into two major groups when they have one or two cotyledons.
- A cotyledon is a small leaf present inside the seed.
- Those with one cotyledon are called monocots and those with two cotyledons are called dicots.
- Soak a few seeds in water (beforehand) and open them to show the different parts of the seed.
- Ask students to study the roots of monocot and dicot plants from pictures on page 11 of text book.
- Divide students in pairs and give each pair a magnifying glass, a monocot, and a dicot seed. Ask them to identify the different parts of the seeds.

Guided Practice
Help students to understand structure of both types of seed from the diagram on page 32.

Independent Working
Give pupils time to draw the internal structure of a monocot and dicot seed in their plant booklets. Display the booklets in the classroom.

Wrap Up
Discuss the differences in monocot and dicot seeds. Elicit from students to ensure the clarity of concepts.

Homework/ Going Further
Ask students to sow a few chickpea seeds in a glass Jar and note down different stages of its development in their plant booklet in preparation for the next class discussion.

Lesson Plan 4 — Student Book Page 33

Learning Objectives
- Demonstrate germination of a seed.
- Illustrate the conditions necessary for germination.

Learning Outcomes
Students should be able to:
- Identify the conditions that seeds need in order to germinate.

Introduction
Encourage the students to share their observations of seeds growing in the jars.

Main Teaching
- Explain that the germination of a seed means the beginning of growth of a new plant.
- Ask students about the conditions required for germination (soil, water, air, warmth) and list them on the board.
- Draw on the board the different stages of germination of a seed and explain each stage (page 33).

Guided Practice
Give the students activity cards with the different stages of germination written on them, help them to arrange cards in the correct order.

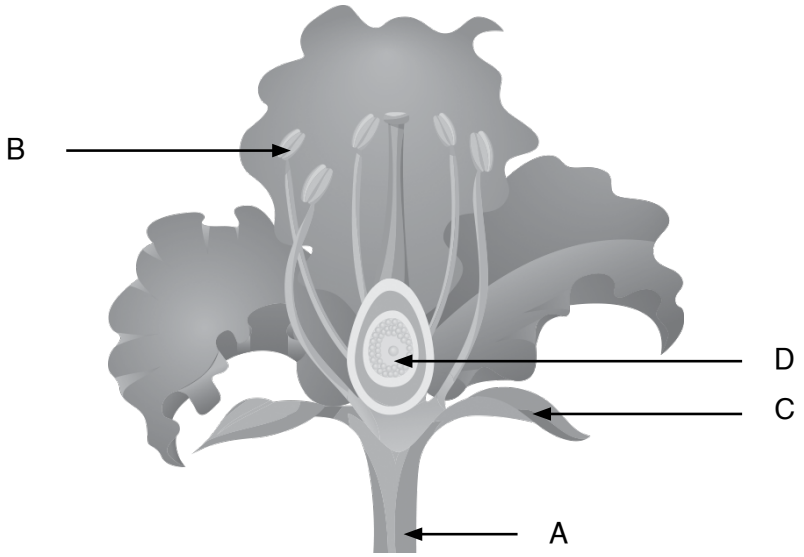
Independent Working
Encourage students to participate in' Discuss and Answer' on page 33.

Wrap Up
Discuss. Question. 4 i on page 35.

Homework/ Going Further
Ask students to draw the stages of germination in their plant booklets.

Worksheet 3-1

Q1. Write down the alphabet next to its correct label.



ovule _____

anther _____

sepal _____

stalk _____

Q2. Write the letters in the correct order to show the stages of germination in a bean plant.

a. Buds appear and these blossom into flowers which produce seeds.

b. The seed leaves become soft and open.

c. Leaves appear on the shoot. These will enable the plant to produce and store food for energy.

d. The stem grows stronger and more leaves appear.

e. The seed is buried in the soil. It gets warmth and water. The see coat become soft.

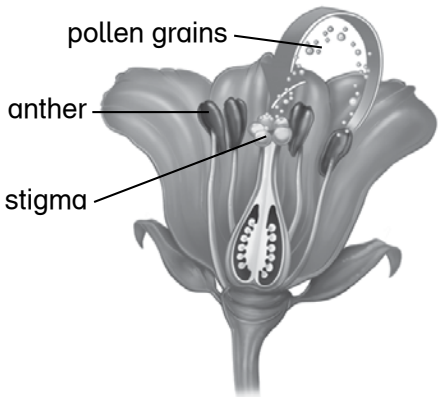
f. The root begins to grow downwards, spreading to fin water.

g. The shoot grows upwards, reaching for air and the warmth of sunlight.

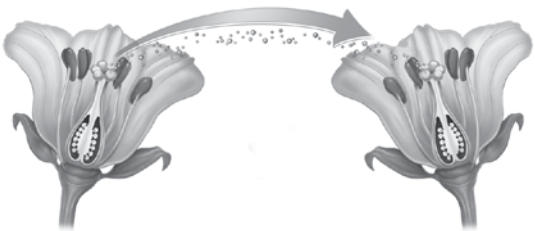
Correct order: _____

Q3. Identify what process is shown.

_____



_____



_____

Q4 Fill in the blanks

Plants like all living things _____.It is the process by which _____ new ones of its kind. There are two types of _____; Cross _____ and _____ pollination.

Unit 4: Environmental Pollution

Lesson Plan 1 Student Book Pages 40–41

Learning Outcome

- Define Pollution and name its type.
- Biodegradable material and its recycling.

Learning Outcomes

Students should be able to:

- explain pollution and its types.
- identify materials that are biodegradable and how nature recycles them.

Introduction

- Show illustrations of different kinds of pollution: land, water and air (Page 40).Let the students identify the problems shown in the picture.

Main Teaching

- Define pollution.
- Discuss pollutants that affect our rivers and oceans, and the sources they come from. How, one of the main causes of pollution is waste substances that flow into storm drains.
- Talk about how the water that comes from human activities, such as cleaning the car or watering the garden, runs off into streams and rivers, and contains many contaminants that cause pollution.

Guided Practic

Pour tap water into 3 separate clean glasses labeled A, B and C. Ask students to make observation and write them down. To make 'polluted water', add soil into Glass B and dishwashing liquid into glass C (take precaution and instruct students not to consume the water and at this point do not mix the contents.)Ask students to make observations again. Now, ask a volunteer student to mix in the contents in each glass. Ask them to make observation to what happens to the water. Filter the polluted water through coffee filter into a clean glass. Repeat for each glass. Record the observations and compare to glass A.

Independent Working

Ask students to do 'Discuss and Answer' activity on page 41.

Wrap Up

Ask students for ideas about ways to reduce pollution.

Homework/ Going Further

Ask students to research different aspects of environmental health and use that information to prepare a small presentation.

Lesson Plan 2 — Student Book Page 42

Learning Objectives

- Differentiate between biodegradable and non-biodegradable materials.
- Explain the impact of non-biodegradable materials on the environment.
- Investigating possibilities and suggest ways to reduce non-biodegradable materials.

Learning Outcomes

Students should be able to:

- Identify and explain the materials that are non-biodegradable, with examples.
- talk about ways to reduce the materials in the environment.

Introduction

Ask students to recall what is biodegradable. Write the term 'non-biodegradable' on the board. Then ask students to put few items on the table which they think are non-biodegradable. For example, water bottle, pen.

Main Teaching

- Define the term 'non-biodegradable' and write its definition on the board.
- Ask students to look at the picture on page 42 and explain that all these materials (things made of metal, ceramic, foam and glass) are non-biodegradable.
- Discuss how pollutants affect beauty of our environment as well as our well-being.
- Place a list (given on page 42) on the soft board and talk about ways to reduce the impact of non-biodegradable materials on the environment.

Guided Practice

Reinforce the lesson by asking students various ways of reducing impact of biodegradable materials.

Independent Working

Ask students to write about some ways they have learnt to reuse materials through recycling.

Wrap Up

Highlight importance of knowledge and action for reducing non-biodegradable waste and how vital it is to reduce non-biodegradable material.

Homework/ Going Further

Ask students to do Question 3 part 1 and 2.

Lesson Plan 3 — Student Book Pages 42–44

Learning Objectives

- Explain the main causes of water, air and land pollution.
- Explain the effects of water, air and land pollution (unclean toxic water, smoke, smog, excess CO^2/ other gases, open garbage dumps, industrial waste, etc.) on the environment and life.
- Discuss and explain the effects of burning fossil fuels and releasing greenhouse gases.

Learning Outcomes

Students should be able to:

- explain how pollution negatively affects the environment and causes major problems.
- identify different types of pollution and their causes and effects.

Introduction

Ask students about their favourite playgrounds. Ask them what makes a playground their favourite: tailor questions to elicit responses of clean, safe, green with fresh air, etc.

Main Teaching

- Ask students to look at the pictures on page 43 and 44 and discuss them with a partner. Write the definition of pollution on board and explain that it is the contamination of air, water or soil, by substances that are harmful to living organisms.
- Stress how environment cannot survive without clean air, water or land.
- Emphasize how it is up to the community to keep the environment free of pollution.

Guided Practice

Ask students to do Question 4, part 1 and 2. Facilitate accordingly.

Independent Working

Ask students to make posters to inform others about the dangers of pollution. Display them around the school.

Wrap Up

Ask students how to stop pollution and suggest ways to help.

Homework/ Going Furthers

Students should plan and carry out an experiment on the sustainability of an environment.

Learning Objectives

- Investigate possibilities and suggest ways to reduce non-biodegradable materials'
- Explain the three 'Rs'.
- Understand responsibilities towards reducing pollution.

Learning Outcomes

Students should be able to:

- explain the three 'Rs' and their impact on reduction of environmental pollution.

Introduction

Show students some items, which are useful. For example, take a handkerchief and ask students about what it has been replaced with? Show them a tissue paper box. Also, show a plastic bottle cut into half with any climber like money plant growing in it. (Prepare the bottle with soil earlier and plant a twig).

Main Teaching

- Write the three 'Rs' on the board and explain what they stand for. Namely, reduce, Reuse, and Recycle. Ask them to remember three Rs.
- Discuss how reducing pollution is our duty and there are number of things we can do to reduce pollution.
- Ask a student to read out 'Environment Watch' on page 45.
- Do activity 1, on page 47 with students. Help in the execution of the task.

Guided Practice

Ask students to do Question 5, part 1, on page 47. Facilitate accordingly.

Independent Working

Ask students to do Question 5, part 2, on page 47.

Wrap Up

Highlight importance of understanding our responsibilities in order to reduce pollution of land, air and water.

Homework/ Going Further

Ask students to do Question 5 part 3, on page 47 in their notebooks.

Worksheet 4-1

Q1. Draw two objects which are biodegradable and two which are non-biodegradable:

Q2. Connect the effect with the type of pollution:

noise pollution	affects water life.
water pollution	causes desertification.
land pollution	causes hearing problems.
air pollution	spoils the atmosphere

Q3. List three causes of air pollution.

_____

_____

_____

Q4. Explain the term biodegradable.

