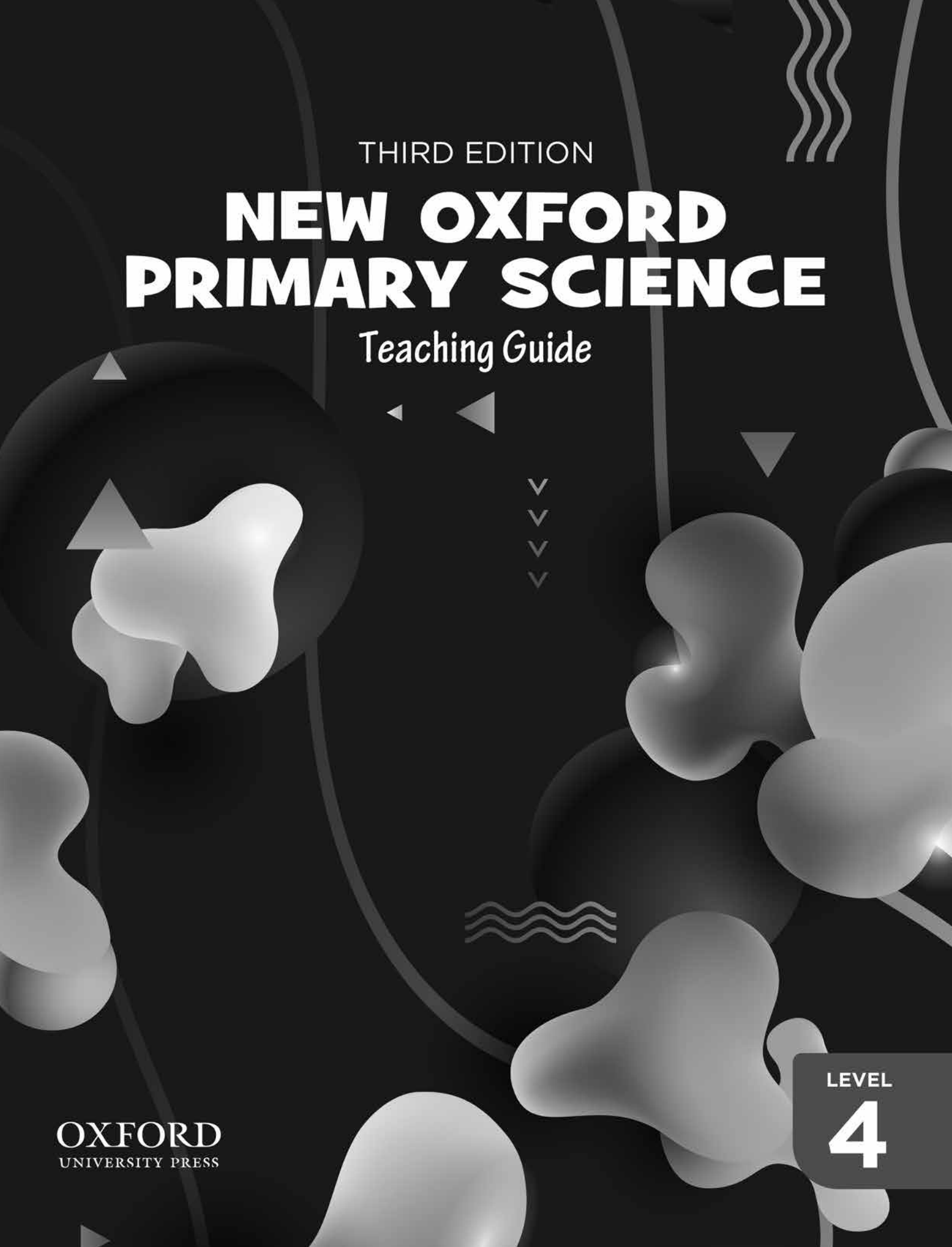
THIRD EDITION

NEW OXFORD PRIMARY SCIENCE

Teaching Guide



LEVEL 4

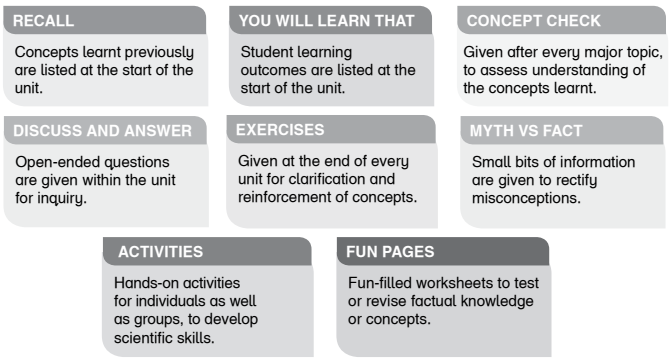
OXFORD UNIVERSITY PRESS

Contents

Introduction

This teaching guide consists of a scheme of work, worksheets, answers to the questions in the book, sample assessment paper, and lesson plans and 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 there 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.

NC alighment

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 describe the scientific knowledge necessary to teach a particular unit.

Lesson plan

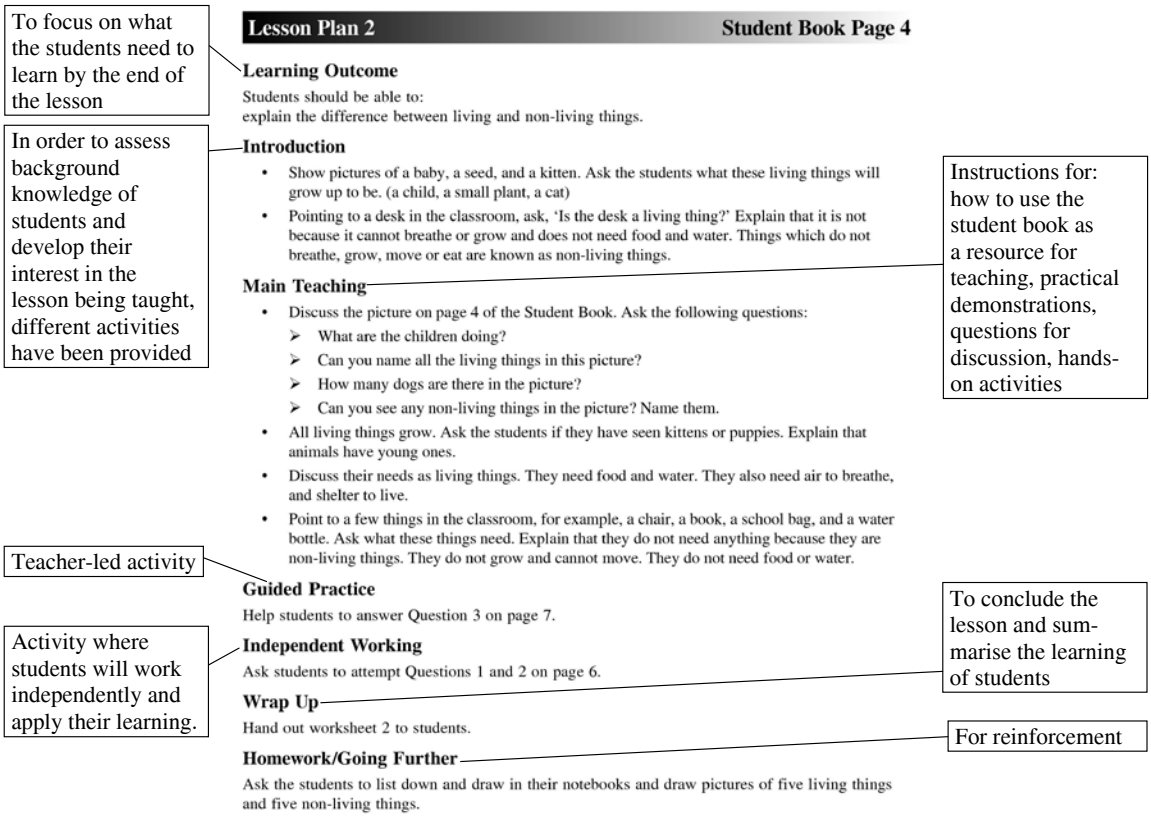
Teachers can use the provided lesson plans for each unit addressing the relevant learning outcomes as is or customise according to their class requirements. Lesson plans can be modified as per available resources.

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:** For introducing 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 in order 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 about 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 some 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.

Topic Progression Across NOPS Series

Starter		Book 1		Book 2	
Unit	Ourselves	Unit	Ourselves	Unit	Ourselves
1	My Body	1	The Human Body - parts of the body and their - functions - growth of living things	1	The Human Body - bones - muscles and joints - internal organs ((brain, heart, lungs, stomach) - sense organs
2	Healthy Habits	2	The Senses - senses and sense organs - movement	2	Health and Safety - looking after body - staying safe
		3	Healthy Habits - food for energy - health habits - illness		
	Living Things		Living Things		Living Things
3	Animals	4	Plants - plants and living things - parts of plants	3	Plants and Their Parts - types of plants - parts of plants - parts of a fruit - seeds
4	Plants	5	Animals and How They Live - basic characteristics of animals - animal food, importance of animals	4	Uses of Plants
5	Living and Non-Living Things			5	Animals - animals live in different places - special body parts - wild and domestic animals - animals and their young ones
	Materials and Matter		Materials and Matter		Materials and Matter
6	Materials	6	Materials and Object - shapes, size, texture and weight of objects - natural and man-made materials	6	Solids, Liquids, Gas - natural resources and man-made materials - solids, liquids, and gases -materials can change shape -more about rocks
				7	Measuring Instruments - measuring length - measuring weight - measuring time - measuring temperature - measuring liquids

Book 3		Book 4		Book 5	
Unit	Ourselves	Unit	Ourselves	Unit	Ourselves
1	The Human Body - brain - sense organs - skeletal system, muscular system,digestive system, circulatory system, respiratory system, nervous system, excretory system	1	The Human Body - cells - tissues - organs - skeletal system - muscular system	1	The Brain and Nerves - Nervous system - Sense Organs
2	Health and Safety - exercise for body - balanced diet - sleep and rest - staying safe	2	Food and Balanced Diet - importance of food - food groups - food pyramid	2	Microorganisms, Health, and Disease - Microrganisms - Microorgansims and Disease - Keeping Healthy
		3	Digestion - teeth and its type - taking care of teeth - digesting food - pancreas, liver, and gall bladder - eating habits		
	Living Things		Living Things		Living Things
3	Living on Earth - characteristics of living things - movement of animals and plants - growth - feeding - feeling - breathing - reproduction - habitats - ecosystems - extinct animals	4	Characteristics of Living Things - animal vs plant cells - charecteristics of living things - dependency on eachother - life cycles	3	Life Functions - Movement - Growth - Food - Respiration - Sensitivity - Reproduction
4	The Life Cycles of Animals - life cycle of fish,insect, birds	5	Environments and Food Chains - environment components - classification of animals and plants - herbivores, carnivores,omnivores - food chains	4	Classification of Living Things - Animals: vertebrates and invertebrates - Friends or enemy
5	The Life Cycles of Plants -flowers, fruits and seeds - germination - vegetables - life cycle of plant			5	Plants - Non-flowering plants - Flowering plants - Comparing a Monocot and a Dicot - Germination
	Materials and Matter		Materials and Matter		Materials and Matter
6	Materials - types of materials - properties of materials - kinds of materials	6	Solids, Liquids, and Gas - matter and its forms - changes of state	6	Soil - What is soil made up of? - Layers of the soil - Types of soil
		7	The Study of Matter - introduction to chemistry - mixtures, solutions - methods of seperation	7	Matter And the Water Cycle - Solid, Liquid, Gas - Comparing states of matter - Changes of states - Water cycle - Reversible and irreversible changes

Starter		Book 1		Book 2	
	Forces, Energy, and Machines		Forces,energy, and Machines		Forces,energy, and Machines
7	Movement	7	Movement - introduction of movement - force is needed to move - use of machines to move	8	Electricity - mains electricity and batteries - batteries and cells
8	Sounds	8	Sounds - introduction to sound - loud and soft sound - different ways of producing sound	9	Light and Shadow - light is energy - sources of light - brigh and dim light - properties of light - what makes a shadow big or small - materials and light
9	Light and Colours	9	Light and Shadow - use of light - sources of light - bright and dim light		
	The Earth and the Atmosphere		The Earth and the Atmosphere		The Earth and the Atmosphere
10	The Earth and The Atmosphere	10	The Weather - types of weather - seasons	10	Water - importance of water - sources of water - uses of water - saving water
11	Air			11	The Environment - what environment is - protecting animals - three R's - looking afer natural resources - deforestation
12	Water And Its Uses				
13	The Weather				
	Sky and Space		Sky and Space		Sky and Space
14	The Sky	11	The Earth, Sun,Moon, and Stars - shapes of earth - Sun - Earth travel round the Sun - Moon travel round the Earth	12	The Earth, Sun, Moon, and Stars - introduction to Earth and Sun - day and night - Moon its shape, life on Moon, and its rotation

Book 3		Book 4		Book 5	
	Forces,energy, and Machines		Forces,energy, and Machines		Forces,energy, and Machines
7	Force - introduction to force - kinds of force - friction - gravity	8	Heat -atoms - temperature - heat - thermometer	8	Forces In Action - Measuring force - Inertia - Friction - ways to reduce friction - Gravity - Balanced and unbalanced forces - Mass and weight - Simple Machines
8	Electricity - electric current - conductors and insulators - circuits - flow of current - complete circuit	9	Forces and Machines - speed - machines and types of machines	9	Electricity - Atoms - Electric Charge - Two types of electricity - Electricity in nature - Circuits and fuses
9	Simple Machines - work - tools or machines - transport	10	Circuit and Switches - complete and incomplete circuits - switches - series and parallel circuits - conductors and insulators	10	Magnets And Electromagnets - Magnetic field - Demagnetism - Creating an electromagnet - Electromagnets in use
10	Sound and Light - how is sound produced - how are sounds useful - loud or soft sound - sources of light - speed of light	11	Magnetism - what is a magnet? - magnetic materials - magnetic field - poles - making magnets	11	Light - Pinhole Camera - Reflected light - Shadows - Eclipses
		12	Sound - sound waves - frequency - sound medium - noise, echoes		
	The Earth and the Atmosphere		The Earth and the Atmosphere		The Earth and the Atmosphere
11	The Earth - structure of Earth - how Earth was formed - rocks, minerals, soil	13	Movement of Earth - rotation - revolution - equator - seasons	12	Air - Air has mass - The atmosphere - Uses of air
				13	Environmental Pollution - Biodegradable waste - Non-biodegradable waste - causes of pollution - types of pollution - the three R's - Environment watch
	Sky and Space				Sky and Space
12	The Earth - introduction to Solar system -objects in space - difference and similarities between a planet and a moon - satellites and space			14	Solar System - The Solar System - Space Probes

Curriculum Map for Grade IV

Knowledge Strands	Learning Units	SLOs (incl. Knowledge, Skills,Attitudes and STSE)	Covered in NOPS
LIFE SCIENCE	Understanding Ourselves	Identify major parts of human body.	Book 1 and 2
		State functions of major parts of the body.	Book 1 and 2
		Describe how bones and muscles work together to produce movement.	unit 1
		Identify common disorders of various parts of body and their causes.	unit 1
		Suggest ways to keep parts of their body healthy.	unit 2,3
	Characteristics and Needs of Living Things	Identify factors necessary for both animals and plants to survive.	unit 4
		Compare physical characteristics of animals and plants.	unit 4
		Perform an experiment to show that living things can grow while non-living things cannot grow.	unit 4
		Explain that many characters are inherited from parents.	unit 4
		Explain the similarities and differences within a single species by giving examples.	unit 4
		Draw and label key stages in the life cycle of a plant and an animal.	unit 4
		Compare the life cycles of two different animals.	unit 4
		Conduct a simple experiment to show growth in plants.	unit 4
	Food and Health	Identify the sources of common food.	Book 1 and 2
		Explain the properties of major food groups.	unit 2
		Classify different food into their basic groups.	unit 2
		Interpret a food pyramid to show the relative importance of various food groups.	unit 2
		Differentiate between balanced and unbalanced diet.	unit 2
		Suggest a balanced meal from the given list of foods and give reasons to explain why each food was chosen.	unit 2
		Explain the effects of unbalanced diet on health.	unit 2
		Explain hygiene and its basic principles.	unit 3
	Living Things and their Environment	Define environment.	unit 5
		Explain components of environment with examples.	unit 5
		Differentiate between various types of environment.	unit 5
		Explain the characteristics of animals and plants, which enable them to survive in a particular environment.	unit 5
		Classify animals on the basis of food they eat.	unit 5
		Differentiate between carnivores, herbivores, and omnivores with the help of examples.	unit 5
		Define producers, consumers and decomposers .	unit 5
		Explain the importance of producers, consumers and decomposers in a food chain.	unit 5
		Make a simple food chain to show the relationship between producers, consumers and decomposers.	unit 5

PHYSICAL SCIENCE	Matter and its States	Define matter and give examples.	unit 6
		Identify three states of matter with examples.	unit 6
		Compare solids, liquids and gases on the basis of shape and volume.	unit 6
		Demonstrate and explain how matter changes its state on heating.	unit 6
		Explain how one state of matter (solid, liquid, gas) dissolves in other.	unit 7
		Predict and demonstrate how various materials mix with water.	unit 7
		Demonstrate separation of insoluble solids from water by decantation and filtration.	unit 7
	Heat and its Measurement	Define heat and temperature.	unit 8
		Draw and label the device for measuring temperature.	unit 8
		Measure and record the body temperature using a laboratory thermometer and a clinical thermometer.	unit 8
		Suggest the safety measures required in using thermometers.	unit 8
	Force and Machines	Define force by giving examples.	unit 9
		Investigate the ways in which motion of an object can be changed.	unit 9
		Demonstrate how force can change the position and the shape of an object.	Book 3
		Explore that greater the force, greater the change in the distance covered by the object.	unit 9
		Design experiments to demonstrate that some objects can return to their original shape after the release of force.	unit 9
		Define speed and give its relation with distance.	unit 9
		Define simple machines by giving examples of commonly used machines from the environment.	unit 9
		Design an experiment to show how simple machines make work easier.	unit 9
	Introduction to Sound	Investigate that sound is produced by vibrating objects.	unit 12
		Differentiate between low and high sounds.	unit 12
		Demonstrate that sound can travel through solids, liquids and gases but cannot travel through a vacuum.	unit 12
		Interpret that the explosions in the core of the sun are not heard, as sound cannot travel through vacuum.	unit 12
		Differentiate between noise and other sounds.	unit 12
		Explore the effects of noise on human health.	unit 12
		Suggest ways to reduce noise pollution and plan an awareness campaign on any one.	unit 12
	Investigating Electricity and Magnetism	Distinguish between insulators and conductors.	unit 10
		Identify examples of conductors and insulators in their environment.	TG
		Make a simple electric circuit.	unit 10
		Differentiate between an open and closed electric circuit.	unit 10
		Investigate using a magnet that some materials are magnetic and some are non magnetic.	unit 11
		Recognize that a magnet has poles.	unit 11

		Demonstrate that like poles repel each other and unlike poles attract each other.	TG
		Investigate that a freely suspended magnet always points in the N - S direction.	unit 11
		Identify the various uses of magnets and magnetic materials in daily life.	Book 5
		Demonstrate how magnets can be formed and stored.	unit 11
		Differentiate between temporary and permanent magnets.	unit 11
EARTH & SPACE SCIENCE	Movements of the Earth	Describe the shape of Earth.	unit 13
		Relate the Earth's spin with the occurrence of day and night.	unit 13
		Define the term revolution.	unit 13
		Identify that the distance between the Earth and the sun effects the time Earth takes to revolve around the sun.	unit 13
		Explain that the Earth is tilted on its axis and this tilt causes seasons.	unit 13

Scheme of Work

1st Term	2nd Term
1 The Human Body	4 Characteristics of Living Things
2 Food and a Balanced Diet	5 Environments and Food Chains
3 Digestion	7 The Study of Matter
6 Solids, Liquids, and Gases	10 Circuits and Switches
8 Heat	11 Magnetism
9 Force and Machines	13 The Movement of the Earth
12 Sound	

Unit	Lesson plan number	Topic wise allocations of periods	Learning outcome
1 The Human Body	Lesson 1	2 periods	All living things are made up of cells. Tissues are special groups of cells which perform a similar job. Groups of tissues that work together are called organs. Each organ has a special function.
	Lesson 2	1 period	Groups of organs work together in organ systems. Our muscles and bones work together as the musculoskeletal system.
	Lesson 3	2 periods	There are different types of muscles: smooth, cardiac, and skeletal. We need to look after our bones so they do not break.
2 Food and a Balanced Diet	Lesson 1	1 period	We all need a balanced diet to keep healthy.
	Lesson 2	2 periods	Foods contain proteins, carbohydrates, fats, Vitamins, and minerals needed by the body.
	Lesson 3	1 period	A food pyramid shows the importance of various food groups. Food can be cooked or preserved in different ways.
3 Digestion	Lesson 1	1 period	Food has to be broken down and softened before it is absorbed into the body.

	Lesson 2	2 periods	Food passes from the mouth to the food pipe, and then to the stomach and the intestines. Good eating habits help the digestive system to work well.
4 Characteristics of Living Things	Lesson 1	1 period	All living things are made of cells.
	Lesson 2	1 period	Living things need air, water, minerals (food), light, and warmth.
	Lesson 3	2 periods	Animals and plants depend on each other.
	Lesson 4	1 period	All living things have a life cycle consisting of different stages. Animals and plants inherit characteristics from their parents.
5 Environments and Food Chains	Lesson 1	2 periods	The environment of all living creatures is the Earth. We must take care of our environment (the Earth, and the plants and animals on it) to keep a proper balance.
	Lesson 2	1 period	Living things need air, water, minerals (food), light, and warmth.
	Lesson 3	1 period	Living things are classified into different groups. Living things live in different environments
	Lesson 4	2 periods	Plants make their food through the process called photosynthesis
6 Solids, Liquids, and Gases	Lesson 1	1 period	Matter is made up of particles.
	Lesson 2	2 periods	Matter has three states: solid, liquid, and gas.
7 The Study of Matter	Lesson 1	1 period	Chemistry is the study of substances, their properties, and their effect on each other.
	Lesson 2	2 periods	Substances can be removed from water in different ways: sedimentation, decantation, filtration, and evaporation.
8 Heat	Lesson 1	2 periods	Matter is made of particles called atoms. When we heat an object, its particles move faster. When we cool an object, its particles move more slowly.

	Lesson 2	1 period	Heat and temperature are different things. Temperature is how hot or cold something is. The heat an object contains is the total amount of thermal energy it has.
9 Force and Machines	Lesson 1	1 period	Forces can change the speed, direction or shape of an object. Different amounts of force have different effects. Speed is equal to distance divided by time.
	Lesson 2	2 periods	Machines can be simple or compound. Machines can be used to make work easier and faster.
10 Circuits and Switches	Lesson 1	1 period	Electricity that flows through a material is called a current. Electricity needs a closed or complete circuit to flow. Electricity will not flow through an open or incomplete circuit.
	Lesson 2	2 periods	As well as simple circuits, there are series and parallel circuits.
11 Magnetism	Lesson 1	1 period	Magnets are useful. Some materials are magnetic, and others are not.
	Lesson 2	2 periods	A magnet has a north pole and a south pole. Opposite poles attract each other. Magnets need to be stored carefully to prevent demagnetisation.
12 Sound	Lesson 1	1 periods	Sound waves travel outward in a circle.
	Lesson 2	2 periods	Noise is irregular, repetitive sound waves. Regular, repetitive sound waves produce musical notes.
	Lesson 3	1 period	Sound can be measured. Sound can be loud or soft. Sound needs a medium to travel through; it cannot travel through a vacuum.
	Lesson 4	1 period	Echoes are produced when sound waves bounce off surfaces.

13 The Movement of the Earth	Lesson 1	1 period	The Earth spins on its axis. This movement is called rotation. The Earth orbits the Sun. This movement is called revolution.
	Lesson 2	2 periods	The Equator divides the Earth into two hemispheres. Seasons are caused by the Earth's tilted axis and its revolution around the Sun.

Unit 1: The Human Body

Students will learn how all living things are made up of cells and that tissues are special groups of cells which perform a similar job. Each organ has a special function and groups of organs work together in organ systems. This topic also details how to look after our bones, so that they do not break.

Lesson Plan 1 — Student Book Pages 2–4

Learning Outcomes

Students should be able to:

- explain that all living things are made up of cells.
- explain that tissues are special groups of cells which perform a similar job.
- explain that groups of tissues that work together are called organs and each organ has a special function.

Introduction

First show the students parts of a toy car and then assemble it to show how the parts work together. Then talk about how the organs in our body work together in groups called systems and these organs are made up of cells.

Main Teaching

- Ask the students to look at pictures of cells and explain that cells are the building blocks of life. Explain how the same types of cells work together and perform different functions in our body.
- Ask students to look at the diagram on page 3 and explain that same type of cells join together and form tissues.
- Write the names of some tissues on the board, show their location in the human body, and ask the students their functions.
- Look at the pictures of the internal organs (heart, lungs, kidneys, muscle, brain, and stomach) on page 4. Ask different students to name the parts and say one thing that each organ does for us.

Guided Practice

Show different cells under the microscope and ask the students to observe them closely.

Independent Working

Ask the students to write the names of different tissues and organs and their functions.

Wrap Up

Ask the students to read the text on page 4 and discuss it in class.

Homework/Going Further

Draw an outline of the human body on A4 paper and label the areas where different cells are located. Write their functions.

Lesson Plan 2 — Student Book Pages 5–6

Learning Outcomes

Students should be able to:

- explain that groups of organs work together in organ systems.
- explain that our muscles and bones work together as the musculoskeletal system.

Introduction

Invite a student volunteer to perform some exercises. Point out how different muscles and bones make it possible to do exercise.

Main Teaching

- Show the students an X-Ray of a broken bone. Ask them to suggest how they can protect their bones.
- Explain that bones cannot move on their own: they need muscles to move them. Show a picture of the muscular system.
- Talk about which muscles are used to do different movements.
- Explain that joints are points where two or more rigid bones are joined together by muscles. Joints enable humans to bend, swivel, curl, pivot, and turn.
- Ask the students to move a hinge joint (elbow or knee) and explain how a hinge joint (like a hinge on a door) and a ball-and-socket joint work. Students should discuss the range of movement of each joint. Ask the students to move some of the major bones in their bodies, such as the shinbone, the thighbone, humerus (upper arm bone), and the jawbone.
- Ask the students which joint is used to move the bone. Ask them to describe the movement of the joint (up and down, around in a circle, etc.) and identify the kind of joint being used. Read about the skeletal/muscular system on page 5-6.

Guided Practice

Show the students a model skeleton to see how bones are connected.

Independent Working

To help students understand how muscles move our bones, invite them to follow the steps below to create a model of a human arm.

1. Fold and then unfold an 8” x 1” strip of cardboard to create a cardboard arm.
2. Cut a rubber band in half to represent two muscles.
3. Tape a rubber-band muscle in a straight line to each side of the cardboard arm.
4. Gently pull one rubber band to make the sections of the arm bend towards each other and contract. This is the action of the *biceps*.

5. Then pull the muscle on the reverse side (the *triceps*) to make the biceps lengthen and relax. The arm will straighten once more.

Wrap Up

Instruct students to answer Question 1 on page 9 in their books.

Homework/Going Further

The students should attempt Activity 1 on page 10.

Lesson Plan 3 — Student Book Pages 6–8

Learning Outcomes

Students should be able to:

- recognise that there are different types of muscle: smooth, cardiac, and skeletal.
- explain that we must look after our bones so they do not break.

Introduction

Do Activity 2 on page 10.

Main Teaching

- Ask the students to read the text on page 7 and discuss the different types of muscle.
- Write the names of some muscles on the board and explain how they work and their locations in the body.
- Discuss some diseases of bones and muscles and explain that although bones are strong, they can break.
- Explain that bones can break or fracture because of injury. Bones become weaker as people grow older so they break more easily in older people.
- Emphasise that eating calcium-rich foods, like milk, cheese, and yoghurt, helps to build strong bones.

Guided Practice

Encourage the students to attempt ''discuss and answer'' on page 8

Independent Working

Give the students cards to match the types of muscles and bones with their functions.

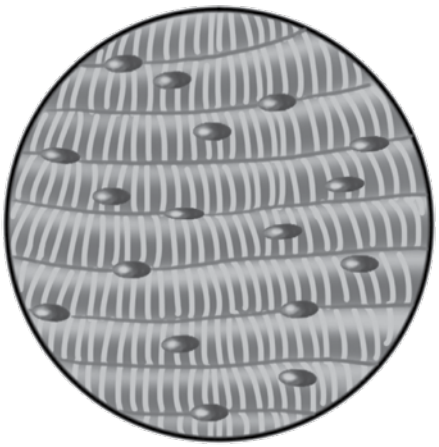
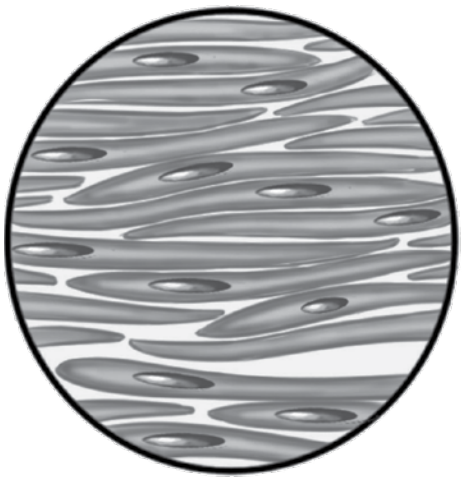
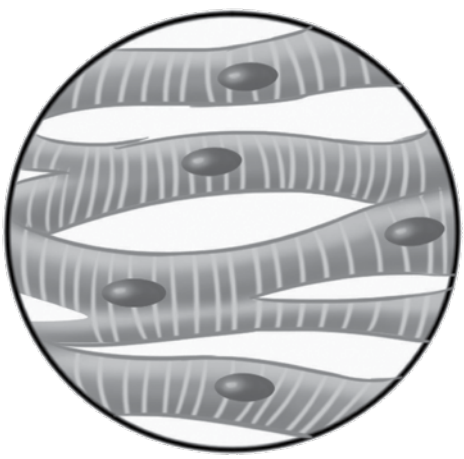
Wrap Up

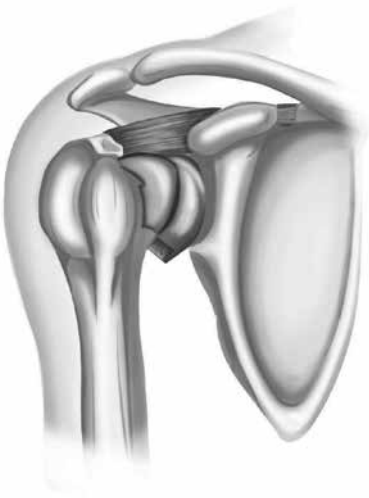
Answer Question 3 on page 10 in their books.

Homework/Going Further

Ask the students to attempt Activity 3 on page 10.

Cards: Bones and muscles

	**cardiac muscle**
	**skeletal muscle**
	**smooth muscle**

elbow joint	
shoulder joint	
hip joint	

Joints move in all directions.	voluntary muscles
involuntary muscles	contract and relax
move your bones in one direction only	Joints move in all directions.

Worksheet 1-1

Q1. Use the words below to complete the sentences.

nervous skeletal organ stirrup tissue

a. A _____ is a special group of cells which perform the same job.

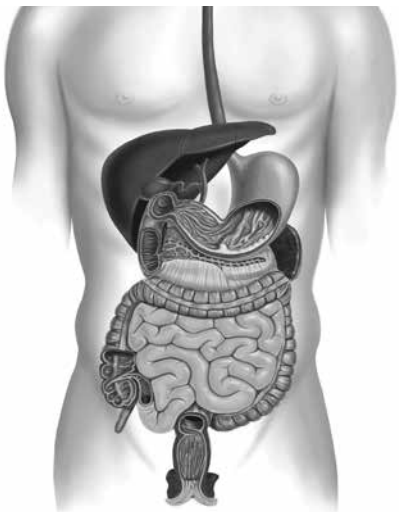
b. The smallest bone in your body is inside your ear and is called the _____ .

c. _____ muscles are also called voluntary muscles.

d. The _____ system is a group of organs which work together to do a special job.

e. _____ tissue sends signals to and from the brain.

Q2. Look at the diagram of one of the human organ systems.



a. What is the name of this system? _____.

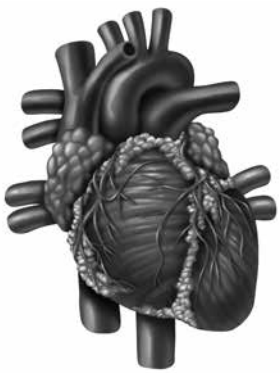
b. Label parts of the system.

Q3. In the table below, write two differences between tendons and ligaments.

Tendons	Ligaments

Worksheet 1-2

Q4. Match the columns to attach the types of muscle to the correct organ organs:

Type of muscle	Organ
smooth muscle	
cardiac muscle	
skeletal muscle	

Q5. Where in the body would you find these?

a. hinge joints _____

b. spine _____

c. ball and socket joints _____

Q6. Explain the function of the small intestine.

_____

_____

Unit 2: Food and a Balanced Diet

This topic is about healthy habits and the important components of food, i.e. proteins, carbohydrates, fats, vitamins, and minerals needed by the body. Students will learn about the food pyramid and preservation of food.

Lesson Plan 1 — Student Book Page 11

Learning Outcomes

Students should be able to:

- explain what is meant by the term 'balanced diet'.
- explain that we all need a balanced diet to keep healthy.

Introduction

Ask the students about what they ate for breakfast. Have a class discussion about the food categories represented in their breakfasts.

Main Teaching

- Ask the students to look at the picture of a balanced meal on page 11 of the Student Book and discuss what it shows.
- Introduce the definition of a balanced diet, that is, eating meals that have enough, but not too much, food from each of the six food groups. Explain that a balanced diet gives you the correct daily amounts of carbohydrates, minerals, fats, proteins, and vitamins.
- Discuss the Do You Know on page 11. Do students agree that breakfast is the most important meal of the day? Is eating a healthy breakfast the best way to start the day?
- Explain that we get different amounts of nutrition from different foods.
- Allow the students to explore and discuss how food choices can affect people's health.
- Emphasise that **washing** your hands before you eat is essential for keeping healthy.

Guided Practice

Ask the students to comment on the Discuss and Answer on page 12.

Independent Working

Instruct the students to play The Balanced Diet game. Divide the students into pairs and give each pair a paper plate. Put pictures of food in a basket and ask the students to collect and put on the plate pictures of foods that would make a balanced lunch. Other pairs should comment on whether it is balanced or not.

Wrap Up

Discuss in detail ways of cooking and preserving food.

Homework/Going Further

Ask the students to attempt Question 5 on page 17.

Lesson Plan 2 — Student Book Pages 12–14

Learning Outcomes

Students should be able to:

- name foods that contain proteins, carbohydrates, and fats, vitamins, and minerals.
- explain how vitamins and minerals are needed by the body.

Introduction

Ask the students about their favourite foods and take a poll of who does and does not like to eat vegetables like bitter gourd, lady's fingers, pumpkin, and turnips.

Main Teaching

- Write the names of the six food groups on the board in a table and write examples under each heading. Discuss the table in detail.
- Ask the students to look at pictures of foods from the six food groups and ask them to name each food item.
- Identify a range of healthy and unhealthy foods and discuss the effects that these foods have on our bodies.
- Emphasise that a healthy meal needs to include starchy foods. Encourage students to try wholegrain varieties, e.g., wholegrain cereal, whole wheat pasta, and brown rice.
- Explain that we should eat at least two portions of fish a week to get proteins and essential fats.
- Ask the students to name some fruits and vegetables and encourage them to eat at least 5 portions of fruit and vegetables every day because they contain fibre.
- Discuss what daily amounts are, what nutrients each food group provides, and why everyone should eat something from each food group at every meal.

Guided Practice

Help the students to discuss and complete the Concept check on page 13.

Independent Working

Ask the students to complete the table in Question 3 on page 17.

Wrap Up

Discuss Question 6 on page 17.

Homework/Going Further

Ask the students to plan a menu for an entire day. They should choose a variety of foods and include the recommended number of servings from each food group for breakfast, lunch, and dinner. For each meal, they should draw the foods (and /or use magazine pictures) and indicate the food groups represented.

Lesson Plan 3 — Student Book Pages 14–15

Learning Outcomes

Students should be able to:

- explain how a food pyramid shows the relative importance of the various food groups.
- describe different ways of cooking and preserving food.

Introduction

Do Activity 1 on page 19

Main Teaching

- Ask the students to compare the proportions of the different food groups shown in the picture on page 15 of the Student Book.
- Refer them to the food pyramid and ask why it is shaped like a pyramid.
- Discuss the six components of the food pyramid and their proportions by explaining the significance of the pyramid formation: the food group we should eat least of is at the top, that is fatty foods, sugar and salts; the food group we should eat most of, like carbohydrates and proteins, is at the bottom.
- Share information about the food pyramid, offer recipe ideas for healthy food choices, and discuss the effects that unhealthy food can have on people's health.
- Ask the students to explain why some people are concerned about the amount of fatty and sugary foods and drinks that some students eat.
- Inform them that eating too many fatty and salty foods can lead to heart disease in later life. Eating too many sugary foods, like cakes, biscuits, sweets, chocolate, and soft drinks, can lead to dental caries.

Guided Practice

Draw a table and ask the students to record their weight and height. If necessary, measure these in the lesson. Invite a dietician to visit the school to answer some questions that the students have about nutrition.

Independent Working

Answer Questions 1 and 2 on page 20.

Wrap Up

Answer Questions 7 and 8 on page 18.

Homework/Going Further

Ask the students to do Activity 4 on page 19. Ask them to write a report of this activity in their notebooks.

Worksheet 2-1

Q1. Look at the picture of foods which contain carbohydrates, proteins, fibre, and fats.

Now answer these questions by writing the names of above foods.

a. Which three give us energy?

_____

b. Which one helps us to build muscles and grow?

_____

c. Which one has no nutritional value but helps to move waste along?

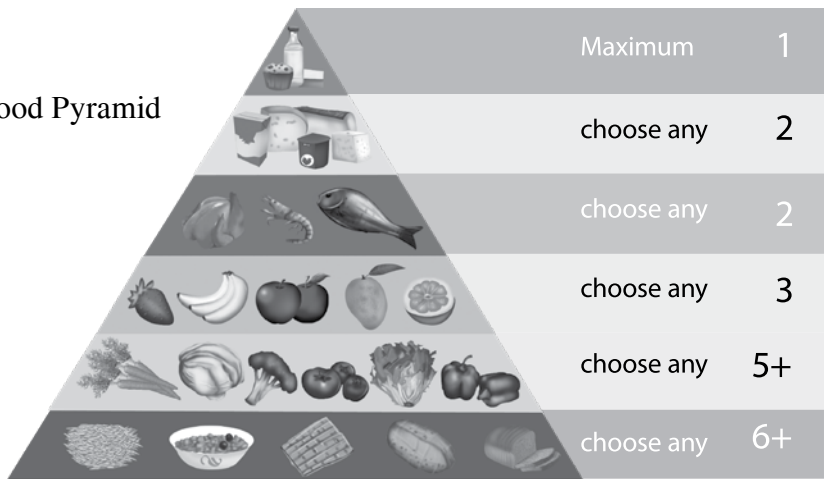
_____

d. Which two can make us fat if we eat too much of them?

_____

Q2. This is a food pyramid.

Food Pyramid



Worksheet 2-2

a. Why are carbohydrates placed at the bottom?