_____

_____

_____

Unit 5: Physical and Chemical Changes of Matter

Lesson Plan 1 — Student Book Pages 49–50

Learning Objectives

- Identify observable changes in materials that do not result in new materials with different properties (dissolving, crushing aluminium can).
- Recognise that matter can be changed from one state to another by heating or cooling (candle wax).

Learning Outcomes

Students should be able to:

- observe and describe material changes that do not change it permanently.
- explain that increasing or decreasing the heat (temperature) will result in physical change.
- explain that physical change results in change in the shape.

Introduction

Bring a plastic bottle to the class, remove its cap and ask a student volunteer to crush it. Ask students if plastic has changed into some other material or only its shape is changed. You may also tear a paper for this activity.

Main Teaching

- Explain matter and share that everything around us is made up of matter.
- Write 'physical changes are mostly 'reversible' on the board and talk about it.
- Discuss how shapes of materials change, called as physical change. Give examples of aluminium can and clay pot from the text.
- Explain how these materials are recycled. For example, a crushed can of aluminium is recycled.

Guided Practice

Ask students to do "Discuss and Answer' on page 50.

Independent Working

Ask students to write examples of three physical changes they have observed in their daily life in their notebooks.

Wrap Up

Briefly talk about the lesson. Ask students to share more examples.

Homework/ Going Further

Ask students to take few ice cubes in a cling film and observe the physical changes.

Lesson Plan 2 — Student Book Pages 51–53

Learning Objectives

Describe and demonstrate the state of matter (i.e., melting, freezing, boiling, evaporation and condensation).

Learning Outcomes

Students should be able to:

- explain that evaporation and condensation are key parts of the water cycle and they lead to formation of the rain, dew, fog, mist, frost, hail and snow.

Introduction

Display a chart of water cycle and ask students to recognise physical changes and write their responses on the board.

Main Teaching

- Show the video of water cycle https://www.youtube.com watch?v=TWb4KlM2vts
- Explain that the term 'cycle' means that a series of events is repeated many times, always in the same order.
- Explain each stage of the 'water cycle'.
- Ask students to read the text on page 52 and 5 stages of the 'water cycle'.
- Divide the pupils into groups and give each group a transparent bowl. Ask the group members to sit around the bowl. Pour some water into each bowl, cover the bowl with a sheet of cling film, and put two to three ice cubes in the centre of the cling film. Leave it for sometime in the direct sunlight.

1. Invite a representative from each group to share with the whole class what they observed in the activity.
2. Have one student per group fill a paper cup with water and draw a line on it to mark the water level. Write the name of each group on each cup of water and place them outside in direct sunlight. Students should check water level line each day and record their observations.

Guided Practice

Ask students to do 'Concept Check' on page 52 in their notebooks.

Independent Working

Ask students to draw 'Water Cycle' and label it. Ensure that they start from any point they like and understand the term cycle.

Wrap Up

Role-play the different parts of the water cycle.

Homework/ Going Further

Ask students to build a water cycle model and monitor for two weeks period. This should help them to understand how water changes its state as it moves through the cycle.

Learning Objectives

- Identify ways of accelerating the process of dissolving materials in given amount of water and provide reasoning (i.e. increasing the temperature, stirring and breaking the solid into smaller pieces increases the process of dissolving).
- Distinguish between strong and weak concentrations of simple solutions.
- Identify observable changes in materials that make new materials with different properties (e.g. decaying, burning, and rusting).
- Differences between physical and chemical changes with examples.

Learning Outcomes

Students should be able to:

- explain that changes in the state of matter can be physical or chemical, reversible or irreversible.

Introduction

Take three boxes. Label them as Solid, Liquid and Gas. Put out a collection of pictures of solids, liquids, and gases. Ask each pupil to select one picture. Call the pupils in turn to place their picture in the relevant box and ask them to give reasons for the decision.

Main Teaching

- Explain the reversible and irreversible changes of matter by sharing some example of changes taking place in their environment.
- Ask the students to read the text on page53 and 54.
- Dry a wet handkerchief in the air, and explain this as evaporation and emphasize that energy is being absorbed by water. Explain that it is a reversible change because we can make the handkerchief wet again.
- Put some ice on a plate. Explain that this process is called melting. Emphasize that energy is being absorbed by the ice and that it is a reversible change. Show students a boiled egg and a raw egg and use them to explain irreversible change.
- Invite students to take part in a little experiment on page 53 and record observations in the given table.
- Talk about ‘Do You Remember?’ on page 53.

Guided Practice

Help the students to define the terms ‘reversible ‘and ‘irreversible’ and write in their notebooks. Ask them to give three examples of each.

Independent Working

Ask students to do ‘Concept Check’ on page 54 in their notebooks.

Wrap Up

Ask students to think of situations in daily life, where these changes regularly take place.

Homework/ Going Further

Ask students to do Question 4 in their notebooks.

Worksheet 5-1

Q1. Fill in the blanks.

a. Evaporation changes water from a _____ to a _____.

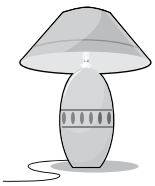
b. _____ is water that falls to the Earth as rain or snow.

c. When a solid changes into a gas without becoming a liquid first, the process is called _____.

d. _____ changes produce a completely new material.

e. When water vapour reaches the colder, upper layers of the atmosphere, it _____ to form droplets.

Q2. Identify the solids, liquids, and gases in each image.

Worksheet 5-2

Q1. Complete the following table:

State	Gas	Liquid	Solid
Examples			
Spacing between particles			
Compressibility			
Movement of particles			
Forces between particles			

Q2. Use your understanding of how particles behave to explain:

a. Why liquid cooking oil flows. _____

b. Why a piece of rock has a fixed shape. _____

c. Why nitrogen gas fills its whole container. _____

Q3. Write the correct word next to each of the definitions below. Remember not all words will be used.

boil	compressed	condensation
evaporation	freeze	gas
heat	liquid	melting
move	solid	vibration

a. a state of matter where the particles do not touch each other _____.

b. when a gas is cooled to form a liquid _____.

c. the movement of particles in a solid _____.

d. the change from a solid to a liquid _____.

e. the change from a liquid into a gas _____.

f. The particles in liquids and gases do this. _____.

g. the state of matter that can be compressed _____.

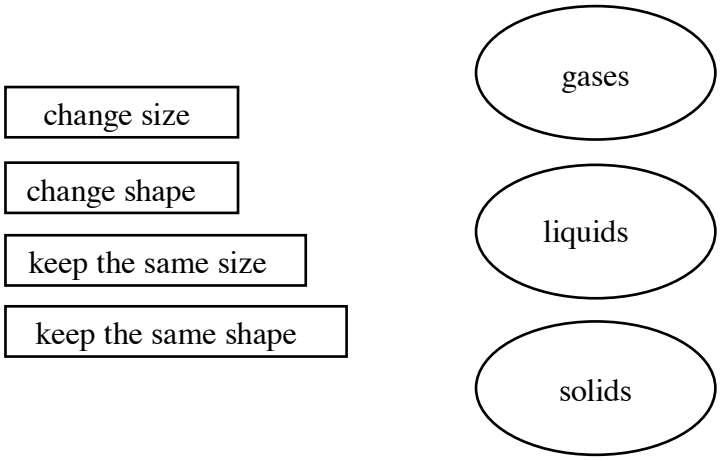
h. A _____. has a definite shape. It does not take the shape of its container. It also has a definite volume because it can be measured.

i. A _____. does not have a definite shape. It takes the shape of its container. It does have a definite volume because it can be measured.

j. A _____. does not have a definite shape. It sometimes takes the shape of its container and sometimes flies freely around you.

Worksheet 5-3

Q1. Join each box on the right to one or more of the words on the left to make short sentences about solids, liquids, and gases. Write the sentences on the lines below.



a. _____ b. _____ c. _____

d. _____ e. _____ f. _____

Q2. What is the water cycle?

_____

Q3. What would happen if water could evaporate but not condense?

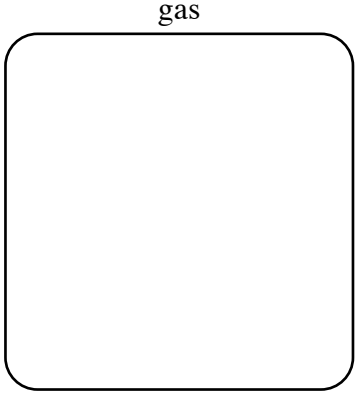
_____

Q4. Write down in the correct order the 5 stages in the water cycle.

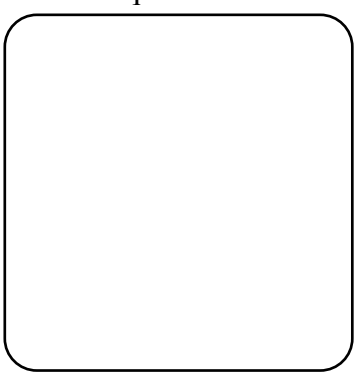
_____

Q5. Draw the arrangements of particles in the boxes.

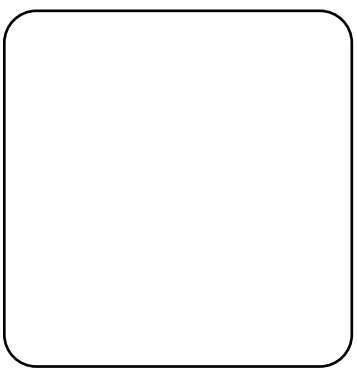
gas



liquid



solid



Unit 6a: Light

Lesson Plan 1 Student Book Page 59

Learning Outcome

- Identify natural and artificial sources of light.
- Investigate luminous and non-luminous objects in daily life.

Learning Outcomes

Students should be able to

- explain that some objects are luminous and produce light.
- explain that some objects are non-luminous and some other produce artificial light.

Introduction

Darken the room and ask students if they can read a book when there is no light in the room. Listen to students' responses and reasons.

Main Teaching

- Turn on a torch and shine its light on a mirror. The mirror becomes bright. Explain that the mirror does not shine with its own light.
- Using a torch demonstrate that we can see things because light is reflected from them. Both light and our eyes work together to enable us to see. Some materials reflect light better than others do.
- Shine the light of a torch on a book. It becomes bright. Explain that the book becomes bright because light from the torch is reaching the book.
- Light the candle and explain that the candle produces its own light.
- Give examples from the classroom and explain that the Sun, a lighted bulb, and a lighted candle are all luminous objects because they all produce their own light.
- Explain that the things that do not emit light are called non-luminous objects and these objects can only be seen when light falling on them is reflected back and enter our eyes.
- A book, a piece of chalk, and a wall are examples of non-luminous objects.
- Explain that light travels in straight lines. When light hits an object, it is bounced back and enters our eyes. This is how we see the object.
- Talk about artificial light. Sources of artificial lights are lamps, candles.

Guided Practice

Ask students to make a list of luminous objects, which emit light.

Independent Working

Ask students to write down five examples of non-luminous objects.

Wrap Up

Discuss how some objects like the moon looks luminous, but actually, they are not. They look bright because they reflect light falling on them.

Homework/ Going Further

Ask students to identify some luminous and non-luminous objects from nature.