_____

b. Why are fats placed at the top?

_____

c. Why should we eat a lot of fruit and vegetables?

_____

Q3. Write the three functions of vitamins in the human body.

a. _____

b. _____

c. _____

Q4. Below is a list of essential nutrients needed by the body. Which nutrients are missing from the list?
fibre, minerals, carbohydrates, _____ , _____ , _____

Q5. Match each word with its correct definition.

Words	Definition
digestive system	The nutrients are small enough to pass through the intestine wall into the blood.
digestion	The path that food takes through the body from the mouth to the anus.
absorption	Food is broken down so that the nutrients can be taken out for the body to use.

Q6. Complete this table to show what each vitamin does in the body.

What is its job	Vitamin
keeps nerves healthy	
	A
keeps teeth and bones healthy	
	C

Unit 3: Digestion

Pupils will learn about digestion and discover the working of parts of digestive system. They will also learn about good eating habits which help the digestive system to work well.

Lesson Plan 1 — Student Book Pages 20–22

Learning Outcomes

Students should be able to:

- explain how food is broken down and softened before it is absorbed into the body.
- identify the different types of teeth and their functions.

Introduction

Ask the students to use their tongue to count the number of teeth they have, and complete the Discuss and Answer on page 21.

Main Teaching

- Ask the students how many teeth they had when they were born.
- Explain the differences between the milk teeth and the permanent teeth.
- Show a model of a jaw. Point to the different types of teeth and explain the role of each type of tooth:
  - incisors - for cutting and biting food
  - canines - for tearing food
  - molars and premolars - for grinding and chewing food
- Ask the students to read the text and study the diagram on page 21 and then discuss the work of a dentist and tooth care.

Guided Practice

Show video demonstration of brushing teeth.

https://www.youtube.com/watch?v=CmZp1wdJAw4

https://www.youtube.com/watch?v=Bi3R0cTie7c

https://www.youtube.com/watch?v=Qq5oamypTCY

Independent Working

The students should complete the Concept check on page 21.

Wrap Up

Invite a student to demonstrate the correct way to brush teeth.

Homework/Going Further

The students should label the diagram in Question 9 on page 28.

Learning Outcomes

Students should be able to:

- explain how food passes from the mouth to the food pipe, and then to the stomach and the intestines.
- list some good eating habits that help the digestive system to work well.

Introduction

Allow the students to take out their lunch boxes and start eating. Ask them to observe how they take a bite, then chew, and then swallow. Ask why the food disappeared and where is it now.

Main Teaching

- Display a poster of the digestive system and ask the students the function of digestive system.
- Explain that the digestive system is responsible for the digestion and distribution of nutrients to the body.
- Explain how the system works and write the series of organs in the digestive system on the board:
  - mouth
  - food pipe
  - stomach
  - small intestine
  - large intestine
  - anus
- Invite the students in turn to read out the explanation about each part of the digestive system on page 23.
- Discuss the digestive enzymes and their sources: pancreas, liver, and gall bladder.
- Discuss the Environment watch on page 25, about spitting in public places.

Guided Practice

Ask the students to discuss and complete the Concept check on page 24.

Independent Working

The students should label the diagram in Question 8 on page 28.

Wrap Up

Encourage every student to contribute to a discussion of healthy eating habits.

Homework/Going Further

Ask the students to complete Activities 1 and 2 on page 29.

Worksheet 3-1

Q1. What is the function of these teeth?

a. incisors _____

b. canines _____

c. premolars and molars _____

Q2. Write any three good eating habits.

a. _____

_____

b. _____

_____

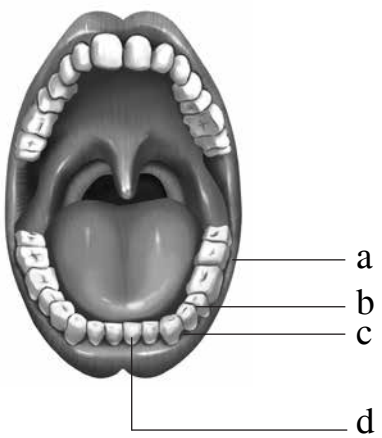
c. _____

_____

Q3. Complete the table.

Organ	Function
liver	
	It helps to filter the blood and it stores food energy.
	The bile is stored here.

Q4. Label the teeth in the diagram.



Worksheet 3-2

Q5. Write two differences between milk teeth and permanent teeth.

Milk teeth	Permanent teeth

Q6. What is digestion?

Unit 4: Characteristics of Living Things

Students will learn that living things are made of cells and need air, water, minerals (food), light, and warmth for survival. This topic discusses how the animals and plants depend on each other and all living things have a life cycle consisting of different stages. Students will discover how animals and plants inherit characteristics from their parents.

Lesson Plan 1 — Student Book Page 31

Learning Outcomes

Students should be able to:

- explain that all living things are made of cells.
- differentiate between plant and animal cells.

Introduction

Show the students a picture of a wall and ask them to identify the building unit of the wall (brick, stone, cement block, etc.). Complete a giant jig-saw puzzle in class and point out that each piece is important in making the whole puzzle.

Main teaching

- Explain that cells are the building blocks of all living organisms.
- Emphasise that all living things are made up of cells and the cell is the basic unit of life.
- On the board, d diagrams of a plant cell and an animal cell and ask the students to find the differences.
- Discuss the similarities and differences: both plant cells and animal cells have a cell membrane; they both contain cytoplasm and a nucleus; a plant cell has one large vacuole while an animal cell has many small vacuoles.
- Explain that plant cells also have a cell wall and chloroplasts but these are not found in animal cells.
- Explain the role of each part of a plant cell and an animal cell.
- Explain that different cells make up the different parts of the body.

Guided Practice

The students should be asked one by one about the roles of different parts of a cell.

Independent Working

Ask the students to read page 31 and identify the different parts of a plant cell and an animal cell.

Wrap Up

Discuss how plants and animals have different cells and talk about their similarities and differences.

Homework/Going Further

Write up the main points of the earlier (above) discussion in your notebooks.

Lesson Plan 2 — Student Book Pages 32–33

Learning Outcomes

Students should be able to:

- distinguish between living and non-living things.
- identify the things that are needed for life, such as air, water, minerals (food), light, and warmth.

Introduction

Show the students pictures of living and non-living things. Ask them to sort them into living and non-living things.

Main Teaching

- There are things that all living beings need. Explain that these things are food, water, air, sunlight and the right temperature.
- Draw two circles on the board and within, list the characteristics of living things and non-living things and explain their importance.
- Explain the differences between living and non-living things on the basis of things that living things can do which non-living things cannot.
- Show the students pictures of various animals and discuss their movements. Discuss different types of movements of animals. Invite student volunteers to role play some animal movements.
- Explain that animals need food to grow.
- Explain that unlike plants, animals do not have special growing points, and that animals' bodies stop growing once they reach adult size.
- Explain that some animals can grow back or repair damaged body parts.

Guided Practice

- Place a brick and an earthworm on the table and gather the students around so that they can see. Ask them to decide whether each object has biological organisation, which is to say, does each object have an internal system. The students should be able to recognise that the earthworm has an internal system and the brick does not. Show them how the earthworm can move because of its internal system.
- Discuss how the earthworm gets food from the soil. If the earthworm is unable to find nutrients, it will slowly die. The brick does not need food.
- Talk about reproduction and what it means. Earthworms are able to reproduce, but the brick cannot.
- Touch the earthworm to show the students that it is sensitive. Touch the brick to show that it does not feel anything.
- Place the earthworm and the brick in a cold environment. The students should note how the worm curls up. The brick obviously does nothing. Do the same with a hot environment.

- The worm will stretch out but the brick does nothing. Talk to the students about the various sizes of worms they have seen.
- Discuss how worms grow as they get older; the brick will remain the same size always. The fact that the worm grows and develops is a sign of life.
- Propose the idea that if there was no soil left on the Earth, the brick would stay the same but the worm would die.

Independent Working

Write these words on the board: stone, pencil, frog, leaf, worm, pin, cactus, door, paper, grass, tree, T-shirt, tennis ball, bicycle, car, human, book, and water.
Make groups of 4 students and ask them to differentiate between the living and non-living objects.
Answer any questions the students may have about this topic.

Wrap Up

Ask the students to list the characteristics of living organisms.

Homework/Going Further

The students should do Activity 1 on page 41.

Lesson Plan 3 — Student Book Page 33

Learning Outcome

Students should be able to:
explain how animals and plants depend on each other.

Introduction

Show the students pictures of vegetables and fruits and ask where these foods come from.

Main Teaching

- Discuss the ways in which plants give something to animals and receive something from the animals in return.
- Ask the students to look at the picture on page 33 and discuss how animals and plants depend on each other; for example, plants provide humans and other animals with food.
- Discuss how animal waste is used as fertiliser to help plants grow. The fertiliser is mixed in the soil, dissolves in water, and is then absorbed through the roots of the plants.
- Breathe out and explain that we breathe out carbon dioxide that is needed by plants to make food; plants produce the oxygen that we breathe in.

Guided Practice

Help the students to draw a simple, labelled diagram to show how animals and plants depend on each other.

Independent Working

The students should list some of the ways in which animals and plants depend on each other.

Wrap Up

Discuss and complete the Concept check on page 34.

Homework/Going Further

The students should use the internet to research how honey bees and plants depend on each other and write a report of their findings.

Lesson Plan 4 — Student Book Pages 34–38

Learning Outcomes

Students should be able to:

- explain that all living things have a life cycle consisting of different stages.
- explain that animals and plants inherit characteristics from their parents.

Introduction

Invite the students to squat and pretend to grow tall like a tree, reaching their hands like branches up to the sky. Explain that once a tree is mature, it begins to grow fruit.

Main Teaching

- Explain that a life cycle is all of the different changes that happen to a living thing during its life. All living things - plants, people, and other animals - have a life cycle.
- Show the students pictures of baby animals. Discuss the process of reproduction.
- Show the students charts of the life cycles of different animals. Explain that all animals grow.
- Explain that the whole body of an animal grows.
- Explain that the basic life cycle is birth-growth-adulthood-decline.
- When a living being, a plant or an animal, has what they need, they grow and complete their life cycle.
- Show a picture of an egg, chick, and hen and explain the life cycle of the chicken.
- Explain that most animal babies resemble their parents when they are born. However, some animals are quite different at birth and undergo developmental changes before they become adults, for example, a frog and a butterfly.
- Emphasise that a puppy does not grow as big as a horse, and a fish does not grow as big as a whale. Most animal babies grow only as big as their parents, and then they stop growing.
- Explain, with the help of a chart, the developmental changes that take place from the time a tadpole hatches until it becomes a frog.
- Draw the life cycles of a butterfly and a cockroach on the board and discuss the different stages in their development.
- Draw the life cycle of a plant on the board and discuss the stages in the development of a plant.
- Ask what happens when we cut a finger or bruise a knee. Would our finger grow back if it were cut off completely? Discuss the reasons why.

Guided Practice

Help the students attempt to arrange the cards in the correct order to show the life cycles.

Help the students do the Concept check on page 37.

Independent Working

The students should answer Question 7 on page 41.

Wrap Up

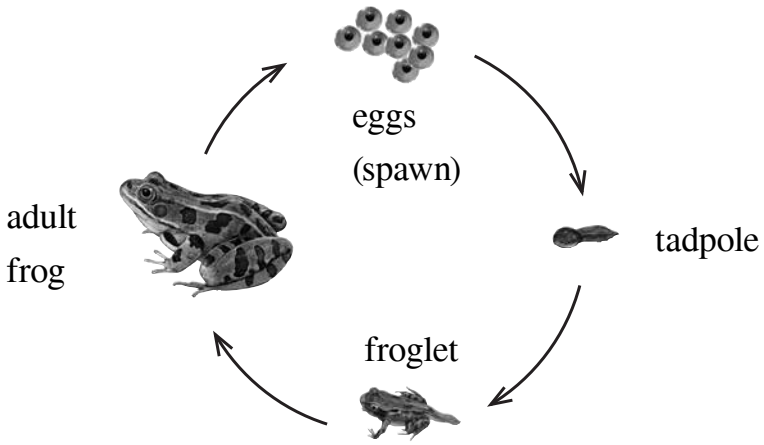
Ask, *What are some of the differences between the life cycles of a plant and of a duck?* Encourage the students to answer and write their responses in a table on the board.

Discuss and answer Questions 3 and 4 on page 41.

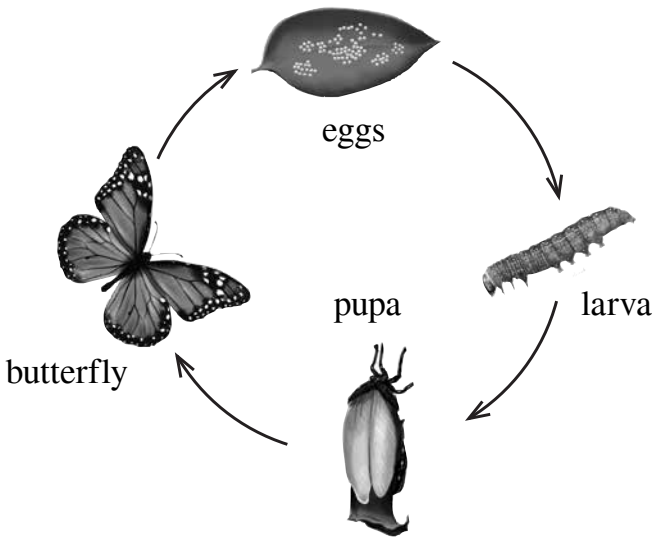
Homework/Going Further

The students should do Activity 4 on page 41.

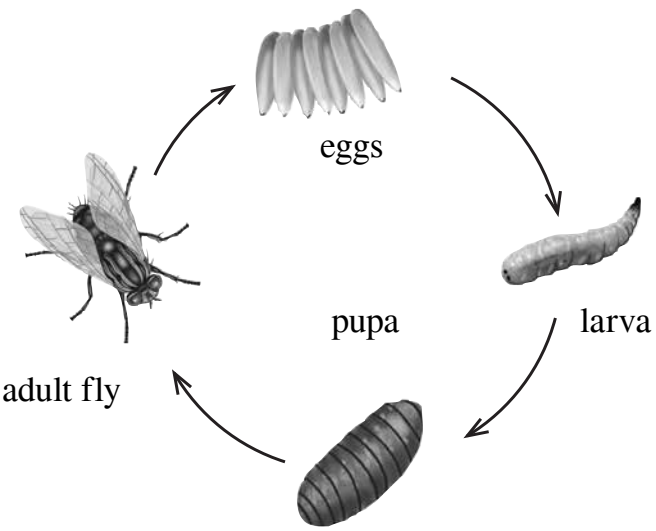
Cards: life cycle of a frog



Cards: life cycle of a butterfly



Cards: life cycle of a housefly



Worksheet 4-1

Q1. Complete the following sentences using the given words.
chloroplasts spawn inherit pupa cell membrane

a. The _____ is the outer wall of the cell.

b. Only plant cells contain _____.

c. Frogs lay eggs called frog _____.

d. Animals _____ characteristics from both parents.

e. The larva grows into a _____.

Q2. Write down the names of the young of these animals:

Animal	Young
	
	
	
	
	

Worksheet 4-2

Q3. Write down any five characteristics of living organisms.

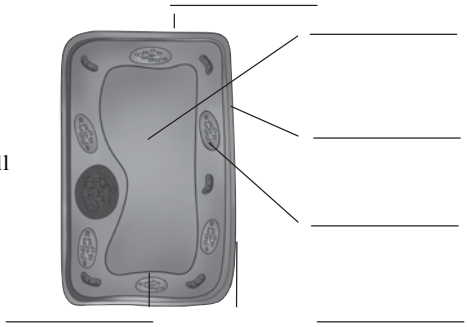
a. _____ b. _____

c. _____ d. _____

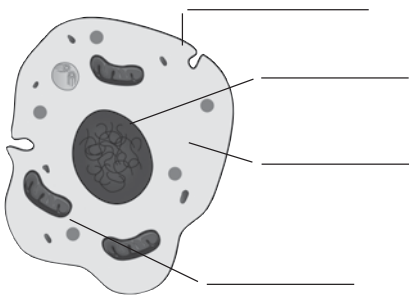
e. _____

Q4. Label the diagrams.

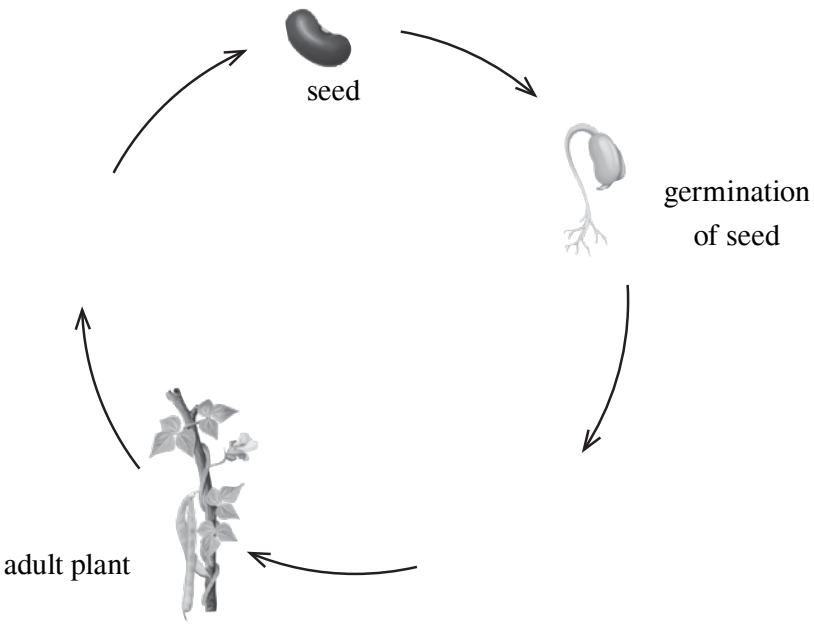
A plant cell



An animal cell



Q5. Complete the life cycle of a flowering plant.



life cycle of a flowering plant

Unit 5: Environment and Food Chains

Students will realise that the environment of all living creatures is the Earth and we must take care of our environment to keep a proper balance. They will review that living things need air, water, minerals (food), light, and warmth for survival. Students will learn classification of living things into different groups. This topic will discuss the food chain and how to classify animals according to the food they eat.

Lesson Plan 1 — Student Book Page 42

Learning Outcomes

Students should be able to:

- explain that the environment of all living creatures is the Earth.
- explain how we must take care of our environment (the Earth, the plants, and animals on it).

Introduction

Do Activities 1 and 2 on page 57.

Main Teaching

- Recall how all living things depend on each other for food, energy, support, and shelter.
- Explain that all those things that are around an organism and which affect its life are called its environment.
- Discuss different environments and the types of animals and plants living there, for example, desert, sea, land.
- Show the students a globe or a chart of the biosphere and explain that the biosphere is the part of the Earth which supports living things.
- Discuss the different components of the biosphere and the importance of each to life on Earth.

Guided Practice

Do the Discuss and Answer on page 43.

Independent Working

Ask the students to complete the Concept check on page 43.

Wrap up

Discuss Different Types of Environments.

Homework/Going Further

The students should draw pictures of two different environments.

Lesson Plan 2 — Student Book Pages 42–44

Learning Outcome

Students should be able to:

identify the non-living parts of the environment as air, water, soil, light, and minerals.

Introduction

Ask the students:

- Where do we live?
- Where do animals live?
- From where do we get our food?

Main Teaching

- Explain that the environment of all living creatures is the Earth. Every living thing has its own environment.
- Explain that it is important to take care of the environment.
- Explain the non-living things that make up the environment such as light, air, minerals, water, and soil.
- Explain that living things need water. Humans and other animals need water to help them digest food. Also, the chemical changes in the body can only take place if there is water.
- We use oxygen when we breathe in and we release carbon dioxide as we breathe out.
- Explain that soil contains minerals. Minerals are important for health and growth. Plants take in minerals through their roots directly from the soil, while animals take in minerals by eating plants.
- Explain that light is essential. Plants produce their own food using sunlight, carbon dioxide, and water. All animals, including humans, get energy from eating plants and other animals.
- Explain that in most places on the Earth, temperatures are neither too high nor too low, but just right to support life.

Guided Practice

Do Activity 1 on page 56.

Independent Working

Ask the students to complete the Concept check on page 46.

Wrap Up

List and discuss the non-living parts of the environment, such as light, air, minerals, water, and soil.

Homework/Going Further

The students should attempt Question 1 on page 54.

Lesson Plan 3 — Student Book Pages 44–46

Learning Outcomes

Students should be able to:

- explain how living things are classified into different groups.
- explain that different living things live in different environments.

Introduction

Ask the students to name some animals that are found around their homes.

Main Teaching

- Explain that living things are classified into two major groups: the animal kingdom and the plant kingdom.
- The animal kingdom is divided further into:
  - terrestrial animals, e.g., elephant, dog, lion
  - arboreal animals, e.g., squirrel, opossum, lizard
  - aquatic animals, e.g., fish, whale, turtle
  - aerial animals, e.g., vulture, bat, crow
- Explain the term habitat and discuss how the habitats of different animals are different.

Guided Practice

With the students prepare a table listing the different environments and animals that live well there.

Independent Working

Direct the students towards resources about different environments. Ask them to prepare short reports on the animals which live in different environments. Include information such as the kind of food they eat and how they protect themselves from extreme weather.

Wrap Up

Ask the students to classify some animals into different classes.

Homework/Going Further

The students should collect pictures of some endangered animals and information about why they are in danger. Students should use this information to write short reports in their notebooks.

Learning Outcomes

Students should be able to:

explain how plants make their own food through the process called photosynthesis.

Introduction

Show the students a potted plant and explain that a plant is a living thing. It grows, respires, and reproduces.

Main Teaching

- Explain that plants grow in all shapes and sizes. Scientists have identified over 380 000 different species of plant.
- Explain that all plants growing on land are called terrestrial plants while plants that grow in water are called aquatic plants.
- Discuss how some plants grow in hot, dry deserts where there is little water, and others grow in or near water.
- Explain that all the plants on the Earth make up the plant kingdom.
- Discuss the important role that plants play in our environment. All living things in the world depend directly or indirectly on plants for their food.

Guided Practice

Discuss the process of photosynthesis.

Independent Working

The students should draw a plant and label its parts.

Wrap Up

Write the names of a desert plant, a terrestrial plant, and an aquatic plant.

Homework/Going Further

The students should do Activity 3 on page 56.

Learning Outcomes

Students should be able to:

- explain how animals deal with temperature variation in different ways.
- draw a food chain to show how all living things depend upon each other for food.
- identify animals as herbivore, carnivore, omnivore, or parasite.

Introduction

Ask the students to look at the food chain on page 53. Discuss it and answer any questions.

Main Teaching

- Quiz the students about their living habits in summer and winter. How are they different from each other?
- Ask them if the animals change their living habits according to seasons as well.
- Relate how humans and animals both adapt and deal with temperature variations.
- Draw some examples of simple food chains on the board.
- Sketch the following on the board to demonstrate to the students that what they eat is part of a food chain. :

  Sun - grass - cow - a student
- Recall that plants are producers, i.e. organisms that make their own food through photosynthesis.
- Introduce the concept of animals as consumers, i.e. organisms that eat producers or other consumers.
- Explain the role of decomposers in all food chains.

Guided Practice

Using the earlier sketched food chain, ask the students to help you identify the primary producer, primary consumer, the instance of photosynthesis, and the secondary consumer.

Independent Working

Write the following terms on the board: plants, rabbit, fox, lion.

Ask the students to make a food chain by sequencing them. The students should also identify the producer and the consumers.

Wrap Up

Complete the Concept check on page 53.

Homework/Going Further

The students should list the names of some producers, consumers, and decomposers

Worksheet 5-1

Q1. Match each term to the correct definition.

consumer	the order in which food passes from one living thing to another
producer	breaks down the dead bodies of animals and plants
food chain	living organism that is capable of manufacturing its own food
decomposer	organism that feeds on plants and other animals

Q2. Use the given terms to make food chains.

a. Sun, snake, eagle, plant, caterpillar, frog

b. cat, seed, Sun, ant, bird

c. snake, rabbit, carrot, Sun, owl, fungi

Q3. Give two examples of each of the following.

i. herbivore a. _____ b. _____

ii. omnivore a. _____ b. _____

iii. carnivore a. _____ b. _____

Q4. Arrange these organisms to make a food chain:

Unit 6: Solids, Liquids, and Gases

Pupils already know about the term material. This topic will reinforce the concept that matter is made up of particles and has three states: solid, liquid, and gas.

Lesson Plan 1 — Student Book Pages 60–62

Learning Outcome

Students should be able to:

explain that matter is made up of particles.

Introduction

Make groups of four students. Give some Bucky balls to each group. Ask the students to use them to make different shapes. Use the activity to explain that, just as their different shapes are made of the balls, every different form of matter is made up of particles.

Main Teaching

- Explain that matter is anything that has mass and takes up space.
- Give each student some books and explain that the mass of each book is different. Explain that mass is the quantity of matter in a body.
- Show different sized beakers to demonstrate that different beakers have different volumes. Explain that volume is a measurement of how much space something takes up.
- Compare the weight of an inflated balloon to the weight of an empty balloon, to demonstrate that air has weight.
- Refer to the Bucky balls again and introduce the concept of particles. Explain that the particles are always moving about.
- Discuss how the particles in solids only vibrate, but in gases they move a lot.

Guided Practice

Activity: Explain that solids are made up of particles that are so tightly packed together that they cannot move about freely, like people in a very crowded room Because the particles are stuck in one place, the shape of a solid usually stays the same. Ask the students to stand as if in a crowded room where nobody can move.

Ask the students to imagine that there are fewer people in that room and people can walk around comfortably. In the same way, in liquids the particles are less tightly packed together, so they can move around more. Liquids do not have a fixed shape of their own because the particles move around more, so liquids take on the shape of the containers they are in. Ask students to role play moving around in this room.

Finally, ask the students to imagine that they are out in the playground and can move around freely because they have plenty of space. This is how the particles in gases move around and because of

this, they have no fixed shape or size; they will spread through the space available. Ask a few students to move around like gas particles.

Independent Working

Ask the students to work in pairs. Distribute one pack of sorting cards to each pair of students. Ask them to sort the cards based on how much mass they think each object has.

Wrap Up

Discuss and answer the Concept check on page 61.

Homework/Going Further

The students should draw shapes in their notebooks to represent a solid, a liquid, and a gas; show the arrangement of the particles in each of them.

Lesson Plan 2 — Student Book Pages 62–64

Learning Outcomes

Students should be able to:

identify the three states of matter: solid, liquid, and gas.

Introduction

Give every student an ice cube and ask them to rub it in their hands. Explain that the ice is melting, i.e. changing state from solid to liquid, because heat is released by the rubbing.

Main Teaching

- Write down the names of the three states of matter on the board and explain how changes of state occur. Discuss the effects of heating and cooling in bringing about changes of state.
- Refer to the melting ice and explain that melting occurs when the temperature is increased and a solid turns into a liquid.
- Explain that when a liquid cools, it becomes a solid as the particles move closer to each other. In water this process is called freezing.
- Put some water in a beaker and heat it. Explain that the bubbles are a gas and the water is boiling. Explain that the water has changed into a gas (water vapour). This change from a liquid to a gas is called evaporation.
- Display a glass of cold water with drops of water on the outside. Explain that when the water vapour (gas) touches a cold surface, it is cooled and changes into water. This process is called condensation.
- Introduce the terms physical change and chemical change and explain their meanings. For example, when a piece of paper is torn, it is a physical change because no new substance is formed, but when a piece of paper is burnt, it is a chemical change because a new substance (ash) is formed.

Guided Practice

Do Questions 3 and 4 on page 66.

Independent Working

The students should attempt the Activity on page 66.

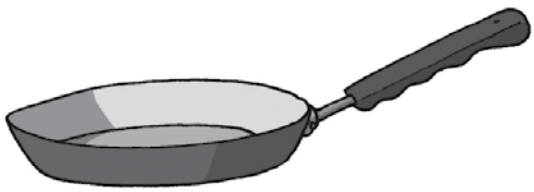
Wrap Up

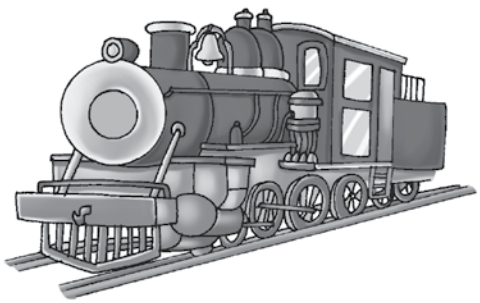
Show different objects and ask the students to identify the state of matter of each.

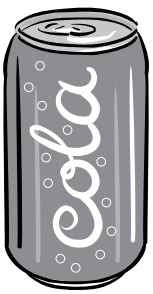
Homework/Going further

Ask the students to observe a puddle and record the way it changes in their notebooks.

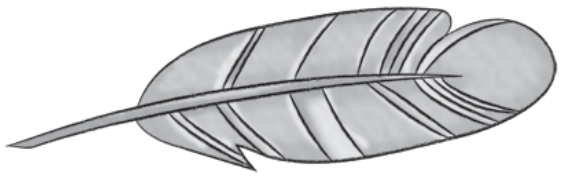
Cards: Matter sorting

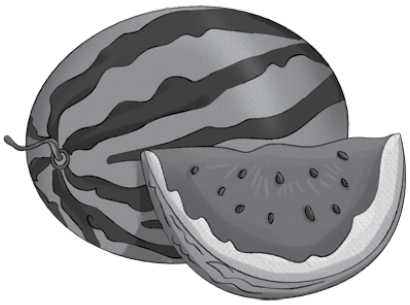


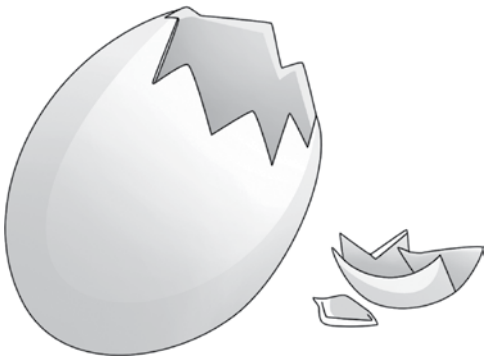


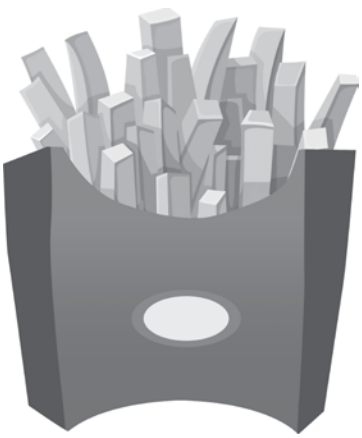


Cards: Matter sorting





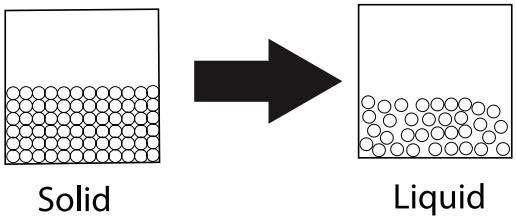




Worksheet 6-1

Q1. Choose the correct answers.

1. The process shown in the diagram is



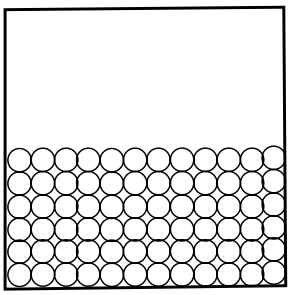
   a. melting
   b. boiling
   c. freezing
   d. condensation

2. Some materials, like wood, burn instead of melting. Why does this happen?

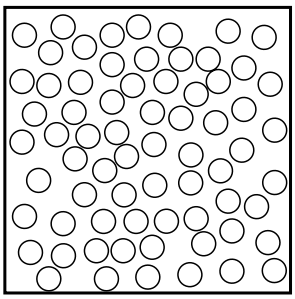
   a. because they are solids
   b. because they react with oxygen
   c. because they are liquids
   d. because their melting point is very high

3. Which diagram shows the arrangement of the particles in a solid?

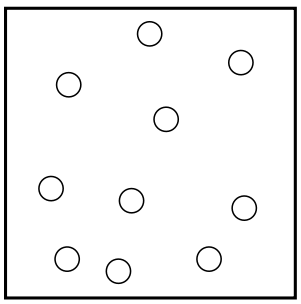
   a.



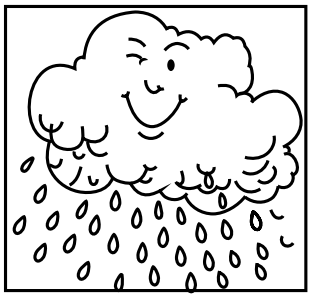
   b.



   c.

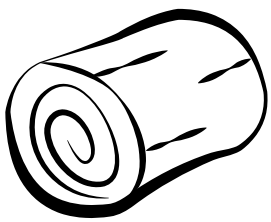


   d.



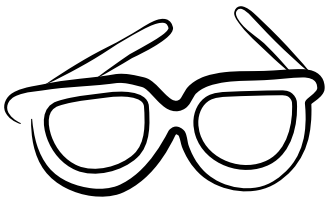
4. Which one of this group is the odd one out?

   a.

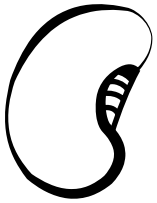


   b.

   c.

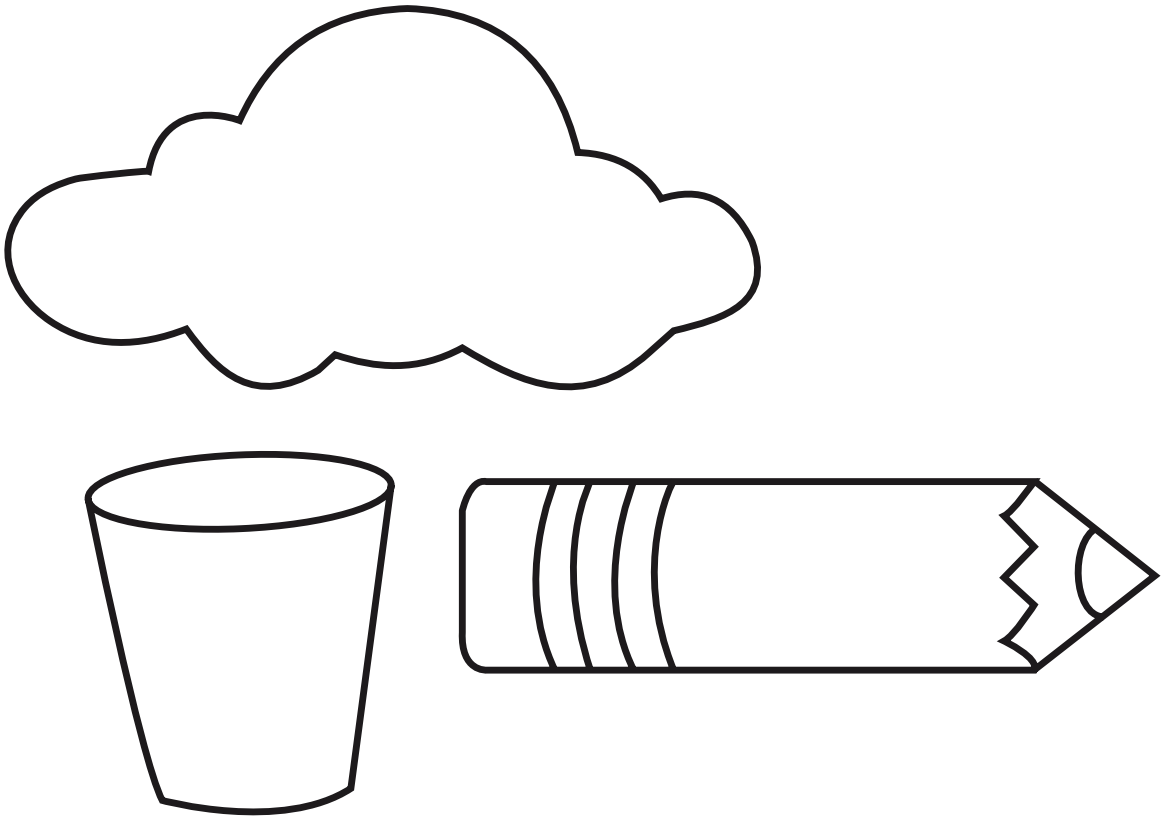


   d.



Worksheet 6-2

Q2. Draw three examples of each state of matter.



Q3. Draw a diagram to explain the changes of states of matter.

Q4. Physical or chemical change? Write P for physical change and C for chemical change.

a. baking bread ☐
b. digestion of food ☐
c. ice cream melting ☐
d. paper burning ☐
e. mixing sugar in water ☐

Unit 7: The Study of Matter

Students will learn about different substances, their properties, and their effect on each other (physical or chemical changes). They will explore techniques for separation of mixtures.

Lesson Plan 1 — Student Book Pages 67–69

Learning Outcomes

Students should be able to:

explain that chemistry is the study of substances, their properties, and their effects on each other.

Introduction

Show the students a cake and explain that a cake is made of flour, eggs, butter, and baking soda, but does not look like any of these ingredients.

Main Teaching

- Explain the properties of water: it is a liquid; it has a definite volume but it does not have a definite shape; it does not have a particular smell, and you can see through it.
- Explain that often, when substances are mixed together, a new substance is formed because of a reaction. (Refer to the cake ingredients.)
- Demonstrate that when sugar is mixed in water a solution is formed. This is a physical reaction because no new substance is formed. The sugar is soluble in water and can be separated from the water again.
- Explain that a physical reaction is one in which no new substance is formed.
- Explain that sand and soil are insoluble in water, so they will not make a solution if they are mixed together.
- Demonstrate that sand is insoluble in water.
- Introduce the term mixture and explain that a substance that is not pure is called a mixture. Give examples of mixtures like tap water and air.

Guided Practice

Help the students to do the Discuss and Answer on page 69.

Independent Working

The students should answer Question 1 (iv-v) on page 72.

Wrap Up

Ask the students to explain the terms chemical change and physical change.

Homework/Going Further

Ask the students to write three chemical and three physical changes.

Lesson Plan 2 — Student Book Pages 69–71

Learning Outcome

Students should be able to:

describe the different ways in which substances can be separated from water: sedimentation, decantation, filtration, and evaporation.

Introduction

Prepare a mixture of soil, iron filings, and salt, and demonstrate how to separate the mixture into its components.

- Remove the iron filings by magnetic separation.
- Remove the sand by filtration.
- Remove the salt by evaporation.

Main Teaching

Explain the methods of separation one by one:

- Refer to the demonstration of filtration and explain that filtration is a method used to separate insoluble solids from a liquid. Explain that solid particles which are bigger than the holes in the filter paper remain on it. These solids are called the residue, and the liquid which passes through the filter paper is called the filtrate.
- Demonstrate the methods of sedimentation and decantation.
- Sedimentation is a method used to separate insoluble solid particles from a liquid.
- First the mixture is left undisturbed so that the heavier, solid particles settle at the bottom of the container. This settling of particles is called sedimentation.
- Decantation is also a method used to separate insoluble solid particles from a liquid.
- After sedimentation, the liquid from this mixture is poured off into another container by tilting the container very gently. The pouring of liquid in this manner is called decantation.
- Refer to the demonstration of evaporation and explain that it is used to obtain salt from sea water.
- Refer to your use of a magnet for magnetic separation.

Guided Practice

Help the students do Activities 1 and 2 on page 74.

Independent Working

The students should attempt Question 5 on page 73.

Wrap Up

Discuss the Environment Watch on page 71.