Learning Objectives

- Justify that light emerges from a source and travels in straight line.
- Identify and differentiate between transparent opaque and translucent objects in their surroundings.
- Investigate that light travels in straight line.
- Explain the formation of shadows.
- Predict the location, size, and shape of a shadow, from a light source relative to the position of the objects.
- Demonstrate that shiny surfaces reflect light better than dull surfaces.

Learning Outcomes

Students should be able to:

- explain that materials are either opaque, translucent or transparent.
- explain that shadows depend on the intensity of light, the size of the object and distances.

Introduction

Ask a student to turn on a torch and hold it. Instruct the others to look at the torch and ask what they observe. Explain that the bulb is emitting light so the bulb is a luminous object and the glass cover of the torch is transparent. Cover the glass with a tissue and ask if there is a change in the torch light. Explain that as the light partially passes through the tissue, the tissue is translucent.

Now cover the glass with a piece of cardboard and explain that no light can be seen. Explain that the light is totally blocked because the cardboard is opaque.

Main Teaching

- Explain that the objects through which you can see clearly are called transparent .e.g., windows, glass, thin plastic sheet, etc. Light can completely pass through transparent objects.
- Non-transparent objects are called opaque. Light cannot pass through them. For example wood, walls, books, metals, etc., are all opaque objects.
- Materials through which light can pass partially are called translucent. Examples of translucent objects include wax paper and frosted glass.
- Light travels in straight lines. When light reaches an object, it can travel through the object if the object is transparent. It can be reflected from a shiny object, or absorbed, if the object is opaque. Shadows are produced, when a light hits an opaque object through which the light beams cannot pass. When an object blocks the lights path, a darkness appears on the other side of the object. The darkness is called a shadow.
- Discuss how the Sun is a very big and important source of light. Provide students with the opportunity to go outside and observe what happens, when the sun shines on them. Ask them to observe and explain how their bodies can be used to create shadows.
- Explain contributions of Ibn al Haitham and explain his pioneering work.

Guided Practice

Divide students into groups of 3. Give each group three items:

a glass, some wax paper and a book. Ask each group to hold their objects in turn in front of a lit bulb to check if they can see the light through them. Sum up their observations to reach conclusions.

Independent Working

Ask students to identify few more examples of opaque, translucent and transparent objects. For example bottle, water, glass, tissue paper, wooden scale, book, air, cloth, thick plastic, file cover.

Wrap Up

Ask students to do 'Concept Check' on page 61.

Homework/ Going Further

Set up a light source and check the shadows of 4 objects. of differing size and shape. Check what happens to the shadows when the brightness of the light source is changed. Note down the results in notebooks, along with the explanation of the result.

Worksheet 6a-1

Q1. In the space below, draw a diagram to show how light is reflected from a mirror:

Q2. Give two examples of each of the following

a. opaque materials: _____

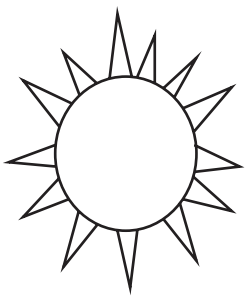
b. luminous materials: _____

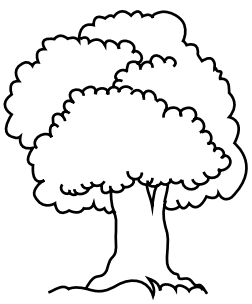
c. non-luminous materials: _____

d. translucent materials: _____

e. transparent materials: _____

Q3. Draw arrows to show how the light from the Sun travels to the eye.





Worksheet 6a-2

Q1. Why is the Moon seen to shine at night though it is a non-luminous object?

Q2. Which three things are required for formation of a shadow?

Q3. Why is a shadow not formed in the dark?

Unit 6b: Sound

Lesson Plan 1 — Student Book Pages 67–70

Learning Objectives

- Describe and demonstrate how sound is produced by a vibrating body.
- Identify variety of materials through which sound can travel.
- Identify that speed of sound differs in solids, liquids and gaseous medium.
- Define and describe intensity of sound with examples.

Learning Outcomes

Students should be able to:

- explain and show how sound is produced.
- Identify various mediums through which sound can travel and speed variation due to change in mediums.
- explain intensity of sounds.

Introduction

Take students to music room and ask the music teacher to play different sounds on keyboard player. At the end, take responses from student.

Main Teaching

- Explain how sound is produced i.e. through vibrations. Also explain that sound requires a medium to travel and other characteristics.
- Place a poster on the board showing human ear and further explain how sound is heard.
- Discuss that sound can be loud or soft. Also show that sound can be measured and write its unit on the board.
- Explain intensity if sound in detail. Also, share how it changes with different materials.
- Elaborate speed of sound in various states of matter.

Guided Practice

Ask students to do ‘Concept Check’ on page 67. Facilitate accordingly.

Independent Working

Ask students to do activity 4 on page 74.

Wrap Up

Ask students to attempt activity 5 on page 74 and write their observations in the notebooks.

Homework/ Going Further

Ask students to attempt Question 2 on page 73 in your notebooks.

Lesson Plan 2 — Student Book Page 70–72

Learning Outcome

- Define noise and its harmful effects on human health.
- Appreciate the role of human beings in reducing noise pollution.

Learning Outcomes

Students should be able to:

- explain what noise is and how it affects us all.

Introduction

Ask students about their experiences at train stations, airports. Why sometimes it is chaotic, at these places? Why it is unpleasant at the roads in case of traffic jams. Record their responses.

Main Teaching

- Define the terms' noise' and 'noise pollution'. Recall pleasant and unpleasant sounds. Elicit examples from students.
- Discuss how loud noise is hazardous for human health. Also, talk about measures that should be taken in order to stay unaffected from noise pollution (use of earplugs, carpeting our homes, etc.).
- Talk about the picture on page 71. (It shows noises around a student trying to study).
- Discuss how noise pollution is hazardous for wild life. In water and land, animals are feeling confused and have communication issues. This results in injury or even death.
- Explain measures that help in reducing noise pollution. For example, sound proofing.
- Ask a student randomly to read 'Did You Know?' on page 71. Briefly explain.

Guided Practice

Ask students to do activity 2 on page 74.

Independent Working

Ask students to do Question 4 part 2.**Wrap Up**

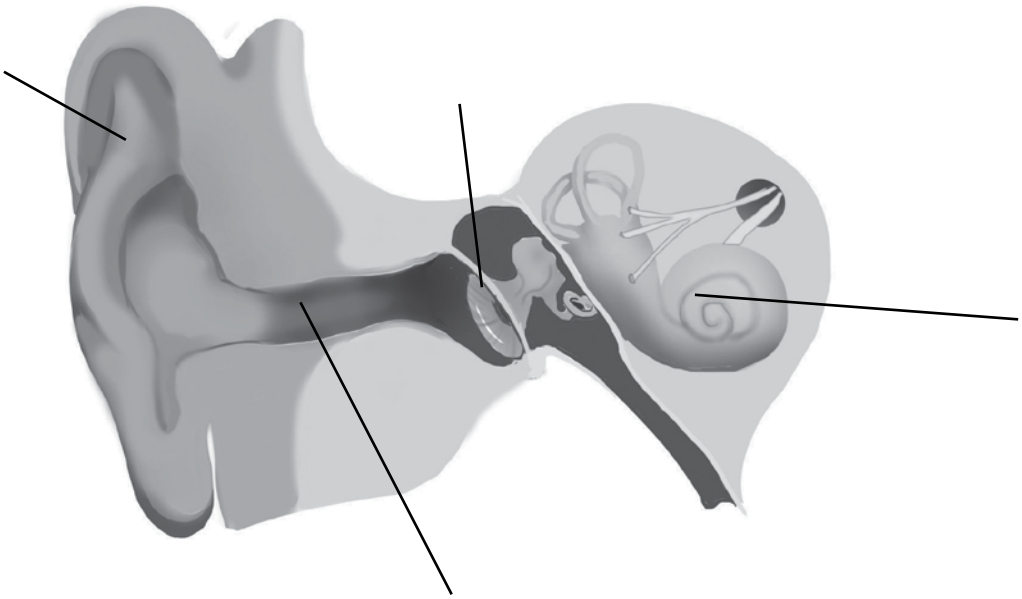
Ask students to do 'Discuss and Answer' on page 72.

Homework/ Going Further

Ask students to do Question 4 part 3.

Worksheet 6b-1

Q1. Label the diagram.



Q2. Fill in the blanks.

1. Sound is produced by _____.
2. _____ waves travel through the air.
3. _____ is the unit for measuring sounds.
4. The frequency or pitch of sound is measured in _____.
5. We need to speak _____ so that people far from us cannot hear.

Q3. Look at the given diagram. The air has been removed. Can we hear the alarm? Explain your answer.

_____

_____

_____

Unit: 7 Electricity and Magnetism

Lesson Plan 1 — Student Book Pages 75–76

Learning Objectives

- Describe charges and their properties.
- Differentiate between conductors and insulators in everyday life.

Learning Outcomes

Students should be able to:

- explain that all matter is made up of atoms.
- explain that atoms contain protons, neutron and electrons.
- explain that the movement of electrons creates electricity.

Introduction

Show some battery toys and explain what the toys can do when the batteries are inserted and what will happen when batteries are removed. Ask pupils to find + and – signs on the batteries. Ask them what they think these signs mean. Ask them where they have seen + and - signs before.

Main Teaching

- Ask the students to read the text on page 85 and locate the electrons, protons and neutrons in an atom.
- Explain that many objects like lights, computers work using electricity. Some of them get their electricity from batteries, while others are plugged into the main electricity supply.
- Show models and diagrams of different atoms and explain the importance of electrons.
- Explain that during winters or dry weather, while taking off a sweater one can feel static electricity. Explain that this due to flow of electricity.
- Switch the lights and fans on and then off to talk further about electricity.
- Point out items in the classroom that use electricity and ask pupils how they work.
- Explain that electricity is what makes electrons move. The electricity moves through wires called conductors and produce the power for work. When no electrons are moving, there is no power. The electrons need to be able to flow through the wires to reach the bulb and fan.
- Show a copper wire. Ask students to read ‘Conductors and Insulators’ on page 75, silently. Later ask them to discuss in peer groups.
- Help students to make a list of Do’s and Don’ts around electricity.

Guided Practice

Ask students to do activity 2 on page 81 and write down the third paragraph from activity detail in their notebooks.

Independent Working

Ask pupils to draw a diagram of an atom and label it.

Wrap Up

Ask students to do Question 2 on page 79-80 in their notebooks. Facilitate accordingly.

Homework/ Going Further

Ask students to do complete the ‘Concept Check’ on page 76.

Lesson Plan 2 — Student Book Pages 76–77

Learning Outcome

- Describe the two types of electricity with examples.
- Explain the phenomenon of static electricity in everyday life.

Learning Outcomes

Students should be able to:

- explain that there are two forms of electricity: current and static.

Introduction

Select a volunteer and ask the student to come in front. Rub a balloon on volunteer's hair, lifting the balloon occasionally. Keep doing this until students hair sticks up all over. Ask the students to suggest why hair is reacted to the balloon this way.

Main Teaching

- Explain that one type of electricity.

1. It does not move, but is attracted to and repelled by static electricity in other objects.
2. The attraction and repulsion properties of static electricity are not the same properties, as the magnets possess.
3. Static electricity can be best produced on cool, dry days.
   - Demonstrate that like charges repel by doing the following: Tie two inflated balloons to the end of a stick with strings. Charge them by rubbing them on a piece of a woolen fabric. Make sure that charged sides are facing each other. Because both balloons have the same charge, they will swing away from each other.
   - Putting an object such as a hand between the balloons will cause the balloons to swing in towards the hands because it has a negative charge. Removing the hand will force the balloons apart once again.
   - Students should draw the demonstration as a labeled diagram in their notebooks.
   - State that the other type of electricity is called the current electricity.

Guided Practice

Ask students to take out their plastic rulers and charge them by rubbing them against some woolen fabrics. Lower the charged ruler towards a small pile of tissue paper. Observe and record what happens to the paper.

Independent Working

Ask small groups of students to brainstorm examples of static electricity in everyday life. Share examples with the whole class.

Some examples:

1. Hair sticking up after jumping on a trampoline.
2. Combing, or brushing clean, dry hair.
3. Being shocked by someone.

Wrap Up

Engage students in a discussion on 'Discuss and Answer' on page 77.

Homework/ Going Further

Ask students to recreate demonstration of the two balloons on a stick by charging their balloons with the same source and then placing them on near each other on a flat surface such as a table. Explore how like charges repel each other while unlike charges attract each other. They should note their observations in notebooks.

Lesson Plan 3 — Student Book Pages 77–78

Learning Outcome

- Describe and design an electric circuit and explain its components.
- Explain lightning in nature.

Learning Outcomes

Students should be able to:

- explain that fuses are safety measures to prevent too much current from flowing.
- Identify lightning as a source of electricity.

Introduction

Show the students individual components of a circuit, (such as wire, battery and bulb) and attach them to each other to make a circuit.

Main Teaching

- Explain that the lightning is caused by the movement of positive and negative charges towards one another.
- During a storm, the particles in a cloud become statically charged because of the wind blowing them around in the cloud.
- Lightning strikes can happen within a cloud, between two clouds, or the cloud or a ground. The stronger source of electricity moves towards the weaker, causing the flash we see as lightning.
- On a larger scale, the discharge of electricity is seen as lightning and heard as thunder. On a small scale, it is seen as sparks and heard as a crackling sound. Both are evidence of energy being released.
- Show the students a circuit and explain the importance of the fuse in the circuit.
- Remove the fuse from an appliance and explain that the fuse is a safety measure, which protects the appliance and its wiring. A fuse contains a small wire, which will melt, if due to error too much current flows. This will break the circuit and protects the appliance. Show different devices that contain fuses.

Guided Practice

Ask students to do ‘Discuss and Answer’ on page 78

Independent Working

Ask students to attempt ‘Concept Check’ on page 78.

Wrap Up

Ask students to do activity 3 on page 81. Supervise and take necessary precautions.

Homework/ Going Further

Ask students to do research on Thomas Edison and write notes in their notebooks on his achievements.

Lesson Plan 4 — Student Book Page 83

Learning Outcome

- Recognise that magnets can be used to attract some metallic objects.
- Describe and demonstrate that magnets have poles and like poles repel and opposite poles attract.

Learning Outcomes

Students should be able to:

- explain that a magnetic field is invisible.
- describe how we can demonstrate it with a magnet and iron fillings.

Introduction

Place a magnet beneath a sheet of paper and place a needle on top of the paper. Demonstrate that when the magnet is moved around underneath, the needle will move too.

Main Teaching

- Show different shaped magnets and explain that the north and south poles of a magnet can be determined by comparing them to Earth's magnetic field.
- Use a magnet to identify magnetic and non-magnetic materials.
- Attach one magnet to a toy car. Hold the other magnet behind the car, about 2 to 3 inches away and show, that car can be made to move with the help of magnetic force.
- Explain that the opposite poles attract while similar poles repel each other and show that the toy car can be made to move forward or backward by bringing similar and opposite poles closer to the magnet and attached to it.
- Give two magnets to each student and ask them to feel the attractive and magnetic
- Spread some iron filings on a sheet of paper and place a magnet under it in the centre. Bring students closer, one by one, so they can observe a magnetic force field on the paper.

Guided Practice

Make groups of 4 students .Provide material and ask them to explore some magnetic and nonmagnetic materials.

Materials to explore:

a sheet of paper, card board, plastic ruler, glass jar, pencil, tin can and a spoon. Students should record their findings in their notebooks.

Independent Working

Ask pupils to do 'Concept Check' on page 83 and make notes.

Wrap Up

Ask students to do 'Concept Check' on page 84 in their notebooks.

Homework/ Going Further

Ask pupils to draw different shaped magnets and label their north and south poles.

Learning Outcome

- Identify Earth as a huge magnet and demonstrate it with experiment.
- Describe the working of a magnetic compass.

Learning Outcomes

Students should be able to:

- explain that magnetic compasses enable us to navigate using the Earth's magnetic field.

Introduction

Ask students to work in pairs and provide each pair with magnetic compass to examine. Now give each pair a bar magnet and ask them to bring the magnetic compass near the bar. Ask them to observe how the compass behaves when it is brought closer to the bar magnet.

Main Teaching

- Explain the term 'magnetised' and 'demagnetised'.
- Demonstrate the methods of demagnetization:
  1. dropping repeatedly
  2. heating
  3. hammering
  4. storing close to each other when not in use.
- Demonstrate how a compass works by asking students to hold the magnet so that the dial of the compass is horizontal and the N—S markings are facing up. Next demonstrate, how to align the line marked N (for north) on glass/ plastic top, with the arrow inside the compass.
- Talk about how compasses are used to find directions.

Guided Practice

Ask students to use a compass to draw lines showing magnetic forces on a sheet of paper.

Place a magnet in the middle of the paper and trace its outline. Next place the compass at one of the marked poles of the traced outline. Make a dot on the paper showing the direction in which the compass arrow is pointing. Next, move the compass so that the base of the arrow is at the dot just made. Make another arrow. Make another dot where tip of the arrow is pointing. Continue until you reach the other end of the magnetic outline. When you connect the dots, the line represents a single magnetic field line.

Continue in this way, each time starting at a different spot, until you have drawn as many lines as you can for both ends of the magnets.

This is a highly accurate representation of the magnetic field lines.

Independent Working

Show students how to magnetise a needle and how to make a floating needle compass.

Wrap Up

Discuss the importance of the compass for navigation in the days before GPS device.

Homework/ Going Further

Ask students to search the internet and find five uses of magnets.

Lesson Plan 6 — Student Book Pages 85–87

Learning Outcome

- Describe the working of a magnetic compass.
- Explain different types of magnets (permanent, temporary and electro magnets).

Learning Outcomes

Students should be able to:

- explain that an electromagnet can be switched on and off.
- make a simple electro magnet.

Introduction

Ask students to study the diagrams on page 86 and read the text.

Main Teaching

- Ask students to read the text on page 85.
- Demonstrate how to wind the wire around the nail, leaving room at each end.
- Explain how to make a closed circuit and by attaching the free ends of the wire to the battery.
- Explain that the strength of an electromagnet can be increased by increasing current in the coil.
- Discuss the uses of electromagnets.
- Compare electromagnets and permanent magnets through hands-on experience by building electromagnet and a motor.

Guided Practice

Divide the pupils in the groups of three or four. Give them materials to make an electromagnet. The materials are:

Large nail/rod, battery and holder, and a long wire. Provide them with instructions.

Independent Working

Using the magnet they have made, students should take turns to pick up small pins and paper clips. Ask them to record how many they picked up. Every student needs to draw a diagram of their completed magnets in their science journals. They should record the number of pins and paper clips they picked up. They should also be given the opportunity to design different experiments using the electromagnets that they have made.

Wrap Up

Discuss the answers to “Concept Check’ on page 87.

Homework/ Going Further

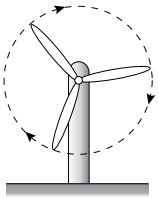
Ask students to do activity 2 and display in school.

Worksheet 7-1

Q1. Circle the electrical objects:

A B C D E




Q2. Define:

- Conductors

_____

_____

_____

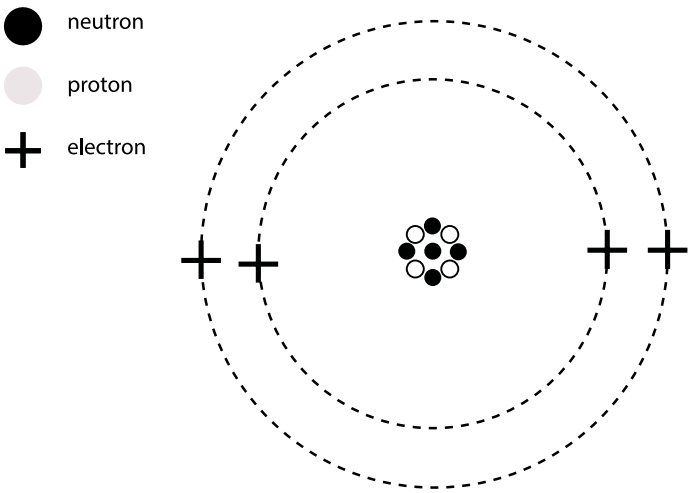
- Insulators

_____

_____

_____

Q3 Count the number of electron, proton, and neutron in the given atom:



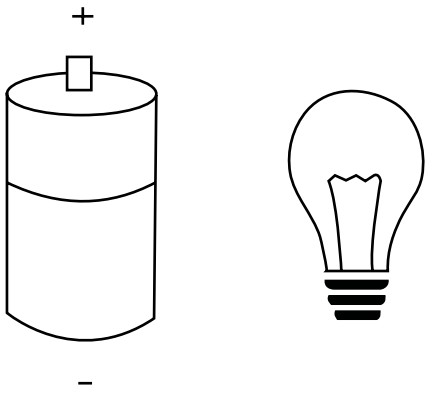
Electron _____

Proton _____

Neutron _____

Worksheet 7-2

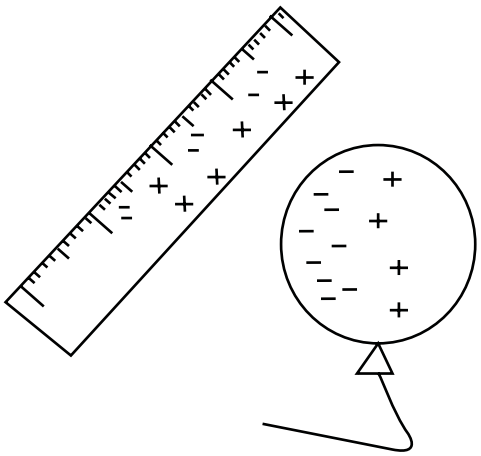
Q1. Look at the given diagram of a battery and a light bulb:



Connect these two devices together as to light the bulb.