Homework/Going Further

Discuss Question 2 on page 72.

Worksheet 7-1

Q1. What is matter?

_____

_____

Q2. What are the differences between physical and chemical changes?

_____

_____

Q3. List the methods of separation of mixtures.

a. _____

b. _____

c. _____

d. _____

Q4. Complete the table.

Method	Mixture
	insoluble solids from a liquid
magnetic separation	
	soluble substance from a mixture
evaporation	

Q5. Complete the table.

Mixture	Solute	Solvent
salt + water		
water + sand		
sugar + water		

Unit 8: Heat

Students will learn and understand differences between the terms hot, cold, and temperature. They will differentiate between heat and temperature.

Lesson Plan 1 — Student Book Page 76

Learning Outcomes

Students should be able to:

- explain that matter is made of particles called atoms.
- explain that when an object is heated, its particles move faster.
- explain that when an object is cooled, its particles move more slowly.

Introduction

Ask a student volunteer to touch a hot cup of tea or an ice cube. Observe their reaction and ask them the reason for their reaction.

Main Teaching

- Explain the terms heat and temperature.
- Recall that everything that has weight and occupies space is called matter. Matter is made up of tiny, invisible particles called atoms.
- Put a glass of water in the freezer and explain that when we cool an object, its particles move more slowly because they release energy.
- Put a glass of water in direct sunlight and explain that when we heat an object, its particles start moving faster because they get energy.
- Take the ice cube out of the freezer and show melting.
- Recall that heat can melt solids and it can evaporate liquids.
- Recall that cooling can freeze liquids and it can condense vapour.
- Introduce the term Absolute zero. -273^{o} Celsius is the coldest temperature that can be measured. Nothing can be colder than Absolute zero.

Guided Practice

Demonstrate Activities 1, 2, and 3 on page 82.

Independent Working

Ask the students to do the Concept check on page 78.

Wrap Up

Students are to answer Question 4 on page 81 in their notebooks.

Homework/Going Further

The student should explain the methods of transfer of heat with the help of a diagram, in their notebooks.

Lesson Plan 2 — Student Book Pages 77–79

Learning Outcomes

Students should be able to:

- explain that temperature is a measure of how hot or cold something is.
- explain that the heat of an object is the total amount of thermal energy it contains.

Introduction

Show the students a thermometer and explain that it is used to measure temperature.

Main Teaching

- Introduce the terms heat and temperature and differentiate between them. Temperature is the measure of the average energy of the particles in an object; the heat of an object is the total amount of thermal energy an object contains.
- Show a Celsius and a Fahrenheit thermometer and explain the different temperature scales.

Guided Practice

Demonstrate activities 5 and 6 on page 83.

Independent Working

Ask the students to attempt Question 5 on page 81.

Wrap Up

Answer Question 2 on page 80 of the students' book.

Homework/Going Further

The students should answer Question 3 on page 80.

Worksheet 8-1

Q1. Correct the incorrect statements.

a. All things are made up of tiny particles called atoms.
b. We can tell how hot something is by using our hands.
c. When the bulb of a thermometer is dipped into hot water, the level of the mercury rises.
d. When the bulb of a thermometer is dipped into cold water, the level of the mercury rises.
e. The freezing point of water is 32ºC.
f. The boiling point of water is 100ºF
g. If you have a fever, your body temperature will be below normal body temperature.

Q3. Explain these terms.

a. Absolute zero

b. thermometer

c. temperature

d. heat

Q2. Draw a labelled diagram of a clinical thermometer.

Unit 9: Force and Machines

The topic discusses how forces can change the speed, direction or shape of an object and different amounts of force have different effects. That is, some objects can return to their original shape after the release of force. Students will discover that machines can be simple or compound and can be used to make work easier and faster. They will deduce the formula of Speed.

Lesson Plan 1 — Student Book Pages 84–85

Learning Outcomes

Students should be able to:

- explain that forces can change the speed, direction, or shape of an object.
- explain that different amounts of force have different effects.
- do calculations using the formula *speed is equal to distance divided by time*.

Introduction

Put a toy car on the floor and push it gently. Ask a student to measure the distance it travelled. Then push it hard and ask a student to measure the distance travelled.

Main Teaching

- Explain that we need to exert a force to perform a job. If we do not push the car, it will not move.
- Explain that some jobs need more force and some need less. When a car is pushed gently it covers less distance because less force is applied, but when it is pushed hard, it covers more distance because more force is applied.
- Ask a student volunteer to lift a spring balance to which a bundle of books has been tied vertically upwards and observe the stretching in the spring.
- Inflate a balloon halfway and inflate another balloon fully. Demonstrate that if we let the air out from both balloons, that the one that contains more air will travel farther. The more air in the balloon, the farther it will travel.
- Explain that forces are pushes or pulls which can change the speed, direction, or shape of an object.
- Explain that force can even stop a moving object.
- Ask the students to lift a bundle of 4 textbooks and then lift a chair. Ask them which one required greater force.
- Make sure that the students understand the concept that the greater the force, the greater the change in distance covered by an object.
- Introduce the term speed and define it as how fast something moves. Things move at different speeds.
- Write down the formula for calculating speed on the board and explain it.

Guided Practice

Use the formula to calculate the speeds of the following:

➢ a car that covers 60km in 5 hours

- a cyclist who covers 10km in 2 hours
- a train that travels 1000km in 10 hours

Independent Working

Ask the students to arrange the force cards in order, from the greatest to the least force.

Wrap Up

Listen to students' comments on the Discuss and Answer on page 84.

Homework/Going Further

Ask the students to write in their notebooks five examples of the use of force from daily life.

Lesson Plan 2 — Student Book Pages 85–87

Learning Outcomes

Students should be able to:

- identify the six types of simple machine.
- distinguish between simple and compound machines.
- explain how machines can be used to make work easier and faster.

Introduction

Show the students some machines such as a hair a dryer, a juicer, a bicycle, etc., and explain that these are compound machines and they make our work easier.

Main Teaching

- Explain that there are two main kinds of machine: simple machines and compound machines.
- Put an apple on the table and cut it with a knife. Explain that a knife is a simple machine.
- Explain that machines are tools that make our work easier.
- Explain that simple machines have few or no moving parts and are used to apply force to do work.
- Introduce the six types of simple machine and discuss them one by one.
- To introduce the lever, show a rod that rests and moves on a support called a fulcrum or pivot. The force which is applied to do the work is called the effort. The object that is moved or lifted is called the load. A see-saw is an example of a lever.
- Make a ramp using a piece of cardboard and pull a toy car up it to demonstrate that inclined planes make it easier to roll objects from lower to higher, or higher to lower surfaces.
- Give the students screws and explain that they are used to fasten or hold things together. Use a screwdriver to demonstrate that by rotating it, the screw can be driven into objects to hold them together.
- Show a wheel and axle on roller skates. Point out that an axle is a rod that goes through a wheel and allows the wheel to move with it. Give examples of axles of cars and bicycles.
- To explain a pulley, show a model of a flagpole and demonstrate how it works.
- Demonstrate how a wedge can be used to break a log into two sections. Point out that a wedge

consists of two inclined planes joined back to back.

- Show a bicycle and ask the students to identify different types of simple machine in it. Explain that a compound machine is the combination of two or more simple machines.

Guided Practice

Help the students to answer Questions 3 and 4 on page 89.

Independent Working

Ask the students to answer Questions 5 and 6 on page 90.

Wrap Up

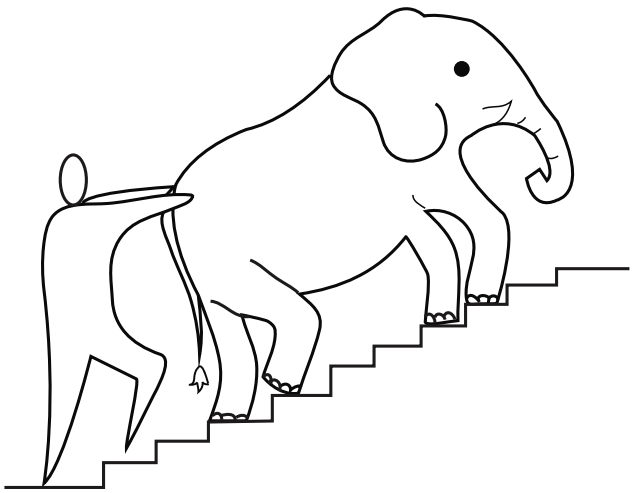
Write this list of objects on the board: knife, bottle-opener, drill, ramp, fork, bicycle, pins, see-saw, car, flagpole, windmill, window blind, door hinge, and fork.

Instruct students to draw a table with six columns in their notebooks, titled with the names of the six simple machines, and classify the objects under the appropriate headings.

Homework/Going Further

Ask the students to complete activities 1 and 2 on page 91.

Cards: Force



Worksheet 9-1

Q1. Use the words to complete the sentences.

machine force movements work does pulley

a. Energy is needed to perform _____.

b. A _____ is made with a wheel and a rope.

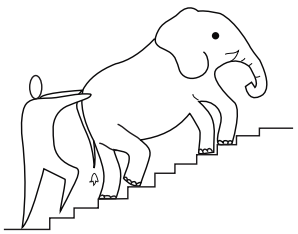
c. A tool that makes work easier is called a _____.

d. We apply _____ for pushing or pulling.

e. A trolley driver _____ work.

f. Force is applied to change the direction or _____ of a body.

Q2. Which of the following activities requires most energy?

			
a.	b.	c.	d.

Q3. Name the six types of simple machine.

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

Worksheet 9-2

Q4. Identify the simple machines shown below.

a. 

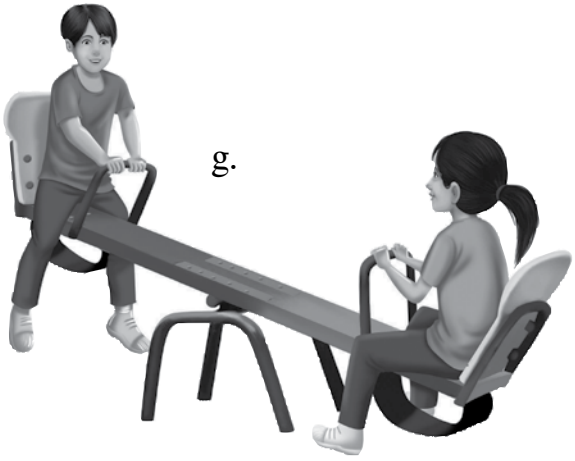
b. 

c. 

d.

e. 

f. 



g.

Q5. Identify the simple machines in these compound machines.

Unit 10: Circuits and Switches

Students will learn that the electricity is energy which flows through a material and requiress a closed or complete circuit to flow. Electricity can not flow through an open or incomplete circuit. They will also learn about switches which can control the flow of the current and about the simple circuits and their types.

Lesson Plan 1 — Student Book Page 92

Learning Outcomes

Students should be able to:

- explain that electricity that flows through a conductor is called a current.
- explain that electricity needs a closed, or complete, circuit to flow.
- explain that electricity will not flow through an open, or incomplete, circuit.

Introduction

Ask the students to pretend to be electricians and ask them to think about and decide what type of circuit allows for a flow of electricity. Ask students if they can identify the differences between a complete and an incomplete circuit. Once identified, ask for suggestions about how to fix the incomplete circuits.

Main Teaching

- Explain the term circuit and show the difference between complete and incomplete circuits. Demonstrate that electricity needs a complete circuit to flow; that is, a closed circuit.
- Demonstrate that if there is a gap or break in the circuit, the electricity will not flow. This is called an open, or incomplete, circuit.
- Construct a simple circuit and point out the different components and discuss what each does.
- Talk about how we turn on a light at night or when it is dark, but turn it off during the day. To do this a switch is used. Show the students a switch board and ask them to point out the switches of different fans and lights in the classroom.
- Discuss and demonstrate how switches control the flow of electric current. When the switch is turned on, the circuit becomes complete, so the appliance starts working. However, when the switch is turned off, the circuit becomes incomplete and the appliance stops working.
- Explain that the bulb glows when the circuit is complete. The electric circuit becomes complete, or closed, when the switch is closed.

Guided Practice

Divide the students into groups. Provide each group with a battery cell, a torch bulb with holder, a switch, and three pieces of connecting wires. Draw a labelled circuit diagram on the board and ask the students to follow the diagram to construct an electric circuit. Direct them to keep the switch open and observe what happens. Then ask them to close the switch and observe what happens.

Independent Working

Ask the students to draw labelled diagrams of complete and incomplete circuits in their notebooks.

Wrap Up

Discuss Do You Remember on page 92.

Homework/Going Further

The students should attempt Activity 3 on page 97.

Lesson Plan 2 — Student Book Pages 93–94

Learning Outcomes

Students should be able to:

- identify simple, series, and parallel circuits.
- explain the terms 'conductor' and 'insulator'.

Introduction

Show the students a series circuit and a parallel circuit and begin by displaying the circuit A and B diagram on the board. https://betterlesson.com/lesson/resource/3061023/circuit-a-and-b-diagram-jpg

Main Teaching

- Explain series and a parallel circuits and ask the students to make predictions about the brightness of the light bulbs in each circuit.
- Discuss the characteristics of a series circuit: the current has only one path to flow along so if one bulb is removed, the circuit is broken and all the other bulbs stop working. Also, because they share the energy, each bulb in the circuit glows less brightly.
- Discuss the characteristics of a parallel circuit: there is more than one path for the current to flow along. If one bulb is removed, the circuit is not broken, and the other bulbs continue to shine. Also, because the bulbs do not share energy with one another, each bulb glows brightly.
- Explain the terms 'conductor' and 'insulator', and demonstrate by using different materials to try to complete a circuit.

Guided Practice

Help the students to construct series and parallel circuits and discuss the characteristics of series and parallel circuits with their peers.

Ask the students to record their ideas and provide time for each group to share their thinking with the class.

Independent Working

Ask the students to construct a simple circuit with a battery, light bulb, and a switch. They should draw the circuits in their notebooks. They should then construct two simple series circuits, each with the number of light bulbs identified. Remind them that in a series circuit, there is only one path for electricity to flow along. Tell them to keep the battery source the same and ask them to rank the relative brightness of the bulbs in each circuit.

Invite them to construct two parallel circuits --one with two light bulbs and the other with three light bulbs. Remind them that in a parallel circuit there are multiple pathways for electricity to flow

along. Again, they should keep the battery source the same. They should draw the circuit diagrams in their table and rank the relative brightness of the bulbs.

Wrap Up

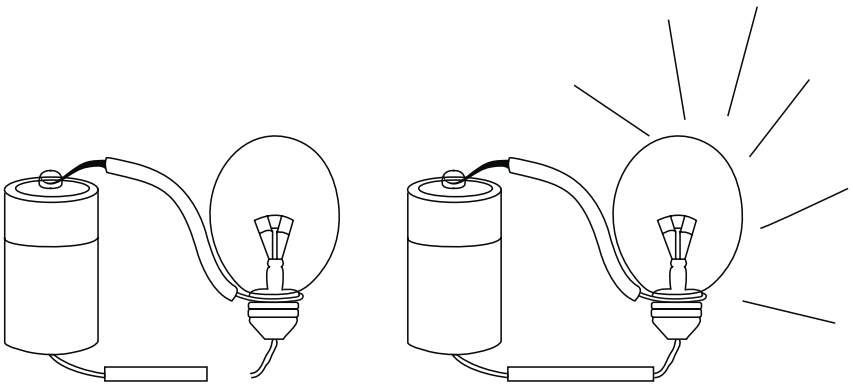
Give the students time to share their observations of each circuit with their peers. Ask them to review the differences between parallel and series circuits and to explain how each might be used to meet a human need.

Homework/Going Further

Ask the students to choose one complete circuit to use to create their own model of a lighthouse. Ask them to construct a lighthouse with a complete circuit and a switch. Ask them to identify the conductors and insulators used in the model.

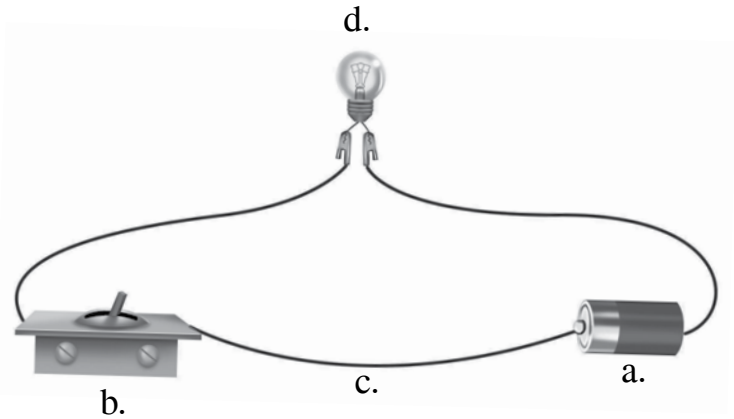
Worksheet 10-1

Q1. Identify the complete and incomplete circuit.

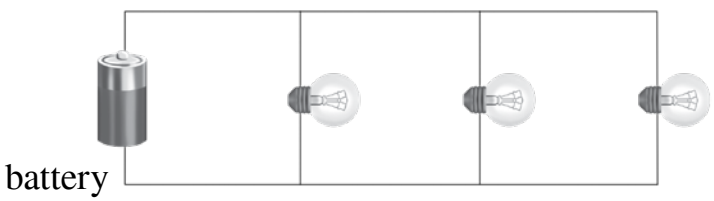


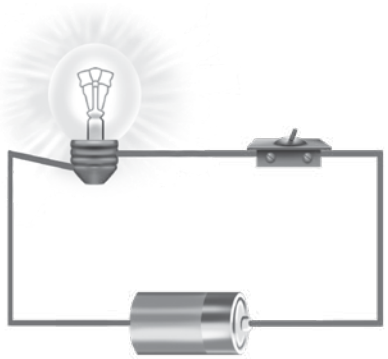
a b

Q2. Name parts a – d in the diagram.



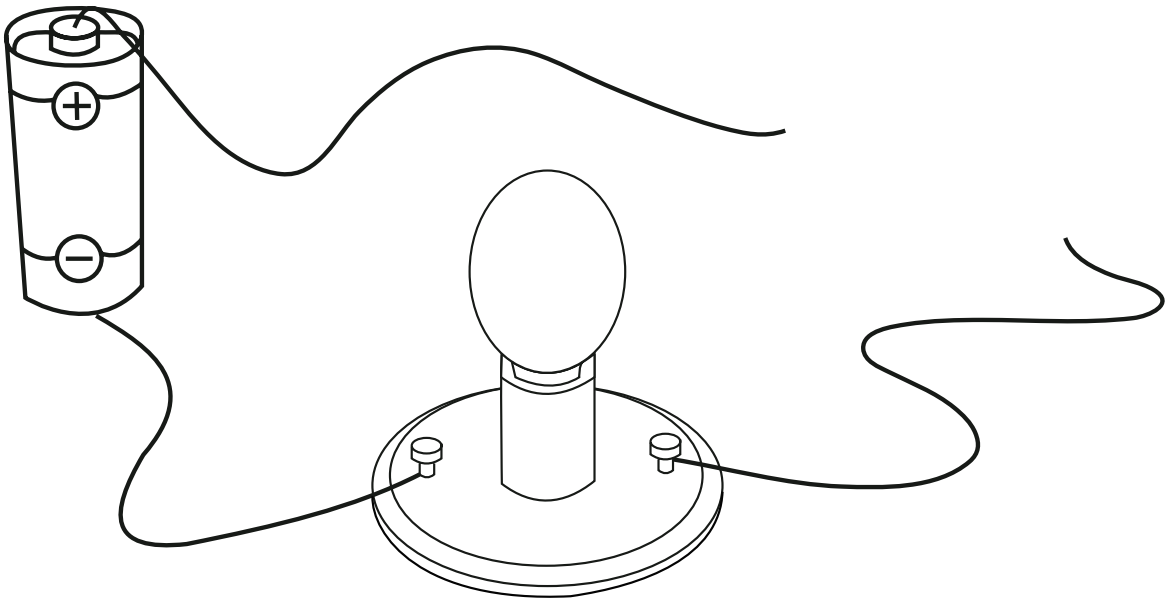
Q3. In which of these circuits will the bulb(s) glow most brightly?