Name the object you will use. _____

Q2. Why are charges on the balloon and ruler arranged as shown?



_____

_____

_____

Q3. What are fuses? Why are they important?

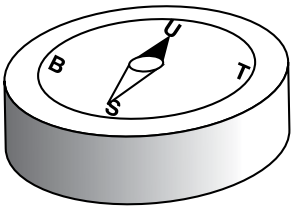
_____

_____

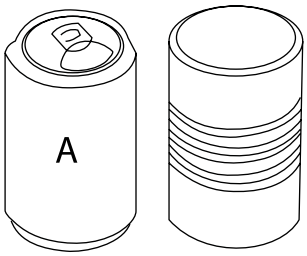
_____

Worksheet 7-3

Q1. What is the name of the following device?



Q2. The drawing shows an aluminium can (A) and an iron can (B).



a. Which cans will be picked up by a magnet? Give reason.

b. Which can will not be picked up by a magnet? Give reason.

Q3. In the centre of the Earth, there is a large amount of magnetic iron.

a. What do we call the effect that the Earth has which makes a compass work?

b. What are the four cardinal points of the earth? Draw

Worksheet 7-4

Q1. Look at the figure:

a. Explain how a heavy scrap of iron is picked up by an electromagnet?

_____

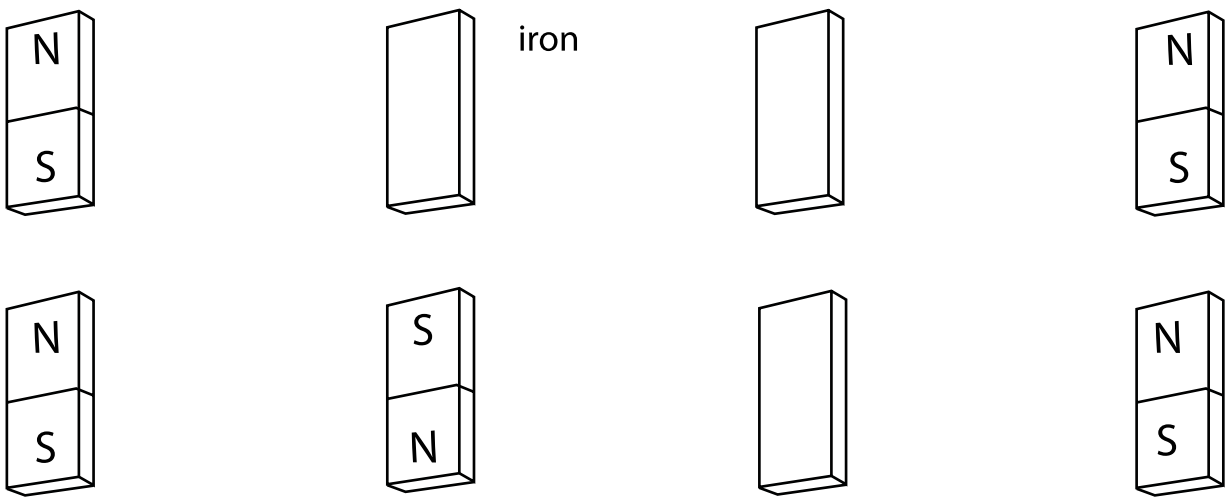
_____

b. Why is it possible to use an electromagnet to separate magnetic materials from non-magnetic materials?

_____

_____

Q2. For each diagram, write either 'attract' or 'repel' and draw arrows to show the magnetic forces.



Unit: 8 The Structure of The Earth

Lesson Plan 1 — Student Book Pages 92–93

Learning Objectives

- Describe the structure of the Earth (i.e. crust, mantle, and core) and the physical characteristics of these distinct parts.
- Describe the sources of water on Earth

Learning Outcomes

Students should be able to:

- explain the structure of the Earth with reference to its layers.
- talk about water on Earth, with its sources, etc.

Introduction

Bring a model showing structure of the Earth to the class (Ref: diagram on page 92).

Ask students if they can identify the model. Then place a poster on the soft board and ask if students can name any of the three layers of Earth.

Main Teaching

- Explain that the Earth is a planet that revolve around the Sun. Due to Sun's heat there are different sorts of rains, etc.
- Explain that if we could cut through the Earth, we can see the following sections:
  1. Crust
  2. Mantle
  3. Core - outer core
     - inner core
- Give details of each section.
- Talk about sources of water and share the amount of water on Earth's surface. Water covers 70% of the Earth's surface. The oceans contain salty water which is 95% of the Earth's water.
- Also, explain that if Earth was closer to the Sun, there would be no water on surface of the Earth and if it was at a further distance, this water would be frozen. Therefore, the heat affects the Earth.

Guided Practice

Ask students to do activity 2 on page 98.Help in the preparation of colour dough.

Independent Working

Ask students to do Question 1 on page 97. Why Earth has water as liquid too? (Solid and gaseous states are also found on Earth).

Wrap Up

Briefly explain the lesson and ask a student randomly to read out 'Do You Know', on page 93, loudly.

Homework/ Going Further

Ask students to do Question 3 part 2 on page 97, in their notebooks.

Lesson Plan 2 — Student Book Pages 93–95

Learning Objectives

Identify similarities and differences among the different types of soil.

Learning Outcomes

Students should be able to:

- explain that soil is made up of water, air, minerals and organic matter.
- explain that there are different types of soil.

Introduction

Bring a bag of layered soil and some clay pots to the class. Begin by asking students to discuss the importance of soil. Encourage students to write their points on the board to share their ideas.

Main Teaching

- Explain that the soil is upper layer of Earth's surface. It is made up of broken down rock combined with a mixture of living organisms, like bacteria and fungi and non-living organic materials. This non-living organic material can include air, water, decayed leaves and dead animals.
- In order to help students make sense of the soil profiles, invite students to dig through bags of soil from top to bottom. Ask students to describe differences between colour, texture and various components (small stones, organic matter, sand, clay). Ask students to note down their observations.
- Explain that the soil is especially important to humans and other animals that eat plants that grow in soil.
- Ask them to examine a sample of soil through a magnifying glass. Take a small amount of soil sample and place it on a sheet of paper. Spread it out and examine it closely through the magnifying glass.
- Explain that the soil is home to many small organisms, such as insects and bacteria. Soil helps to filter and clear water. Discuss how the soil is needed for plants to grow and it holds them in the ground.
- Explain and highlight animals that live in soil. Discuss 'humus', its formation and importance.
- Put 3 to 4 spoonful of soil in a beaker of water and stir it well. Leave it undisturbed for a time and then examine layers of soil that form.
- Divide the pupils into groups .Ask them to read page 93 and discuss the content.

Guided Practice

Help the students to understand layers of soil. Ask students to read page 94, silently. Later ask them what they have comprehended about layers of soil.

Independent Working

Ask students to draw and colour a diagram of soil profile.

Wrap Up

Ask students to do' Concept Check' on page 95.

Homework/ Going Further

Ask students to do some research on internet on soil and write a brief report in their notebooks.

Learning Objectives

Investigate the composition and characteristics of different types of soil.

Learning Outcomes

Students should be able to:

- explain how moisture has different effects on different types of soil.

Introduction

Invite students to study bags A, B and C containing three different types of soil and compare the colours.

Main Teaching

- Take a small amount of each sample. Put it on a sheet of newspaper. Spread it out so that students can examine it closely through the magnifying glass. Ask them to press the soil between their forefingers and thumb to feel the texture. Ask students to pair with a partner and discuss their findings and ideas. Teacher then involve the entire class in a detailed discussion.
- Talk about the three different types of soil and their characteristics.
- Show students a collection of rocks and explain that they are made up of soil particles.
- Perform activity on page 98.

Guided Practice

After all the samples have been examined, ask for feedback. Draw three columns on the board with the heading A, B and C; ask students to draw it in their notebooks and then share students observations and write them on the board under the appropriate letter heading.

Independent Working

Give pupils time to do Question 4 on page 97.

Wrap Up

Discuss the 'Environmental Watch' on page 96 and show pictures of such disasters. Ask for students responses to the Questions:

What happens to the fertile farmlands due to rain and flood?

How does this effects humans and livestock?

Homework/ Going Further

Visit a local nursery and ask for a sample of the soil in which plants grow.

Worksheet 8-1

Q1. Identify the types of soil.

a. _____: Due to its smaller particles, it can retain more water than sand.

b. _____: The spaces between the particles are very tiny.

c. _____: The particles do not stick together when wet.

Q2. Complete these sentences.

a. _____ soil can become as hard as stone when dry.

b. _____ soil dries out quickly after rainfall.

c. A cactus would do well in _____ soil.

Q3. Label the following soil profile:

_____

_____

_____

_____

Unit: 9 Space and Satellite

Lesson Plan 1 Student Book Page 99

Learning Objectives

- Define the term 'Space' and emphasize the need to explore it.
- Recognise the role of NASA (National Aeronautics and Space Administration) in space exploration.
- Define the term 'satellite' and describe its importance.

Learning Outcomes

Students should be able to:

- explain the term 'space' and the reasons for its exploration.
- talk about NASA and its role towards space exploration.
- explain satellites and its two main types.

Introduction

Distribute some sets of flash cards (pictures of satellites) in 4 groups of students. Ask them to discuss in each group for a short time and group leader will identify each picture.

Main Teaching

- Explain the term' space'. Tell students from where it starts beyond the atmosphere.
- Discuss what is happening in the area of space exploration.
- Discuss the role of scientist in gaining knowledge of space.
- Introduce NASA and what it stands for (National Aeronautics and Space administration).
- Discuss that the aim of scientists is to discover and expand the knowledge of space for benefit of humanity. For example, NASA has satellites in space to monitor Earth.
- Define satellite and its two types.

Guided Practice

Ask students to do Question 4 part 1, in their notebooks.

Independent Working

Ask students to do Question 6 part 1.

Wrap Up

Use the same set of flash cards to explain space and celestial bodies.

Homework/ Going Further

Ask students to attempt Question 5 and share their responses in the next class.

Lesson Plan 2 — Student Book Pages 99–100

Learning Objectives
Describe the natural satellites of the planets of the solar system.

Learning Outcomes
Students should be able to:

- explain that the moon is a natural satellite of the Earth.
- identify other planets that have moons.

Introduction
Show students a video of maximum 3 minutes duration. Select any video showing planets, moons and asteroids from internet.

Main Teaching
- Discuss the term moon and explain that many planets in our solar system have moons. The number of moons also varies. Talk about the picture on page 100 that shows planets of the solar system and presence or absence of moon. For example, Mercury and Venus have no moon. Planet Earth has one moon, while Saturn has 82 moons. Therefore, it shows that the number of moons varies. The sizes of different planets are also markedly different.
- Explain that the moon is a natural satellite of the Earth and it orbits the Earth. Discuss the characteristics of a satellite.
- Explain the term asteroid. Talk about its size and presence in the space.

Guided Practice
Ask students to do Question 4 part 5.

Independent Working
Ask students to do activity 1 on page 105.

Wrap Up
Talk about the space and different celestial bodies, especially moons.

Homework/ Going Further
Ask students to use the internet and other traditional sources to find information about the moons in the solar system.

Learning Objectives

- Define artificial satellites and explain their importance in exploring the Earth and space.
- Recognise the key milestones in the space technology.
- Describe the uses of various technologies in space i.e., geostationary, weather, communication, and Global positioning System (GPS).

Learning Outcomes

Students should be able to:

- understand and explain what artificial satellite are.
- explain types of satellites and their uses.
- major steps taken through space technology and milestones reached.
- to further explain the present and future role of NASA.

Introduction

Prepare a poster showing artificial satellites of different satellites. Ask students to recognise the objects.

Record their responses on the board. Write the word 'artificial 'or 'man made' satellites on the board.

Main Teaching

- Define and explain artificial satellites.
- Show different pictures of artificial satellites .Recall that moon is also a satellite; however, it's a natural object. Talk about GPS and how it works
- Discuss in detail the types of satellites and their uses. For example .: geostationary satellites.
- Recall asteroids from the previous lesson and share further details.
- Share how space technology has transformed our lives.
- Highlight milestones achieved over last 60 years.
- Explain how NASA is playing a major role in space exploration and their aim to discover and expand knowledge for benefit of humanity.
- Make students aware that NASA uses satellites to collect a variety of information about Earth.

Guided Practice

Ask students to do activity 2 on page 105.

Independent Working

Ask students to do Question 3 on page 104.

Wrap Up

Ask students to do 'Concept Check' on page 103, in their notebooks

Homework/ Going Further

Ask students to write on the following: Do you think humans will be able to visit any other planet .Write with reasons on an A-4 sheet .Display on school board.

Worksheet 9–1

Q1. Complete the following sentences.

a. The Earth takes _____ hours to turn once on its axis while the Earth takes _____ days to go round the Sun.

b. A _____ is a celestial or man-made body orbiting the Earth or another planet.

c. The _____ is the centre of our solar system.

d. A planet is a celestial body moving in an elliptical orbit round a _____ .

e. The Sun and the eight planets revolving around it form the _____ .

Q2. Put these in order of size: Sun, Moon, Earth.

_____

Q3. What are the different movements of the Earth?

_____

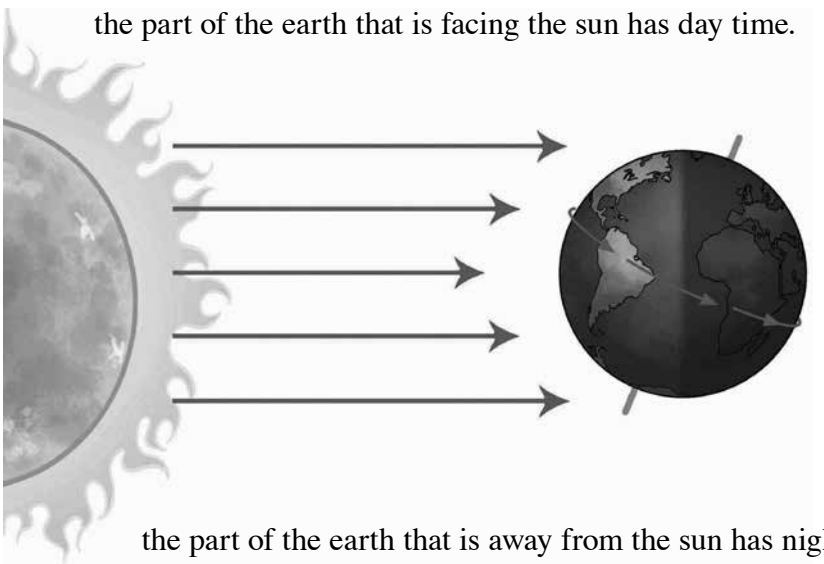
Q4. Name the planets in the correct order from the Sun.

_____

_____

_____

Q5. Match the sentences with the label positions.



Unit: 10 Technology In Everyday Life

Lesson Plan 1 — Student Book Pages 108–110

Learning Objectives

- Enlist and practice safety procedures while carrying out activities.
- Use items from a first aid box to dress a wound.
- Practice shifting an injured person to the hospital.

Learning Outcomes

Students should be able to:

- enlist the different uses of modern technology in daily life and learn various techniques.
- explain and apply various measures needed for safety and security by preparing a list and following it.
- learn first aid techniques and apply as/ when needed.
- take care of an injured person with elders' support.

Introduction

Ask students to share names of various modern technologies and note their responses on the board. Add more to have a comprehensive list.

Main Teaching

- Explain important role of modern day technology in everyday life.
- Prepare a list of safety rules from page 108 of textbook and put up on the soft board.
- Discuss various measures to be taken in case someone has a minor injury (page 190).
- Explain that students should learn to take body temperature of a person who has fever. If needed then the sick person must be taken to a doctor for medical advice.
- Talk about handling the injured person. Arrange a demonstration with medical staff and student volunteers.

Guided Practice

Ask students to do' Discuss and Answer' on page 108.

Independent Working

Ask student to do 'Concept Check' on page 110.

Wrap Up

Ask medical staff to show techniques of dressing a wound. The students can practice the same under medical staff supervision.

Homework/ Going Further

Ask students to do Question 2 on page 117, in their notebooks.

Lesson Plan 2 — Student Book Pages 110–112

Learning Objectives

- Practice shifting a person to a hospital.
- Practice drills for earthquake and fire

Learning Outcomes

Students should be able to:

- practice shifting a person to hospital with elder's support.
- practice drills for earthquake and fire in school regularly.

Introduction

Ask students to name natural calamities and emergencies due to accidents. Write their responses on the board. Mention a natural disaster that occurred in recent past. For example, an earthquake or a fire. Also share that news of earthquakes, fires, water floods, are frequently shown on television news.

Main Teaching

- Explain what emergency drill is and how important it is to have an evacuation plan, in school and at residence.
- Elaborate various types of natural disasters that require proactive approach to save ourselves and property from greater damage.
- Give an outline for different types of emergencies and various tactics to be followed. (For earthquakes, flood, fire, etc)
- Use various techniques to ensure students learn well . Explain various steps shown on the posters.

Guided Practice

Prepare an evacuation plan and share with the school management. With their approval:

1. Arrange an emergency drill. Follow the steps given on page 110-111 for flood situation and earthquake.
2. For fire, firstly take students on a round to show various signs, related to emergencies on the boards (on page 112). In case of any emergency, this practice will help in saving lives, as safety protocol will be followed for the same. Secondly arrange and conduct a fire drill.

Independent Working

Ask students to look at the signs closely to enable them to recognise and follow.

Wrap Up

An emergency drill to be carried out randomly to prepare students for unforeseen circumstances. First drill is conducted with full information shared about it.

Homework/ Going Further

Ask students to do 'Concept Check' on page 112.

Learning Objectives

Through hands-on experiences, in various activities, enable students to make various objects. The use of different technology will help in these activities.

Learning Outcomes

Students should be able to:

- make a model of footbridge and bookshelf.
- make their own sundial.
- use spirit level/ water level to level different objects (table, picture, frame, etc.).
- use a plumb line to install a flag pole, vertically.
- prepare LED light strings.
- make a musical instrument from easily available resources.
- make moveable van, bus, trolley.

Introduction

Prepare and place models of some objects the students will be making in the class. Ask them to name these objects randomly. Share that they will be making these objects in class.

Main Teaching

- Arrange various materials required for the number of activities in their lesson. Try to use recycled material as much as possible.
- Explain to the students that they will be involved in making of different objects, one by one. For example :

1. Make a moving vehicle.
2. Make a guitar.
3. Make a bookshelf.
4. Design and make a footbridge.
5. Make a sundial.

- Divide the class into 5 groups. Assign each group with one activity. Designate a group leader and set rules for work.
- Provide required materials and supervise assigned activities. Take support of other school staff for further assistance throughout these activities. Display the objects prepared.
- Discuss the next activity i.e., installation of a flagpole.
- Show the students how to use a spirit level.
- Find a suitable place in school ground for installation of a flagpole. Perform the activity with the students.
- Ask students to prepare LED lights and make prior arrangements for the activity. Divide students in 4 groups and supervise the activity.

At the end, the students should be able to switch the lights on and off to mark the success of the task.

Guided Practice

Display with the students help, different objects prepared in the class in a mini science exhibition. Ensure to write names of students with class prominently near objects on display.

Independent Working

Ask students to write a brief report on the activities.

Wrap Up

Certificates of achievement and participation can also be issued.

Homework/ Going Further

Ask students to do project number 2 on page 117.

Worksheet 10-1

Q1. Match to related statements.

Perform almost all type of work	Modern technology
Life is not imaginable without them	Laptops
Safety	Check the temperature.
If a person has fever	first

Q2. Fill in the blanks.

Drills are important in _____ situations. In case of natural disasters like _____ , _____it is important to take measures for safety. Sometimes due to short circuits, fire breaks out. Therefore, _____ drill is also important because everyone has to _____ the premises.

Q3. Explain the importance of knowing First Aid.

_____

_____

_____

_____

Unit 1: Classification of Living Things

P4 Discuss and Answer

Students should use their learning from the previous page to discuss classification.

P6 Concept Check

1. Students should add suitable examples of their own to the following:

Vertebrates	Invertebrates
goldfish, cat, parrot, whale, frog, lizard	slug, snail, cockroach, beetle, worm, spider

P11 Concept Check

Parts of the plant	Dicot	Monocot
flower	petals in sets divisible by four or five	petals in multiples of three
seed	Two seed leaves (cotyledons)	one seed leaf (cotyledon)
leaf	net-like veins, criss-crossing	parallel veins, running in straight lines
roots	taproots	fibrous roots
stem	vascular bundles arranged in rings	vascular bundles scattered throughout

P13 Discuss and Answer

Students can give their own examples and build their understanding of this issue.

P13 Concept Check

1. Extinct animals are animals that used to exist but no longer do because they have been destroyed or have died out.
2. If something is biodegradable it means that it can decay naturally.
3. Biodiversity is the word we use for the huge variety of living things on Earth, including plants, animals, fungi and bacteria.
4. Dodo, Tasmanian tiger, any dinosaurs, students can search for others.

EXERCISES

1. i. d. ii. c. iii. d. iv. d. v. c. vi. b.
2. i. Students should answer in their own words. Classification allows scientists to group living things according to their shared characteristics. This makes it easier to order living things and see patterns.
   ii. The five kingdoms are: animals, plants, monera (bacteria, algae), fungi (mushrooms, mould, yeast), protista (amoeba). Accept any suitable answers students give as examples under each heading.
   iii. Some answers (many others possible): insects, bee, ant, ladybird, beetle, worms, snail, slug…
   iv. Some answers (many others possible): sea snail, sponges, starfish, anemone, worms, jellyfish, crabs,
   v. Some answers (many others possible): caterpillar, millipede, centipede,
   vi. Biodiversity is the word we use for the huge variety of living things on Earth, including plants, animals, fungi and bacteria.
   vii. No, all insects cannot fly. Some examples of flightless insects: fleas, ants, grasshoppers, stick insects…students can use their own observations or do some research.

viii. Extinct animals, such as the dodo, dinosaurs, and Tasmanian tigers, are animals that were alive but have died out (or been killed by humans). Endangered animals are animals threatened with extinction, usually due to human activities such as hunting, habitat destruction, and pollution. The WWF has a list of endangered animals that students can view.