Worksheet 10-2

Q4. Look at the diagram. A conductor is a material that allows electricity to flow through it. An insulator is a material that electricity cannot flow through. To determine whether an object is a conductor or insulator, you can build a simple circuit with a battery, light bulb, and three pieces of wire.
Touch the ends A and B of the wire to the objects you are testing. If the bulb lights up, the object is made from a material that is a conductor. If it does not, the object is made from a material that is an insulator.



Complete the table.

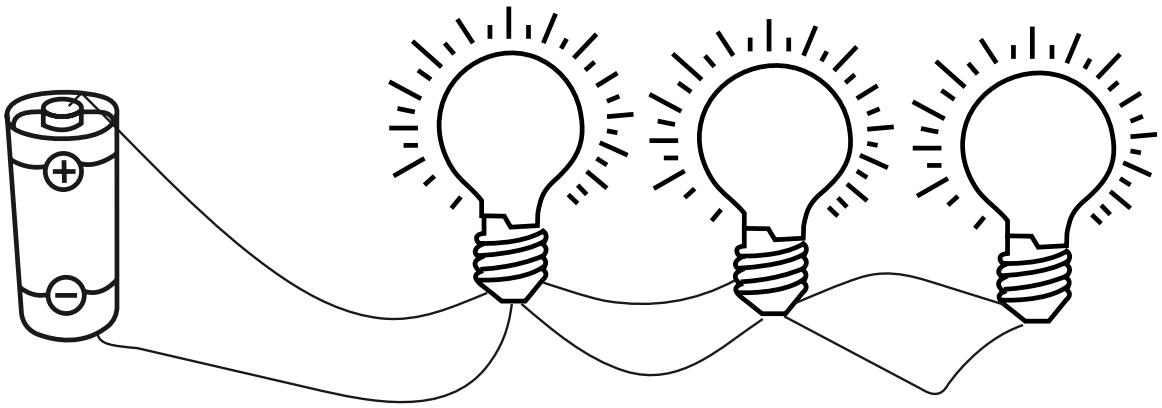
Material	Conductor or Insulator
cloth	
pencil	
paper	
rubber band	
coin	
screw	
pin	
glass	
toothpick	
key	

Q5. Choose the correct answers:

1. What supplies the energy in an electric circuit?
   a. a conductor
   b. a light bulb
   c. a wire
   d. a battery

Worksheet 10-3

2. Which type of circuit is this?



a. series
b. parallel
c. open
d. all of the above

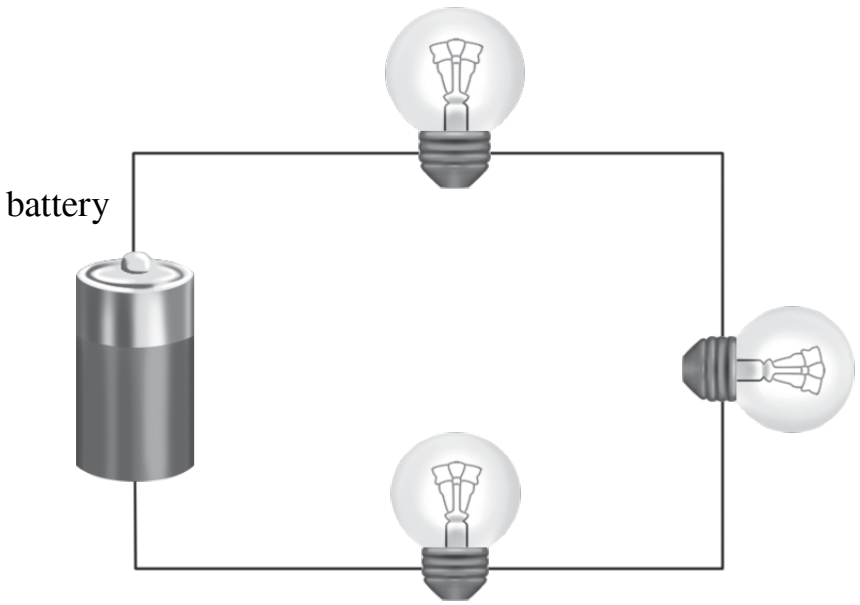
3. Which of these could be used as a conductor in a circuit?

a. a pencil
b. a gas
c. a rubber eraser
d. a needle

4. Which material is a conductor?

a. plastic
b. iron
c. glass
d. rubber

5. Which type of circuit is this?



a. series
b. parallel
c. open
d. all of the above

Unit 11: Magnetism

The pupil will explore the magnetic and non- magnetic materials and discover the uses of magnets. They will learn about magnetisation and demagnetisation.

Lesson Plan 1 — Student Book Page 98

Learning Outcomes

Students should be able to:

- describe ways in which magnets are useful
- differentiate between magnetic and non-magnetic materials.

Introduction

Bring to the lesson a magnet that is wrapped in paper and ask students to use it to pick up some pins. When they show surprise, slowly unwrap the magnet and show it to them.

Main Teaching

- Put some nails, screws, and pieces of paper on the table and demonstrate that a magnet can attract objects made of iron and steel, but cannot attract paper.
- Explain the term magnetic: materials that are attracted by a magnet are magnetic materials.
- Explain the term non-magnetic: materials that are not attracted by a magnet are non-magnetic materials.
- Place a magnet at some distance from some pins and demonstrate that there is an area of invisible force around a magnet that is called the magnetic field. Slowly bring the pins closer to the magnet until the pins are attracted by it.
- Show pictures of telephones, speakers, computers, washing machines, televisions, and even some high speed trains (e.g. the Maglev) and explain that magnets are found in all these devices.

Guided Practice

Help the students do Activity 1 on page 103.

Independent Working

The students should complete the table in Question 4 on page 102.

Wrap Up

Take comments from the students about the Discuss and Answer on page 98.

Homework/Going Further

The students should attempt Activities 2 and 3 on page 103.

Learning Outcomes

Students should be able to:

- identify the north pole and south pole of a magnet.
- explain that opposite poles of a magnet attract each other.
- explain how magnets should be stored to prevent demagnetisation.

Introduction

Put two magnets together and show how like poles attract and unlike poles repel.

Main Teaching

- Explain that the Earth is a huge magnet. Its magnetic field is like a bar magnet at its centre.
- Show that the north and south poles of a magnet are the places where the magnetism, or the magnet's power, is strongest.
- Use magnets to show again how like poles repel each other. Two south poles will repel each other, so will two north poles.
- Use magnets to show how unlike poles attract each other. A south pole will attract a north pole.
- Explain that we should not heat, drop, or hammer a magnet because it will become demagnetised.

Guided Practice

Stroke a metal paper-clip across a magnet about 50 times in the same direction, then see if it will pick up small bits of metal. If it does not work, try stroking it across the magnet another 50 times.

Independent Working

Ask the students to note how long the paper-clip stays magnetised. Try the same thing with a nail, a pin, and other small metal objects and record how long each remains magnetised.

Wrap Up

Students should complete Question 1 on page 101 of their students' book.

Homework/Going Further

Ask the students to research the magnetic game board on page 103.

Worksheet 11-1

Q1. Describe two ways in which a magnet can be demagnetised.

Q2. Use the words below to complete the sentences; remember words maybe used more than once.

poles magnet magnetic

a. Any material that can attract iron is called a _____ .

b. The force which holds objects to a magnet is called _____ force.

c. We can pick up iron filings using a _____

d. A magnet has two ends called _____ .

e. Magnets are made when metals like iron are exposed to strong _____ fields.

Q3. Cross out the names of the objects which are non-magnetic.

plastic spoon, drawing pin, ceramic cup, paper clip, car body, gold chain, wooden chopstick, metal fork, plastic needles, lock.

Q4. What is a magnetic field?

Q6. At which part of a magnet is the magnetic field strongest?

Worksheet 11-2

Q7. Draw some different types of magnets.

Q8. Draw the lines of magnetic force around this magnet:

Unit 12: Sound

Pupil will explore the types of sound waves such as regular, irregular, or repetitive sound waves. Students will learn how sound is measured and that echoes are produced when sound waves bounce off surfaces. Students will brainstorm the ways to reduce noise pollution which causes health problems.

Lesson Plan 1 — Student Book Page 104

Learning Outcomes

Students should be able to:

explain that sound waves travel outwards in circles.

Introduction

Do Activity 1 on page 112.

Main Teaching

- Explain that sound is a form of energy. It is produced by vibrations and travels in waves.
- Explain that every sound that we hear is caused by something shaking.
- Demonstrate that when a stone hits the surface of water, the waves travel outwards in circles. Explain that sound waves also travel outwards in circles, but we cannot see them.
- Things that produce sound shake back and forth very quickly. These shaking movements are called vibrations. Vibrations cause the air in front of them to vibrate; when the vibrations reach our ears, they cause the ear drums to vibrate, and we hear the sound.
- Beat a drum and explain that sound moves through the air by pushing the air particles around its source. When this happens, the particles are first pressed together and then they spread apart, or they expand.
- Each particle passes its energy to the next particle and in this way vibrations are passed on from molecule to molecule. This movement is called a sound wave.
- Draw a sound wave on the board and explain it.

Guided Practice

Perform Activity 2 on page 112 and explain how sound is created.

Independent Working

Ask the students to draw sound waves in their notebooks.

Wrap Up

Ask a student volunteer to explain how sound travels from its source to the ear.

Homework/Going Further

Ask the students to write the names of 5 different sources of sound.

Learning Outcome

Students should be able to:

distinguish between noise (irregular, repetitive sound waves) and music (regular, repetitive sound waves).

Introduction

Ask the students to look at the picture on page 108 and discuss the different types of sounds.

Main Teaching

- Discuss the difference between noise and music. Irregular, repetitive sound waves create noise, while regular, repetitive waves produce musical notes.
- Ask the students to do the Discuss and Answer on page 105.
- Explain that a loud sound is produced by a larger vibration and a softer sound is produced by a smaller vibration. Discuss the sounds produced by different objects.
- Draw sound waves with high frequency and low frequency and discuss the differences.

Guided Practice

Make groups of four students. Demonstrate to them the making of a Jaltarang using 7 identical bowls containing different volumes of water. Ask the students to try composing music.

Independent Working

Each group should present its musical composition.

Wrap Up

Ask the students to draw sound waves with high frequency and low frequency in their notebooks.

Homework/Going Further

The students should make a string phone using two paper cups and string. Write a short note in their notebooks discussing their findings.

Learning Outcomes

Students should be able to:

- explain that sound can be measured.
  distinguish between loud and soft sounds.
- explain that sound needs a medium to travel through; it cannot travel through a vacuum.

Introduction

Ask the students to look at the table on page 107 and discuss how the hearing capacities of different animals are different.

Main Teaching

- Explain that sound that is pleasing to the ears is musical. Sounds which we find unpleasant are called noise. Musical sounds and noise are produced by a number of different vibrations reaching our ears at the same time.
- Explain that sounds can travel through water.
- Explain that sound travels at different speeds through different materials.
- Explain that sound travels best through solids. Invite a volunteer to hold a watch between his/her teeth. Ask their reaction to the movement of the clock hands. Explain that teeth are solid so sound vibration can travel through them.
- Sound cannot travel in a vacuum, therefore the noise of the explosions on the Sun cannot be heard on Earth.

Guided Practice

Help the students to answer Questions 4 and 5 on page 111.

Independent Working

Identify some sounds around you and differentiate between soft and loud sounds.

Wrap up

Discuss Question 3 on page 114 and revise the main points of this topic.

Homework/Going Further

Ask the students to search the internet to find places where echoes can be produced.

Learning Outcome

Students should be able to:

explain that echoes are produced when sound waves bounce off hard surfaces.

Introduction

Throw a ball against the wall and catch it. Do this two or three times. Explain that when sound bounces back off a wall it produces an echo.

Main Teaching

- Introduce the term echo and explain that sound is reflected when it strikes a hard surface. This bouncing back of sound is called an echo.
- This means that when sound waves hit a physical barrier such as a cliff or a wall, they bounce back and we hear the sound again. The reflected sound is called an echo. We hear louder echoes in a valley or a hall.
- Explain that scientists have invented some instruments which can be used by fishermen to detect shoals of fish in the sea. Explain how an echo sounder works.
- Explain that bats do have eyes but they cannot see. They use echoes to detect and catch flying insects.
- Show a video https://www.youtube.com/watch?v=kp5jyZtoTIg or https://www.youtube.com/watch?v=laeE4icRYp4 about echolocation in bats. Answer any questions.
- Explain that noise is any sound that is unpleasant. Ask the students to name some unpleasant sounds around them.
- Discuss noise as a form of pollution of the environment. Discuss the effects of noise pollution and the ways in which it can be reduced and controlled.

Guided Practice

Complete the Concept check on page 109.

Independent Working

Ask the students to attempt Activity 4 on page 112.

Wrap Up

Ask the students to try to produce an echo in the classroom.

Homework/Going Further

Draw a poster showing ways of preventing noise pollution.

Worksheet 12-1

Q1. Cross out the wrong word in each sentence:

a. Movements that make the air shake back and forth are called waves / vibrations.
b. The passing of energy from one particle to the next is called a vibration / sound wave.
c. Striking a gong hard makes a loud / soft sound.
d. Sounds cannot travel through solids / space.
e. Sound travels better through solid / liquids.
f. Sounds that we find unpleasant are called noise / music.
g. Reflected sound is called an echo / ray.
h. Very loud sounds can damage the eyes / ears.

Q2. Match the description to the correct term.

Term	Description
echolocation	high, squeaking sounds made by bats to find their way in the dark and to catch flying insects
frequency	an instrument that is used to send sound waves into the sea to detect shoals of fish, and to make maps of the seabed
echo	the number of vibrations per second
echo sounder	what is produced when sound waves hit a barrier and bounce back so that we hear the sound again

Q3. Explain the term echo.

_____

_____

Q4. Draw sound waves of high and low frequency.

Unit 13: The Movement of the Earth

This topic is about the types of movements of the Earth. Students will learn that seasons are caused by the Earth's tilted axis and its revolution around the Sun.

Lesson Plan 1 — Student Book Pages 115–117

Learning Outcomes

Students should be able to:

- explain that the Earth spins on its axis (called rotation).
- explain that the Earth orbits the Sun (called revolution).

Introduction

Do Activity 3 on page 122.

Shine a torch on a globe from one side. Explain that the part of the globe that is facing the Sun has daytime. Rotate the globe on its axis. Ask the students which part has day and which has night.

Main Teaching

- Explain that the Sun does not move. The Sun appears to move across the sky, but actually, it is the Earth that is moving, not the Sun.
- Ask the students to read the text page on 115 to find out about the characteristics of the Earth.
- Discuss the characteristics of the Earth and explain that the shape of the Earth is almost a sphere.
- Discuss the imaginary line on which the Earth rotates which is called its axis.
- Explain that the Earth has two types of movement. The spinning of the Earth on its axis makes the Sun appear to move from east to west in an anticlockwise direction. This movement is called rotation. The rotation of the Earth on its axis causes day and night.
- Explain that as the Earth spins, the part that faces the Sun has day and the part that is away from the Sun has night.
- Show the students a globe. Explain that the rotation of the Earth means it spins on its axis. At the same time it also moves around the Sun. This movement is called revolution. Revolution is a movement in which one object moves around another object.
- Discuss how the Earth revolves around the Sun, and the Moon revolves around the Earth, in fixed paths called orbits.

Guided Practice

Help the students answer Question 2 on page 119.

Independent Working

Ask the students to list the characteristics of the Earth.

Wrap Up

Ask the students to read page 116 and discuss the difference between revolution and rotation.

Homework/Going Further

The students should do Activity 1 on page 122.

Lesson Plan 2 — Student Book Pages 117–118

Learning Outcomes

Students should be able to:

- explain that the Equator divides the Earth into two hemispheres.
- explain how the seasons are caused by the Earth's tilted axis and its revolution around the Sun.

Introduction

Do Activity 2 on page 122.

Main Teaching

- Explain the change of seasons with the help of a chart or drawings on the board.
- Explain that the Earth takes 365.25 days to orbit the Sun. This period is called a solar year.
- When both halves of the Earth receive equal amounts of light, it is either spring or autumn.
- Use a globe and a torch to demonstrate that when the North Pole is tilted towards the Sun, the southern hemisphere is tilted away from the Sun. As a result, the southern hemisphere is colder at this time and has winter.
- Explain that when it is winter in the northern hemisphere, it is summer in the southern hemisphere.

Guided Practice

Help the students do Activity 4 on page 123.

Independent Working

The students should do the Fun pages Activities 1 and 2 on page 124.

Wrap Up

Discuss the answer to Questions 4 and 5 on page 120.

Homework/Going Further

Ask the students to answer Questions 7 and 8 on page 121 in their notebooks.

Worksheet 13-1

Q1. Make complete sentences by matching the correct halves of the sentences in Columns A and B.

Column A	Column B
The Earth completes one revolution	day and night.
Revolution causes	in 24 hours.
The duration of 1 complete rotation	is Earth.
Rotation causes	the seasons.
The only planet that has life	is 365.25 days.

Q2. Label the diagram.

Q3. Complete the following sentences.

365 two axis sphere Revolution 24

a. _____ is the movement of the Earth around the Sun.

b. The Earth is almost a _____ .

c. The _____ of the Earth is the imaginary line on which the Earth spins.

d. The Earth has _____ types of movement.

e. The Earth takes_____ hours to rotate once on its axis.

f. The Earth completes one orbit around the Sun in _____ days.

Answers

Unit 1 The Human Body

Discuss and Answer

Look at your hand. Can you count how many joints you have in one hand? Compare your answer with your classmates' answers. Which number did most people come up with?

The human hand has 27 bones and is one of the most flexible parts of the body. There are 14 joints in the fingers. The wrist is another joint. In the palm area the four bones that link the fingers to the wrist have some flexibility at the point where they meet the wrist, though not as much as the thumb/wrist joint. Students should discuss this while observing and feeling/ moving their own hands.

Concept Check

Fill in the blanks.

Cells are the smallest building units of living things.

The muscles which make up the **heart** are the cardiac muscles.

Skeletal muscles are also called **voluntary** muscles.

All the bones of the body together make up the **skeleton**.

Discuss and Answer

Talk about broken bones. Has anyone in the class accidentally broken a bone? How are broken bones fixed? Find out. **Students should discuss this and share anecdotes. Some bones are left to mend on their own when a fracture or break occurs, especially when they are protected by other bones around them. Bones in the arms and legs tend to be placed in some type of a cast. In the case of severe breaks, surgery or realigning the bones may be necessary.**

Exercises

1. Choose the correct answer.
   i. Which kind of tissue gives shape to the organs and holds them in place? **a. connective**
   ii. Cardiac muscles make up which organ? **b. heart**
   iii. What are the muscles that perform their jobs without you even thinking about them called? **c. involuntary muscles**
   iv. What makes our bones strong? **d. all of them**
   v. The smallest bone of the body is in the **d. ear.**
2. Fill in the blanks.
   i. Bone is an example of a **connective tissue**.
   ii. **Cardiac** muscles contract and relax when pumping blood around the body.
   iii. A place in a vertebrate's body where two or more bones meet is a **joint**.
   iv. The tissue that joins two bones together is known as **ligament**.
   v. The joint which moves a part of our body only in one direction is known as a **hinge** joint.

vi. The joint that can move a part of our body in a circular direction is known as a **ball and socket** joint.

vii. The stomach is an example of **smooth (or involuntary)** muscles.

viii. The muscular system works with the **skeletal** system to help us move.

ix. **Smooth** muscles make up the internal hollow organs in the body.

3. Match each definition in column A with the terms in column B and write the correct answers in the spaces given below.

Column A	Column B
i. a tissue that holds two or more bones together at a movable joint	**b. ligament**
ii. the framework of bones in a body	**d. skeleton**
iii. a group of tissues performing a specific function	**a. organ**
iv. a thick sheet of tissues that attaches a muscle to a bone	**e. tendon**
v. the building unit of all living things	**c. cell**

4. Answer the following questions.

i. What are the main functions of the skeleton? **The skeleton is a framework of bones that helps to give strength and support to the body. It allows us to stand and move and provides a frame for the shape of the body. It protects internal organs.**

ii. Joints.

a. What is a joint? Which two types of joints have been discussed in this unit? Where is each of them found in the body? **A joint is a place in a body where two or more bones meet. The two kinds of joint discussed in the unit are the ball and socket joint and the hinge joint. The hinge joint is found at the knee, elbow, fingers etc. The shoulder and the hip are examples of the ball and socket joint.**

b. Write any one activity you can perform with the help of these joints. **Students can name a range of activities.**

iii. Differentiate between voluntary and involuntary muscles and give an example of each one. **Involuntary muscles operate automatically whereas we consciously use our voluntary muscles. If we wanted to pick something up and eat it, we would use voluntary muscles in our hand, arm and mouth to do so. The involuntary muscles of the digestive tract and the stomach would digest it automatically. Students can give other plausible examples.**

iv. How many types of muscle are there? Describe each of them with an example. **There are three different types of muscle: smooth, cardiac and skeletal. Students should use their own words to describe them based on the explanations given on pages 6 and 7. They may choose any of the examples given there too.**

v. Suggest any two ways to take good care of muscles and bones. **Students can suggest exercise, eating the right kinds of foods (calcium rich for bones), or proper rest as ways to take good care of muscles and bones.**

Unit 2: Food and a Balanced Diet

Discuss and Answer

Look at these two plates. What makes the meal on the left a balanced meal? What makes the meal on the right an unbalanced meal? **Students should discuss the contents and portion sizes of each plate and talk about the features of a balanced diet in order to become familiar with it.**

Concept Check

Complete the following sentence.

We need to eat the right amount of **carbohydrate**, **dietary fibre**, **protein,** and **fat**:

Now use the four key words you used in the blanks above to answer these questions.

1. Which three give us energy? **Carbohydrate, protein and fat**
2. Which one helps us to build and grow? **Protein**
3. Which one has no food value but helps to move waste along? **Dietary fibre**
4. Which two can make us fat if we eat too much of them? **Fats and carbohydrates**

Exercises

1. Choose the correct answer.
   i. Dietary fibre can be found in **b. wheat.**
   ii. Which of these foods is a good source of carbohydrate? **a. bread**
   iii. This vitamin is made by the skin in sunlight: **d. vitamin D**
   iv. Which food is a good source of protein and calcium? **a. cheese**
   v. Which of these we should eat very little of? **c. sweets**
2. Find the odd one out in each of the following.
   i. milk, curds, cheese, **jam**, butter
   Jam is **not a dairy product**
   ii. cucumber, peas, **carrot**, lettuce, spinach
   Carrot is **a root vegetable (it is also orange and the others are green!)**
   iii. **sugarcane**, banana, apple, grape, guava
   Sugarcane is **a stem rather than a fruit**
   iv. pistachio, cashew nut, walnut, **onion**, almond
   Onion is **not a nut or seed, it is a bulb used as a vegetable**
   v. protein, mineral, **wood**, fat, vitamin
   Wood is **not a food group**
3. Put two words from the list into each column of the table below.

Proteins	Carbohydrates	Fats	Vitamins
eggs	**carrot**	**butter**	**sunshine**
nuts	**cereals**	**chocolate**	**lemon**

Can you add at least one home food to each column? When you have finished, find out what the others in class have added to their lists. Has everyone added the correct food to each column?

Students can discuss the items and argue for them to be placed in different columns. For example, carrots are a good source of vitamins and nuts contain a lot of fats. They should add their own choices to each column and discuss them too.

4. How many different ways of cooking food can you think of?

Draw a table in your notebook like the one below. Fill it in. Then find out which foods you can add to your table by discussing the tables in class.

Students will list some or all of the following (and others if they can think of any): fry, boil, steam, bake, or roast. They will need to come up with their own ideas to fill in the table.

5. Answer these questions.
   i. Why do we need food? **Food gives us energy to live.**
   ii. What do proteins do for the body? **Proteins give us energy and are body-building foods that make us grow. They help our body to build up and repair tissues and muscles. They enable your body to replace dead cells.**
   iii. Why does the body need carbohydrates? **The body needs carbohydrates because they give us energy.**
   iv. How do dietary fibres help digestion? **Dietary fibre helps to move waste through the digestive system.**
   v. In what way are vitamins good for the body? **Vitamins keep bones and skin healthy. They help eyesight, give energy, and prevent infections. They also help wounds to heal.**
   vi. What do we mean by a balanced diet? **A balanced diet means eating the right variety of foods in the right amounts.**
   vii. How much water is needed by the body every day? Does this mean we have to drink that amount? **The body needs water in order to function properly. We should drink at least six to eight glasses of water daily. We also get water from our food.**
6. Think about it!
   i. Do you have a balanced diet? Make a list of the foods you eat for each meal. Would you say you have a balanced diet? Do you think you should eat less or more of any particular food? **Students will use their own words.**
   ii. Is it good to be too thin? Is it good to be too fat? What do you think? What is the best way to live a healthy life? **While it is unhealthy to be *too* thin or *too* fat, people have very different body shapes. Ideally, we should all be within a healthy weight range. Eating a balanced diet, exercising regularly, getting enough rest, and not smoking etc. is a good way to live a healthy life.**
7. Tell your teacher in your own words:
   i. About what a food pyramid shows us.
   ii. About the foods that are good for the body.
   iii. About the way in which your favourite dish is prepared.

   Students will use their own words.

8. Search for each of the following words in the squares below, and draw a circle round them.

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

Unit 3: Digestion

Discuss and Answer

Look at this picture of a girl eating food. Can you name the body parts that will help the girl in digesting food? Can you also draw those body parts? **Students should attempt to name and draw the parts but, as these will be covered in this unit, do not worry if there are some inaccuracies or omissions. They could repeat a version of the activity at the end of the unit.**

Discuss and Answer

Use your tongue to count the number of teeth you have. Do you have any teeth that have fallen out? Compare the number of teeth you have with the number of teeth other classmates have.

Answers will vary.

Concept Check

Fill in the blanks.

A baby is born with **no** teeth. A three-year-old child will usually have a set of about **twenty** milk teeth. An adult who has looked after their teeth will usually have **thirty-two** permanent teeth. There are four different types of permanent teeth: **incisors**, **canines**, **molars,** and **premolars**.

Discuss and Answer

Saliva can be produced even if you do not have any food in your mouth. Just think of eating some delicious food, and saliva will be produced! Why do you think this happens?

Listen to a few ideas from the students after they have discussed this.

Concept Check

Under each of the stages of the digestive process, say what happens to the food. The last one has been done for you.

mouth	food pipe	stomach	small intestine	large intestine	anus
Food is chewed, the tongue helps to mix the food with saliva produced by the salivary glands	The throat leads into a tube called the food pipe. Portions of the pipe contract and relax alternately to push the food forward and in time it enters your stomach.	The stomach releases acid and digestive juices which break down the food into still smaller particles. The stomach muscles churn the food and mix it with the juices. The acid kills harmful germs called bacteria and helps to digest proteins.	food passes from the stomach through the small intestine, where more digestive juices make the food softer. The walls of the small intestine are very thin. Digested food, in the form of nutrients passes through the walls into the blood vessels.	Some of the things you eat cannot be digested. They pass into the large intestine. Here water is absorbed from the undigested food and fibre.	- Solid food waste (faeces) exits the body

Exercises

1. Choose the correct answer.
   i. Which teeth are used for biting into food? **d. incisors**
   ii. The undigested food passes out through the **c. anus.**
   iii. What is stored in the gall bladder? **a. bile**
   iv. Where do the nutrients go after they pass through the intestinal walls? **b. into blood vessels**
   v. Which of the following are facts about the liver? **d. All of the above.**
2. Match the following.

i. saliva	**b. a fluid that helps with digestion**
ii. liver	**d. produces bile**
iii. intestine	**e. a long tube in the digestive system**
iv. gall bladder	**c. it stores bile**
v. stomach	**f. stores food for several hours**
vi. pancreas	**a. produces digestive juices that break down fats**

3. Fill in the blanks.
   i. **Saliva** in the mouth helps to soften food.

ii. The stomach produces **acid** which kills the bacteria in food.

iii. The large intestine absorbs **water** from the waste and sends the solid part of it out of the **anus** body as **faeces**.

iv. The liver produces a digestive juice called **bile**.

v. The **tongue** helps to mix the food with saliva.

vi. Bile is produced by the **liver** and stored in the **gall bladder**.

vii. Saliva softens the food and starts the digestion of **starches**.

4. Mark these sentences with ✓ or ×.

i. The teeth which cut food are incisors. ✓

ii. There are salivary glands in the teeth. ×

iii. Food enters the stomach through the small intestine. ×

iv. The liver is bigger than the pancreas. ✓

v. It is better for the digestion if one stands while eating. ×

5. Answer these questions.

i. Name four types of teeth. **Incisors, canines, molars, and premolars.**

ii. What are the intestines and what are their functions? **The intestines are tubes that carry food from the stomach to the anus. In the small intestine more digestive juices make the food softer. The walls of the small intestine are very thin. Digested food, in the form of nutrients, passes through the walls into the blood vessels. Some of the things you eat cannot be digested. They pass into the large intestine. Here, water is absorbed from the undigested food and fibre and the solid part of it is sent out of the body as faeces through the anus.**

iii. What is saliva? How does it help digestion? **Salivary glands in the mouth produce saliva. Saliva is a liquid that softens the food and starts the digestion of starches.**

iv. What does the liver do? **The liver has many functions. It helps to filter the blood and it stores food energy (in the form of glucose). It is the largest glandular organ in the body. It produces a digestive juice called bile.**

v. How do the nutrients from food get to the different parts of the body? **The walls of the small intestine are very thin. Digested food, in the form of nutrients passes through the walls into the blood vessels. The blood vessels transport the broken-down substances to the body cells where they are used to provide energy and build new tissue.**

iv. What is bile? Where in the body is it produced and stored? **Bile is a digestive juice. The bile is produced in the liver and stored in the gall bladder and when needed, released into part of the small intestine.**

vii. Which foods are easier to digest? Make a list of the foods you think are easy to digest and those which are not. **Students will use their own words.**

6. Think about it!

i. Can the body survive without any one of the parts involved in the digestion of food? **Students will use their own words.**

ii. What are the causes of stomach-ache? When was the last time you had a stomach-ache? How can stomach-ache be avoided? **Students will use their own words.**

7. Tell your teacher in your own words

Students will use their own words.

i. what you know about the liver.

ii. how the body breaks down food in the process of digestion.

8. Label the picture.

Answer given in the book.

9. Label the diagram. In the picture, label the four different types of teeth with the correct names. Add an explanation of what each kind of tooth is used for.

Answer given in the book.

Fun pages

The best way to do this would be to enlarge the image of the body and use cut out images of the organs.

1. Ali has lost his insides. They are on the right. Can you put them back inside him, and write the names of the missing parts too? (Be careful! The parts may not be the right way up!)

a. KIDNEYS

b. BLADDER

c. LARGE INTESTINE

d. STOMACH

e. LIVER

f. PANCREAS

g. SMALL INTESTINE

h. FOOD PIPE

2. Now here are some incomplete words. Can you complete the words?

i. BACTERIA **ii. PLAQUE** **iii. FILLING**

iv. TOOTH **v. CANINE** **vi. INTESTINE**

vii. PANCREAS **viii. KIDNEY** **ix. VITAMINS**

x. MINERAL

3. Look at these three breakfast menus. Can you match each one to the country it comes from? Which one is the healthiest? Why?

American pancakes and maple syrup

Chinese dumplings

Pakistani roti and egg

Students will give their own views, with reasons, about which is the healthiest.

4. What are these scrambled words? Unscramble these words to reveal meal names.

i. CHUNL **LUNCH** ii. FASTKREAB **BREAKFAST**

iii. ERDNIN **DINNER** iv. KSACN **SNACK** v. EASFT **FEAST**

5. Draw and describe your favourite healthy meals.

Students will use their own words.

Unit 4: Characteristics of living things

Discuss and Answer

As you know, all living things breathe, feel, grow, move, eat, excrete, and reproduce. Non-living things do not do these things. How can you prove that non-living things cannot grow? Design an experiment to show that living things grow while non-living things cannot.

Students will have their own ideas.

Concept Check

Unscramble these words and place them in the correct spaces below:

PENDED **DEPEND** BONCAR IDEXDIO **CARBON DIOXIDE** GXYONE **OXYGEN** OFOD **FOOD**

1. Living things **depend** on each other.
2. Plants provide humans and animals with **food** and **oxygen**.
3. Plants need **carbon dioxide** to make food.

Discuss and Answer

Discuss the following and say how old you were (or think you might have been) when the following happened to you: First tooth; learned to read; first word; learned to ride a bike; first steps; learned to tie a shoelace.

Which things did you learn to do quickly? Which things took you longer?

Students will use their own words.

Discuss and Answer

These are all kinds of dogs. They have similarities because they are all part of the same species: dogs. What are the similarities and differences between the dogs in the pictures?

Students will use their own words.

Concept Check

Fill in the blanks

i. The life cycle of a grasshopper has **three** stages.

ii. The life cycle of a housefly has **four** stages.

iii. Look at these two pictures of a goat and a kid goat.

Write a list of three things about them that are the same and three things about them that are different. They can be things you know as well as things you can see.

Students will use their own words.

Exercises

1. Choose the correct answer.

   i. Another word for movement is **c. locomotion**

ii. We need to look after plants and animals because **c. we depend on each other for life.**

iii. What hatches from the egg of a grasshopper? **b. a nymph**

iv. The egg of a butterfly hatches into a **b. larva.**

v. What grows from a seed when it germinates? **a. roots**

2. Fill in the blanks.

i. Humans and animals take in **oxygen** and breathe out **carbon dioxide**.

ii. Plants make their own **food** by a process called photosynthesis.

iii. All living things do the following:

a. eat b. respire c. excrete d. have sensitivity

e. move f. grow g. reproduce

iv. Plants and animals **depend** on each other.

v. Plants produce **oxygen** which is the air we breathe in.

3. Mark these sentences with ✓ or ×.

i. Plants never move. ×

ii. Only plant cells have chloroplasts. ✓

iii. All living things grow. ✓

iv. All life cycles have three stages. ×

v. Frogs eggs are called fry. ×

vi. Humans inherit all their characteristics from only one parent. ×

4. Find one word for each sentence.

i. The gas that we need to breathe. **oxygen**

ii. Another word for movement. **locomotion**

iii. The word for the process of getting rid of waste products. **excretion**

iv. The word for frog eggs. **spawn**

v. A young fish. **fry**

5. Answer these questions.

i. Give two examples of how plants and animals rely on each other. **Students can come up with specific examples. Some suggestions: plants provide humans and other animals with food. Plants produce oxygen that we breathe. Humans and animals breathe out carbon dioxide that is used by plants to make food. Animals provide plants with manure and, when they die, compost.**

ii. What is the function of a vacuole? **The function of a vacuole is to store food, water and waste substances.**

iii. Do plants respire? **Yes, plants respire. They take in oxygen and use it to break down their food.**

iv. What things do plants need to make their own food? What do they use the food for? **Plants possess chlorophyll and make their food themselves through a process called photosynthesis, using sunlight, water, and carbon dioxide. Plants need food**

in order to perform their life processes. Food gives them energy to move, grow, etc.

v. Where do animals get their energy from? **Animals get their energy by eating different plants and other animals**.

vi. How long does it take a new-born calf to get up and walk? **Usually, a calf will be up and walking thirty minutes after it has been born.**

vii. What are the stages in the life cycle of a cockroach? **A cockroach has a three-stage life cycle. A nymph hatches from the egg. It looks and behaves just like an adult cockroach.**

viii. Explain how you know that humans are a different species to other animals. **Students should attempt to explain this in their own words, describing the similarities that all humans share (number of limbs, organs, etc.) and their differences to other animals.**

6. Think about it!

   i. Can you say in what ways a pine tree and a mango tree are similar, and in what ways they are different? **Students can pick any of the differences – height, shape, fruit, leaf shape etc. If possible, show images of each of the two trees.**

   ii. In what ways do young animals look and behave like their parents? In what ways are they very different? Choose any three animals and their young and try to find out the similarities and differences. **Students will pick their own animals and explore the differences. Share their findings in class.**

7. Label the diagram below with the stages of the life cycle of a flowering plant. germination of seed, seedling, adult plant, flowers, seeds.

   Note: In some plants the flowers develop into fruit which contains the seeds.

   Answer given in the book.

Unit 5: Environments and Food Chains

Discuss and Answer

Talk about these questions and then note down answers in your own words. Where can humans get water from? What type of water do we need to drink? Which types of water are not suitable for drinking? Why?

Students should discuss the questions and talk about water: as essential for life; the need for clean, drinking water; water pollution, etc.

Concept Check

1. Fill in the blanks.

All living things need oxygen to get **energy** from their food. Plants breathe through **pores (stomata)** in their leaves.

Concept Check

Match the words in A with their pairs in B. Give two examples of animals that can be found in each environment.

A	B
arboreal	**tree**
aerial	**air**
aquatic	**water**
terrestrial	**land**

Discuss and Answer

Think of some more examples of how plants and animals protect themselves. Talk about them.

Students can think of a range of examples. Most animals and plants have some way of protecting themselves so consider a wide range of animals and plants – snails have shells to retreat into; plants have sap, thick bark, bitter tasting leaves, thorns.

Discuss and Answer

What would happen if all the snakes were killed?

Students should discuss their views, giving reasons for them. Every living creature is part of an eco-system. In the food chain shown, if there were no snakes, the frog population might grow too large and cause damage to the population of caterpillar which in turn would have an impact on the plants. The fox would lose part of its diet; this would have an impact on the populations of other animals in a fox's diet.

Concept Check

A food chain shows how energy moves along from one living thing to another. Put these living things in order in a food chain. **Allow students to discuss these and agree on an order.**

1. owl, plants, insect, mouse **plants, insect, mouse, owl**
2. hawk, hare, grass **grass, hare, hawk**
3. grasshopper, bird, grass, hawk **grass, grasshopper, bird, hawk**

Exercises

1. Choose the correct answer.
   i. The green substance in leaves that is needed for photosynthesis is called **b. chlorophyll.**
   ii. Pick the correct definition of aerial animals. **d. Aerial animals have wings and spend a lot of time in the air.**
   iii. An animal which eats meat and plants is called **c. omnivore.**
   iv. Why are aquatic plants important for animal life? **d. All of the above.**
   v. Which of these is an omnivore? **c. human.**
2. Fill in the blanks.
   i. Decomposers feed on **the dead bodies of animals and plants**.
   ii. Only producers can make **their own food**.
   iii. Consumers are those living things that cannot **produce their own food**.
   iv. Cows and goats are examples of **herbivorous** animals. They do not eat **animals**.
   v. Omnivorous animals eat **plants** and **animals**.

vi. An animal which maintains its body temperature by absorbing heat from the surrounding environment is **cold-blooded**.

vii. An animal that maintains its body temperature internally, and does change it with the surrounding temperature, is **warm-blooded**.

viii. A process through which plants make their food is called **photosynthesis**.