3. Protista, monera, fungi, plants, animals.
4. i. wings ii. colony iii. parasites iv. diseases v. bodies
5. To answer these questions, students will need to think about the information in the unit, use their prior knowledge, and, perhaps, do some further research.
   i. Adult insects have three sections to their bodies, spiders have two; insects have three pairs of legs, spiders have 4 pairs legs; most insects have wings, spiders do not.
   ii. Some insects are useful (e.g.: bees make honey, many insects help to break down waste materials, some insects eat other insects that are pests) and some insects are harmful (bees and wasps can sting us, mosquitos spread malaria and other insects spread other diseases, some are pests that eat crops…).
   iii. Humans cause damage to biodiversity by polluting, overuse (eg over consumption, hunting to extinction/endangerment, overfishing, deforestation), mining, etc.
6. Students should use their own words to talk about the topics.
7. i. C ii. A
   iii. vascular bundles are arranged in rings in a dicot and scattered throughout in a monocot.
8. Insects: cockroach, wasp, dragonfly, mosquito, bee, fly, ladybird. Not insects: slug, snail, millipede, spider.

ACTIVITY 4.

F	B	V	G	X	U	J	E	L	L	Y	F	I	S	H	L	X
D	N	S	F	C	G	U	B	U	T	T	E	R	F	L	Y	Q
C	R	N	X	O	C	O	C	K	R	O	A	C	H	I	D	C
E	R	A	C	R	A	B	V	G	D	J	J	X	J	U	B	T
G	Z	I	G	D	E	G	R	A	S	S	H	O	P	P	E	R
J	G	L	C	O	Y	M	E	A	R	T	H	W	O	R	M	S
T	Q	R	Y	K	N	B	E	E	T	L	E	H	U	F	K	S
D	U	Q	Z	J	E	F	A	N	T	U	B	O	V	L	E	L
V	B	E	E	G	O	T	L	D	J	C	D	R	H	Y	U	U
S	P	I	D	E	R	N	R	Y	C	C	S	H	I	N	H	G
O	K	Q	Z	J	V	G	U	A	N	E	M	O	N	E	F	N

Insects: ant, bee, beetle, butterfly, cricket, dragonfly, fly, grasshopper, cockroach.

Unit 2: Microogrganisms

P20 Concept check

Yeast is a useful fungus because it is used in making break (to help it rise). It is also used in some antibiotics.

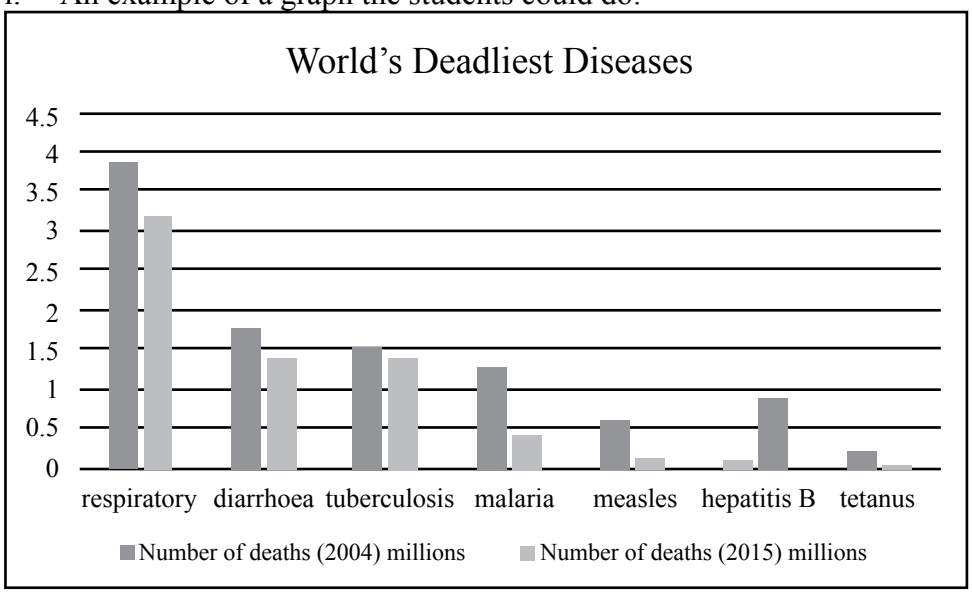
P25

Concept Check

1. Methods used to preserve food: chemical preservatives, sealing in plastic or tin, pasteurization (milk),
2. We should always wash our hands thoroughly before handling or eating food.
3. We should wash fruits and vegetables before eating them to get rid of germs and chemicals that have been sprayed on them.

Exercises

1. i. d. ii. a. iii. a. iv. b. v. c.
2. i. chemical preservatives ii. pasteurisation iii. unicellular iv. bacteria v. fungus
3. i. X ii. / iii. / iv. X v. /
4. i. An example of a graph the students could do:



   ii. Students will need to provide their own answers about their experiences. Vaccines are available for measles, tetanus, and hepatitis B.
5. i. Vitamin S is not a vitamin ii. protein is not a microorganism
   iii. a tortoise is not an insect iv. a headache is not a disease
6. Students will need to provide their own answers about their experiences.
7. i. Germs are kept out of tinned foods by adding preservatives or by boiling the foods during the canning process.
   ii. Pasteurisation is the process used to make milk last for longer. The milk is heated to 60C and then cooled quickly.
   iii. The main kinds of microorganisms are viruses, bacteria, protozoa and fungi.
   iv. Diseases are spread from person to person through coughing, spitting, sneezing, and close contact.

v. We can stop diseases from spreading by wearing a mask when we are unwell, sneezing and coughing into the crook of the elbow, washing hands well regularly, keeping ourselves and our environments clean, cooking food properly, storing food correctly, only drinking clean water, and wearing clothes that protect us from insect bites.

vi. a. a microorganism is a tiny organism that can only be seen with the aid of a microscope. b. when something is microscopic it can only be seen with a microscope.

vii. Students can name any three places (apart from recently sterilized items!). It is worth reminding them that many kinds of bacteria exist and have useful functions.

viii. Fungi are useful because they are decomposers. Also yeast is used to make bread and some mushrooms are edible.

viii. Microorganisms can enter the body through food, water, the air, cuts, insect bites, and skin contact.

8. Students will need to provide their own answers in their own words.

Unit 3: Flowers and seeds

P32 Concept check

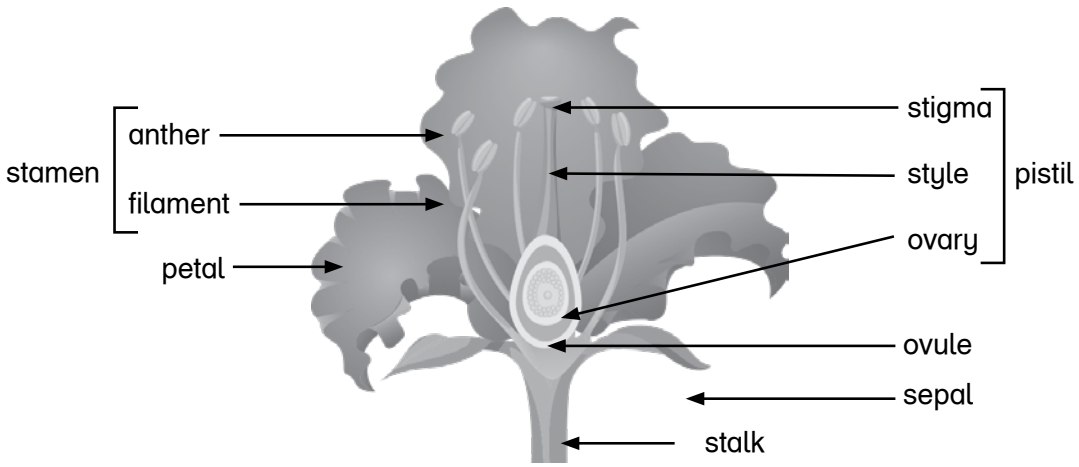
Students can try to identify parts of a flower during the exercise. Taking photographs at each stage is a good idea.

P33 Discuss and Answer

Students can use the list above the exercise or close their books and try to recall the stages. Placing the stages on separate cards (without the numbers) and getting them to work in groups to try and place the stages in order is also a good way of doing this exercise.

Exercises

1. i. c. ii. d. iii. c. iv. a. v. a.
2. i. d. ii. a. iii. b. iv. c.
3. i. pollination ii. sepals iii. stigma
   iv. style v. insects vi. anther vii. nectar
4. i. Germination is when a seed begins to grow.
   ii. a. If the pollen grains of a flower fall onto the stigma of another flower, it is called cross-pollination
   b. If the pollen grains of a flower fall onto the stigma of the same flower, it is called self-pollination
   iii. a. fertilization is a product of pollination. When a flowering plant is fertile it can produce fruit and seeds. Plants are pollinated by themselves, other plants, animals, or the wind.
   b. Steps showing how a flower is fertilized:
      1. The pollen grain lands on the stigma.
      2. The pollen tube starts to grow.
      3. It continues to grow downwards.
      4. It reaches the ovary.
      5. The pollen grain (male) joins the ovule (female cell).
      6. The ovary begins to change into fruit.
5. Diagram of the parts of a flower with labels.



6. Across 1. Style 4. Calyx 6. Stigma 7. Petals
   9. Fertilization 10. Nectar
   Down 1. Sepal 2. Pollination 3. Stamen 5. Anther 8. Flower

Unit 4: Environmental Pollution

P40 Discuss and answer

1. Own responses.
2. One is polluted and the other is not. Students should attempt to list the ways it is polluted and the related issues and solutions.

P41 Discuss and answer

The forms of pollution shown are air, noise, and water. Students can make posters, conduct a litter pick or other activity, and tell the school about it in an assembly or video diary. Tackling how the school disposes of waste etc is an option. Letter writing to businesses to ask them to be environmentally responsible can also be done.

Exercises

1. i. c. ii. b. iii. d. iv. d. v. b.
2. i. / ii. X iii. X iv. X v. / vi. X vii. / viii. X ix. X x. /
3. i. In school research and action planning.
   ii. Do some composting in school. Do internet research into a selection of items and the time they take to decompose.
4. i. a. environment – everything around you/all living things on Earth b. pollution – the contamination of the air, soil, or water by substances that are harmful to living organisms
5. Research to be done in class or at home to complete these tasks.

Unit 5: Physical and chemical changes of matter

P50

The paper has been torn in two but is not chemically altered or significantly changed. This change cannot be reversed unless the paper is pulped and reformed. The ice is melting. The water can be refrozen. The change is reversible. The banana has been peeled and sliced. The change is not reversible (but more bananas can be grown!).

P52 Concept check

1. i. Water turns to ice if you freeze it. ii. Water turns to steam (water vapour) if you boil it.
2. If you heat ice gently it melts to become water.
3. When the wick is lit, the heat from the flame melts the wax near it.

P53 A little experiment:

Students should record what they observe. If multiple small groups can do the experiment at the same time, the results should be compared and discussed.

Concept Check

1. Chemical 2. Irreversible

Exercises

1. i. a. ii. d. iii. a. iv. c. v. b.
2. i. sublimation ii. condensation iii. physical iv. frozen
3. Students should use what they have learned to answer in their own words. i. physical changes are changes to the state of the matter. They are usually reversible. ii. Students should be able to draw water vapour, water and ice, and describe the states. iii. a strong simple solution will have a higher amount of the solute in the solution than a weak one.
4. Differences between physical and chemical changes

Physical change	Chemical change
Temporary change	Permanent change
No new substance is formed	A new substance is formed
Reversible (mostly)	Irreversible
Brings about a change in the physical properties	Brings about a change in both chemical and physical properties
The constituents of the new substance can be restored to their original states	The constituents of the new substance cannot be restored to their original states

Unit 6A: Light

P61 Concept check

1. A smooth, polished surface reflects more light than a bumpy, dull surface. A white car will reflect more light than a black car. A mirror will reflect more light than a log. All surfaces reflect light but shiny, smooth, light surfaces reflect more light.
2. Independent work.

P63 Discuss and answer

The electric light will have greater intensity than the candle. Electric lights are brighter than candlelight.

Concept Check

1. Umbra 2. Penumbra 3. Midday (when the Sun is directly overhead)

Exercises

1. i. d. ii. a. iii. c. iv. c. v. d.
2. i. d. ii. c. iii. e. iv. a. v. f. vi. b.
3. i. / ii. / iii. / iv. X v. / vi. X
4. Students should conduct the experiment. i. the electric light is likely to give off more light. Usually a torch will be brighter than a candle if the bulb and batteries are sufficiently powerful. ii. A large source of light will make a shadow with an umbra and a penumbra. A small source of light will make a very dark shadow with sharp edges. iii. If the surface is close to the object the shadow is the same size as or a little bigger than the object itself. If the surface is further away the shadow appears longer.
5. i. Students should discuss and attempt to test the suggestions they come up with if they can. ii. Other objects can be used to cast shadows with the light a. to one side and b. above. Students should be able to see the relationship between where the light is and where the shadow is.
6. i. The Sun, fire, lava, lightning, glow-worms, fireflies, stars. Artificial sources of light: lamps, torches, candles, matches, any other kinds of electric or battery-operated light.
   ii. Students can provide examples of any opaque objects.
   iii. Students should use their own words to explain how a shadow is formed.
   iv. Students can list any examples of translucent materials such as frosted, stained, coloured, or textured glass, very thin paper or cloth, etc.
   v. Students' responses should show that they understand that transparent materials allow light through them and we are able to see through them. They should give examples too, such as clear glass.
   vi. Luminous things give out light. Students can talk about the intensity of the five light sources they list, the kind of shadows they are likely to cast, whether they are natural or artificial sources of light, and so on.

Unit 6B: Sound

P67 Concept Check

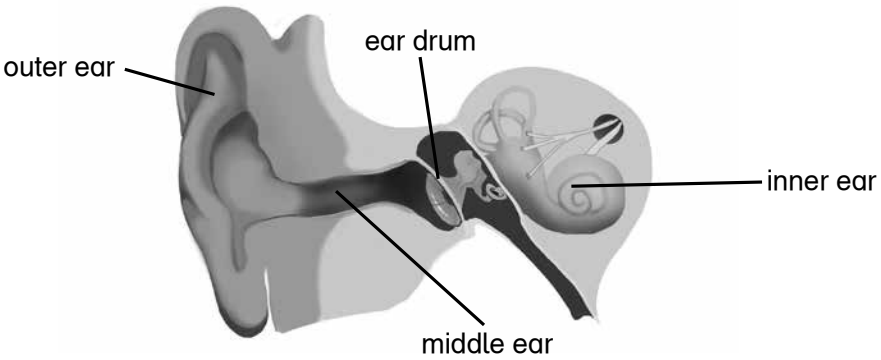
Students should conduct the experiment and note down their observations about the sound and movement produced and experienced.

P72 Discuss and answer

Students should create their lists of appliances first.

Exercises

1. i. c. ii. c. iii. b. iv. d. v. a.
2. Diagram of the parts of the ear.



3. i. medium ii. decibels iii. frequency iv. hertz v. 130 vi. gas vii. solid
4. i. a Sound is vibrations that travel through a medium (such as air) and can be heard when they reach a person or animal's ears. B. Noise pollution is
   ii. Students' responses (in their own words) should convey the difference between music and noise in terms of the regularity of the repetitive noise.
   iii. Students should pick any tree examples of noise pollution and offer suggestions soundproofing, ear protection, tree planting, reduced use…appropriate to the chosen examples.
   iv. Sound is vibrations and needs a medium to travel through. Sound waves cannot travel through empty space.

Unit 7: Electricity and Magnetism

P76 Concept Check

Atoms are so tiny that they are invisible to the naked eye. They are composed of subatomic particles called protons, neutrons, and electrons.

P77 Discuss and answer

Students should use their books if they need to check their understanding but aim to be able to explain the two kinds of electricity without reading from the book by the end of the given time. Electricity is a type of energy. Current electricity flows from one place to another (through a conductor). Static electricity is an imbalance of charges that build up in one place (on an insulator). The charge remains until it is able to move away by means of an electric current or electrical discharge (for example, when someone touches it).

P78 Concept check

1. An electron has a negative charge.
2. A proton has a positive charge.
3. A neutron has no charge.

Discuss and answer

Students should become familiar with all the parts of a circuit.

Exercises

1. i. c. ii. b. iii. a. iv. b. v. b.
2. i. current ii. static iii. iv. conductors v. insulators
   vi. atoms vii. static viii. neutral ix. positively x. positively
3. i. b. ii. f. iii. e. iv. a. v. d. vi. c.
4. i. X ii. X iii. / iv. / v. X
5. i. Electric current is the flow of electrons in matter.
   ii. Students should be able to articulate that a wire is a conductor that the current can flow through.
   iii. Students should be able to articulate that electrons move from one object to another (the hair to another surface) when they rub together. Electrons are transferred and the surfaces that have lost electrons (hairs) become positively charged. Thus the hairs repel each other. iii. Static electricity is the build up of charge on the surface of objects. iv. Students can name any suitable items.

Magnetism

P83 Concept Check

Students should test their designs for experiments if time allows so they can handle magnets and experience the attraction/repulsion of the poles.

P84 Concept check

Magnetic materials: iron, steel, nickel. Non-magnetic materials: glass, plastic, wood.

Concept check

Before conducting the experiment, note which way is north.

P85 Discuss and answer

Students can test the items with a magnet.

P87 Concept check

1. the magnetic field
2. opposite poles attract, like poles repel

3. Magnets can become demagnetised if they are dropped repeatedly, heated, hammered, or stored close to each other.
4. Students can name any of the devices listed in the unit (or other devices that they know about).

Exercises

1. i. b. ii. a. iii. c. iv. c. v. b.
2. i. X ii. X iii. X iv. / v. X
3. i. magnet ii. magnetic field iii. attract repel
   iv. diamagnetism v. electromagnet
4. i. a. Magnetic materials are attracted by a magnet. Non-magnetic materials do not feel the force of a magnet. b. The area of force around a magnet is its magnetic field.
   ii. Demagnetisation is the process by which a magnet loses its power. Demagnetisation can occur if a magnet is stored close to another magnet, hammered, heated, or dropped repeatedly.
   iii. Electromagnets are magnets that can be turned off and on.
   iv. An iron nail can be turned into an electromagnet by passing electric current around it.
   v. The strength of an electromagnet can be increased by increasing the flow of current.
   vi. Students can give any of the uses from the unit (or other uses that they know about).
   vii. The toy base of the toy train and the top of the tracks contain magnets. The magnets are arranged so that the like poles in the track and toy face each other and therefore repel each other.
   viii. The Earth has a magnetic field and North and South poles. We can use magnets (in experiments such as the ones in this unit or in a compass) to tell which way is North.

Unit 8: The structure of the earth

P95 Concept check

1. topsoil
2. subsoil
3. rock
4. water and wind pebbles, gravel, sand, and mud
5. air nutrients

P95 Discuss and answer

Students should use their own experiences to answer. If possible, handle different soil samples in the classroom.

Exercises

1. i. d. ii. a iii. c. iv. d. v. b.
2. i. F ii. F iii. T iv. F v. T vi. F
3. i. Students should draw and label a diagram similar to the one provided in the unit.
   ii. Over 95% of the water on Earth is salty water in oceans. Fresh water is found in rivers, lakes, streams, and ice.
   iii. Living things live on and in soil. Soil contains minerals we need. Plants grow in soil (all living things need plants!). Soil, such as clay, can be used to make pots and other useful things. Sand is used in construction.
   iv. Small animals improve the soil by aerating it and enriching it with their waste.
4. i. topsoil ii. silt iii. subsoil iv. sand v. clay vi. silt vii. roots

Unit 9: Space and satellites

P103 Concept check

1. / 2. X 3. / 4. X 5. X

Discuss and answer

Students should give their own opinions with reasons.

Exercises

1. i. c. ii. d. iii. c. iv. c. v. a.
2. i. moon ii. reflected iii. 82 iv. mars and Jupiter v. astronauts vi. stars GPS
3. i. X ii. X iii. / iv. X v. /
4. i. Space is the area beyond the Earth's atmosphere and between the planets and other celestial bodies. Space begins in the thermosphere, around 100km above the surface of the Earth.
   ii. A satellite is a celestial body orbiting another body. Natural satellites are the planets orbiting the Sun and moons or other celestial bodies orbiting planets. Artificial satellites are man-made. The moon is the natural satellite of the Earth.
   iii. Asteroids are small rocky bodies which orbit the Sun.
   iv. A space probe is a small space craft that travels fast through space sending pictures and other information back to Earth. They do not carry astronauts.
   v. Neptune has 14 moons.
5. Students should explain in their own words how the conditions on Earth (water, soil, atmosphere etc) make it possible for there to be life here. They should give their own views and reasons for them as to whether there is life on other planets.
6. Students should explain their own views with reasons.

Unit 10: Technology in everyday life

P108 Discuss and answer

Students should express their own views and experiences. They should use their classmates' lists to develop their own further.

P109 Concept check

Students should be shown how to do the activities and then attempt to do them.

P112 Concept check

Students should do research and then make their own posters. Teachers should lead the school specific safety drills.

Exercises

1. i. T ii. T iii. F
2. i. first aid kit ii. adult
3. i. Any three from the following or other suitable options with their uses: spirit level, plumb line, hammer, nails, screwdriver, screws, sander, paint, varnish, brushes…
   ii. An evacuation plan is a plan for what to do in an emergency situation.
4. Students should express their own views.