3. Read the food chain below.

cabbage caterpillar sparrow eagle

Which of the above is a producer and which are consumers? **The cabbage is a producer. All the rest are consumers.**

4. Herbivore, carnivore, or omnivore

i. Put these animals in the correct columns of the table.

herbivore	carnivore	omnivore
horse	**tiger**	**bear**
elephant	**cat**	**human**
rabbit	**dog**	**jackal**
deer		**crow**
cow		**cockroach**
sheep		**vulture**

ii. Add other names to each list. **Students will add to the lists.**

iii. Discuss the animals you and others have put into your lists. **Students should discus which animals they have put in and added to the lists. They should look up any that they are unsure about.**

5. Find two examples of each of the following. **Students can use examples from the book or from their own knowledge. They can also do some research to find examples. Some suggestions are given here.**

i. Desert plants a. **cactus** b. **palm**

ii. Terrestrial plants a. **mango tree** b. **daisy**

iii. Floating plants a. **water lily** b. **lotus**

iv. Insect-eating plants a. **Venus fly trap** b. **pitcher plant**

v. Underwater plants a. **duck weed** b. **algae**

6. Answer these questions.

i. How many types or species of plants have scientists found? **Scientists have found billions of species of plants.**

ii. What is meant by classification? Why do scientists classify things? **Classification means sorting things into different groups according to specific criteria. Scientists classify things because it makes them easier to study.**

iii. Define the following terms with examples of each:

a. cold-blooded animal **Cold-blooded animals take on the temperature of their surroundings. Their body temperature changes with the outside temperature.**

They are hot when their environment is hot, and cold when their environment is cold. Snakes, lizards, crocodiles, and frogs are cold-blooded animals.

b. warm-blooded animal **Warm-blooded animals maintain a constant body temperature. This means that they do not depend upon the temperature of their environment. Humans, mammals, and birds are warm-blooded animals.**

iv. What do herbivores eat? Where do they find their food? **Herbivores eat plants. These animals eat grass or plants that are around them.**

v. Where do terrestrial animals live? Where do they make their homes? **Terrestrial animals live on the ground. They make their homes on land or in caves or burrows.**

vi. What does 'arboreal' mean? Name three arboreal creatures. **Arboreal means *of the trees*. Monkeys, apes, squirrels, opossums, and some kinds of lizard, are arboreal. Students may think of other animals too.**

vii. How does colour help animals to protect themselves? Give some examples. **Colour can help animals to protect themselves by helping them to blend in with their surroundings. Green and brown birds blend in with the leaves or earth. Certain insects also do this. The stripes of the zebra help it to blend in with the grasslands. White fur stops predators and prey from being seen in the snow. Students can come up with some general animal examples.**

viii. What are parasites? Name some and describe what they live on. **Parasites live on or inside the bodies of other animals (or trees). They use the other living thing as their source of life energy. Fleas and lice live on animals and suck their blood; certain types of worm live inside the bodies of animals, feeding on their flesh, blood, or the food they eat; mistletoe lives on other plants. Students may suggest others too.**

ix. If you could be any animal (apart from a human) which would you be? Why? **Students will give their own answers and reasons.**

x. What things do plants need to make their own food? **Plants possess chlorophyll which they use to make their food themselves through a process called photosynthesis. The process also requires sunlight, water, and carbon dioxide.** What do they use the food for? **They use their food for energy to live.**

Fun pages

1. Animal alphabet

In a pair, take it in turns to name an animal for each letter of the alphabet.

(X is very tricky so you can miss it out).

Take it in turns to start first, like this:

Student A: alligator

Student B: ant

Student B: butterfly

Student A: bear

When you get to the end of the alphabet, join up with another pair so that you are in a group of 4 (or 5) and play again. It'll be much harder this time.

2. Can you spot the mistakes in these pictures?

Students should play the game in pairs first and then form bigger groups to play again.

3. Find 19 words related to plants in this word search. Do you know what they all mean?

Students should revise the meaning of any words they do not know.

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

4. Match the adult animals with their young by drawing lines. Write in the name of the animal in the blank space under the pictures. **kitten, frog, larva, sheep, lamb, cat, pupa, froglet, butterfly, fly; kitten/cat, frog/froglet, larva/fly, sheep/lamb, pupa/butterfly**
5. Make a poster with the heading 'LIVING THINGS DEPEND ON EACH OTHER'. Make sure you include images to show how animals and plants depend on each other. **Students should make their own posters. If they do a quick bit of planning of what to include before they start, it should yield better results.**

Unit 6: Solids, Liquids, and Gases

Discuss and Answer

Can you think of an example of a solid, a liquid, and a gas found in a motorcycle? **Students should discuss this and come up with their own ideas. The motorcycle parts are solid (metal, glass, plastic, rubber), the fuel and oil are liquid, the air in the tyres is gas.**

Concept Check

1. Use these words to fill in the blanks.
   - Everything in this world that has **mass** and occupies **space** is matter.
   - **Particles** are always moving about.
   - **Matter** is found in three states, or forms.

2. Now, complete these three sentences using the same pair of words each time.

   Ice is made up of **water particles**.

   Water is made up of **water particles**.

   Water vapour is made up of **water particles**.

Concept Check

Fill in the blanks.

1. In a physical change no **new** substances are formed.
2. In a **chemical** change, new substances are formed.

Discuss and Answer

Think about it. How would you explain the following to a friend?

a. change of state b. physical change c. chemical change

Students should practise explaining the processes to each other to gain or secure a confident understanding of them.

Exercises

1. Choose the correct answer.
   i. Which of the following is not a state of matter? **c. oil**
   ii. Everything on Earth is made of tiny **a. particles.**
   iii. Ice, water and water vapour are made of **a. water particles.**
   iv. Which type of matter has a fixed shape and a fixed volume? **a. solids**
   v. When wood is burned and turns into ash what type of change has taken place? **b. chemical change**
2. Fill in the blanks.
   i. Matter is made up of **particles**.
   ii. The particles in a **solid** are packed very closely together.
   iii. The **particles** in a liquid are packed loosely together. They can flow.
   iv. In a gas, the **spaces** between the particles are bigger.
3. Match each definition in column A with the terms in column B.

Column A	Column B
1. a change in which new substances are formed	**C. chemical change**
2. a change of state but no new substances are formed	**A. physical change**
3. everything in the world that has mass and occupies space	**B. matter**

4. Mark these sentences with ✓ or ×.
   i. Particles move. ✓
   ii. Particles in gas are packed tightly together. ×
   iii. A litre of water is more when it is in a 5-litre container. ×
   iv. Particles in orange juice are packed less closely than those in an orange ice lolly. ✓
   v. Ice melts into a gas. ×

5. Answer these questions.
   i. What is matter? **Everything in this world that has mass and occupies space is matter.**
   ii. What is the difference between a solid and a liquid? **In a solid, the particles are packed closely together and cannot move about freely. Particles in solids vibrate in their place. A solid has a definite shape and volume. The particles in a liquid are not packed together so closely. This means that liquids can flow. Liquids do have a definite volume, but they do not have a fixed shape.**
   iii. Do the particles in a liquid stay in one place? **The particles in a liquid can flow.**
   iv. Do liquids have a fixed shape? Why not? **No, liquids can be poured into any shape of container.**
   v. Why is it not a very good idea to use aerosol sprays? **Aerosol sprays contain chemicals that could harm the environment when released into the atmosphere.**
   vi. Why is it not a good idea to dispose of oil down drains or into lakes and rivers? **Oil, fat, and grease do not dissolve in water. They can block drains. They form a film on water and can harm wildlife and plants.**

Unit 7: The Study of Matter

Discuss and Answer

Can you think of some more examples of substances which are soluble in water? Which substances are insoluble in water? Make a class list. If you can, test some of them!

Sugar, masala powder, curry powder, coffee powder, salt and many other substances are soluble in water. Some insoluble substances are tea, flour, sand, oil, talcum powder.

Discuss and Answer

- Look at this picture of a fish. How do we know that there are gases (such as oxygen) in the fresh water this fish is living in? **A fish is a living thing and all living things respire. There must be oxygen in the water for the fish to live.**
- How would you separate a mixture of flour and rice into separate piles? If you can, test your ideas. What happens? Are there any problems? If so, how could you overcome them? **Try by experimentation, if possible. The flour will go through the holes in a fine sieve whereas the rice will not. If students try to use water or other methods, they might encounter problems!**

Exercises

1. Choose the correct answer.
   i. Which of the following is NOT one of the properties of water? **c. It has a definite shape.**
   ii. Which of the following are ways to separate salt from water? **b. evaporation**
   iii. What can you use to remove iron filings from a mixture of substances? **a. magnet**
   iv. A solution is created when **a. a solute is mixed in a solvent.**
   v. Which TWO of the following will NOT dissolve in water? **c. oil and d. sand**

2. Match each definition in column A with the terms in column B.

Column A	Column B
i. the solid that remains on the filter paper after filtration	**c. residue**
ii. the liquid that passes through a filter paper	**d. filtrate**
iii. the method used to separate heavier solid particles from a liquid	**a. decantation**
iv. when particles in a liquid fall to the bottom	**e. sedimentation**
v. the method of separation in which the liquid is heated	**b. evaporation**

3. In your notebook, write a few properties of the following substances.

Students will write their own descriptions. Discuss. Some suggestions: i. salt **white powder or crystals, dissolves in water, absorbs moisture, etc.** ii. flour **light powdery substance, forms a dough when mixed with some water, etc.** iii. roti **round, thin, solid made from flour, water and salt, can be torn apart, etc.**

4. Give two properties for each of the following.
   i. solid **has a definite volume and a definite shape, usually hard, the particles are tightly packed together.**
   ii. liquid **has a definite volume, takes the shape of the container it is in, flows because the particles move around each other.**
   iii. gas **no fixed shape or volume, it occupies the whole space of the container it is in, particles move about freely in all directions.**
5. Answer these questions.
   i. In which states can water exist? **Water can be a solid (ice), a liquid (water), or a gas (steam/water vapour).**
   ii. Does water contain oxygen? How do we know? **Yes. We know that water contains oxygen because plants and animals live in it and all living things need oxygen to respire.**
   iii. What are all substances made up of? **particles**
   iv. What are some of the properties of water? **has a definite volume, takes the shape of the container it is in, flows because the particles move around each other, does not smell of anything in particular.**
   v. You have a mixture of sand, salt, and iron filings. How will you separate all the components of this mixture? **The iron filings can be removed by a magnet. The sand could be separated from the salt by mixing both with water and then filtering out the insoluble sand. The water could be evaporated to leave the salt. Students may suggest other methods.**
   vi. Where do we use the magnetic method of separation? Give an example from your daily life. **Electromagnets are used to sort magnetic metals in a scrapyard.**
   vii. What happens to a substance when it dissolves in a liquid? In your own words, try to explain what the word 'dissolve' means. **When a substance dissolves in water its particles mix into the entire volume of the liquid.**
   viii. Why can we not taste all substances to tell what is in them? Give at least two reasons. **Some substances have no taste, and some are poisonous.**

ix. Does a filter separate a substance which will not dissolve in water? How will you experiment to find out? **Yes. Students should use their experience of previous filtering exercises.**

6. Tell your teacher in your own words.

What substances do your parents put into your favourite dish they make. How do they make that dish? **Students will use their own words. If they do not know the recipe, they should find out.**

Fun page

1. These words have become scrambled. Unscramble them. They are all words you have read in this part.

   ACTION DANTE/DECANTATION CAMELHIC/CHEMICAL CLAYHIPS/ PHYSICAL

   HANGCE/CHANGE MEDITATION SEN/SEDIMENTATION QUIDLI/LIQUID

   RESORTPIPE/PROPERTIES SUNSETCABS/SUBSTANCES TRIFLE/FILTER

2. Put the unscrambled words into the grid below.

			D	E	C	A	N	T	A	T	I	O	N
				C	H	A	N	G	E				
			C	H	E	M	I	C	A	L			
	S	E	D	I	M	E	N	T	A	T	I	O	N
				L	I	Q	U	I	D				
		S	U	B	S	T	A	N	C	E	S		
		F	I	L	T	E	R						
P	R	O	P	E	R	T	I	E	S				
			P	H	Y	S	I	C	A	L			

3. Tricky questions about volume.

   i. A woman has five children. Half of them are boys. How can this be? **The other half are boys too!**

   ii. A man carried a sack of rice to his house. His servant carried two sacks. Who carried the heavier load? Why? **The man carried a sack of rice. The servant carried two empty sacks.**

   iii. A girl said to her brother, 'If I write your exact weight on this piece of paper, you must give me Rs 100. If I cannot, I will pay you Rs 100.' There were no scales in the room. The boy thought, 'Whatever she says my weight is, I shall say it is different.' He agreed. But in the end, the brother had to pay his sister Rs100. How did the girl win the bet? **She wrote what she said she would write: 'your exact weight'!**

   iv. There are two glasses filled with water. How could you put all of this water into a jug, without using the glasses or any dividers, and still tell which water came from which glass? **Freeze the water into two blocks and put the blocks in the jug!**

Unit 8: Heat

Discuss and Answer

In which of the above containers are the particles moving faster? **Pupils should be encouraged to think and talk about this. The particles in the liquid that is being warmed by the Sun will be moving faster than those that are freezing into a solid.**

Concept Check

Fill in the blanks.

1. **Temperature** is the measure of the average energy of particles in a substance.
2. **Heat** is the total amount of energy of particles in a substance.

Exercises

1. Choose the correct answer.
   i. Temperature is the **b. average** energy of particles.
   ii. Heat is the **a. total** energy of particles.
   iii. The flow of thermal energy from a warmer object to a cooler object is known as **a. heat.**
   iv. Any temperature on the Celsius scale which is lower than that of melting ice (0^o) is written with a **a. minus** sign.
   v. The normal human body temperature on the Celsius scale is **a. 37^o**
2. Match each definition in column A with the terms in column B.

Column A	Column B
i. the total energy of particles of a substance	a. heat
ii. the average energy of particles of a substance	c. temperature
iii. the flow of energy from a warmer to a cooler object	b. thermal energy

3. Fill in the blanks.
   i. The average energy of particles in a substance is called **temperature**.
   ii. The total energy of particles in a substance is called **heat**.
   iii. The flow of thermal energy from a warmer object to a cooler object is known as **heat (heat transfer)**.
   iv. The instrument which is used to measure temperature is called **a thermometer**.
   v. All matter is made of tiny particles called **atoms**.
   v. The normal human body temperature on the Celsius scale is **37 degrees**.
   vi. The melting point of ice is **32 degrees** Fahrenheit and **0 degrees** Celsius.
   vii. The temperature at which pure water boils is **212 degrees** Fahrenheit and **100 degrees** Celsius.
   viii. Temperature that is lower than 0^oC is written with a **minus** sign.
   ix. Nothing can get colder than **-273 degrees** Celsius and this is called **absolute zero**.

4. Answer the following questions.
   i. Define the following terms:
      a. **heat is the total energy of particles in a substance.**
      b. **temperature is the average energy of particles in a substance.**
   ii. Which two scales are commonly used to measure temperature? **Fahrenheit and Celsius**
   iii. Which instrument is used to measure temperature? **A thermometer**
   iv. What happens to the liquid in a thermometer when the air around it gets a. warmer? **When the air around the thermometer gets hot, the liquid inside the thermometer begins to expand. It moves upwards inside the tube.** b. colder? **When the air around the thermometer gets cold, the liquid contracts and moves downwards.**
5. Use a thermometer to measure your temperature. Draw the thermometer, label it and mark on it what your body temperature is. **Students should have the opportunity to measure their temperature.**

Unit 9: Force and machines

Discuss and Answer

If you blow up a balloon halfway, what happens? What happens to the balloon if you let the air out? What happens when you blow the balloon up so that it is totally full of air? Test your answers if you can. **Students should discuss their ideas. The balloon regains its shape when the air is let out. The force of the air coming out can propel the balloon if it is not held onto. The surface of the balloon is stretched thin and tight when it is full of air and it is firmer than when it is half full. If more air is forced in, the balloon will burst.**

Discuss and Answer

When you travel from one place to another you can find out or measure the distance. What is the distance between A and B? **50 km.** The car goes from A to B in one hour. The cyclist in 5 hours. The man who walks takes 10 hours. What is the speed, in km per hour, of each traveller? **car = 50 km per hour (50/1 = 50), cyclist = 10 km per hour (50/5 = 10), man = 5 km per hour (50/10 =5)**

Concept Check

Pick the correct response.

1. Roller skates are an example of a lever/**wheel and axle**/inclined plane.
2. A wheelchair ramp is an example of a lever/wheel and axle/**inclined plane**.
3. When two or more simple machines are put together, they make a complex machine/ **compound machine**/computer.

Exercises

1. Choose the correct answer.
   i. Which of the following is not an example of a simple machine? **a. juicer**
   ii. A light bulb is an example of a **b. screw**
   iii. A fork is an example of a **a. lever**

iv. Toilet paper on a roller is an example of a **b. wheel and axle**

v. The metal cap of a bottle can be opened by using a bottle opener. In this case the bottle opener works as a **c. lever**

vi. A flagpole is an example of a **c. pulley**

2. Fill in the blanks.

i. A device or tool used to make the work easier and faster is called a **machine**.

ii. A **simple** machine has few or no moving parts.

iii. A **compound** machine is made up of two or more simple machines combined together.

iv. A simple machine made up of a bar or rod, which rests and turns on a fixed point is called a **lever**.

v. A simple machine used to cut or split things apart is called a **wedge**.

vi. A simple machine that is used to fasten or hold materials together is called a **screw**.

vii. A fork is an example of a simple machine called a **lever**.

viii. A simple machine with a slanting surface, used to move heavy loads up or down is called an **inclined plane**.

ix. A simple machine consisting of a rope or string, wound around a grooved wheel is called a **pulley**.

x. The rod that goes through the wheel and helps the wheel to move is called an **axel**.

3. Match each definition in column A with the terms in column B and write the correct answers in the spaces given below.

Column A	Column B
i. two inclined planes joined back to back, used to cut or split things apart	d. wedge
ii. a rigid bar or rod that rests and moves on a support, and is used to move a heavy load easily	e. lever
iii. a rope or string wound around a grooved wheel, used to move objects up, down or across	b. pulley
iv. a slanting surface used for moving objects from lower to higher, or higher to lower surfaces easily	a. inclined plane
v. an inclined plane wrapped around a cylindrical pole that is used to fasten, or hold things together	c. screw

4. Label the load, effort, and fulcrum on the illustration below.

Answer given in the book.

5. Word search:

Find and circle the names of the following simple machines in the square below:

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

6. Answer these questions.
   i. If an object is acting as a lever, what is the force applied on the object called? **The effort**
   ii. What is the point where a lever moves called? **Fulcrum or pivot**
   iii. How is a simple machine different from a compound machine? **A simple machine has few or no moving parts. A compound machine is one in which two or more simple machines are put together.**
   iv. Draw a lever and label all three parts in it.
   v. Where do you see the use of pulleys? Give at least three examples from your daily life. **Some suggestions: flagpole, curtains, window blinds, clothes lines, cranes.**
   vi. How do wheels and axles make work easier? **Wheels and axels make work easier by allowing heavy loads to be moved easily. They allow loads to be rolled along and to travel for greater distances.**
   vii. How can you say that inclined planes are machines? Give at least three examples from your daily life to support your answer. **Inclined planes are machines because they make work easier. We use inclined planes regularly to move loads over raised obstacles. Some suggestions: chopping knife, spade, access ramps, stairs/escalators, dropped curbs.**
   viii. Read the following situations carefully and decide which simple machines should be used to solve these problems. **Students will think of solutions. Some suggestions:**

Situation 1:

Ali lives on the fourth floor of an apartment which does not have a lift. He is supposed to carry a bucket full of water to his apartment. Suggest which simple machine is best to help in this situation. Explain how that machine would be used. **Ali could use a pulley mounted above a window in his apartment to raise the bucket up the side of the building.**

Situation 2:

A person needs to load a heavy bag of rice onto a truck. Suggest which simple machine is best to help in this situation. Explain how this machine would be used. **An inclined plane would allow the person to roll the bag up and onto the truck.**

Situation 3:

A man needs to move a large, heavy stone from the road to avoid all accidents. Suggest which simple machine would help best in this situation. Explain how this machine would be used.

A lever would allow the man to move the heavy stone. He would need to find a pivot to rest the lever on and apply effort to the other end in order to lift the load. He could also use a wedge and insert it under the stone to push it over.

Unit 10: Circuits and switches

Discuss and Answer

Observe the pictures of two circuits given below. How are these circuits different from each other?

In which set up will the light bulbs burn brighter? What can happen to both of the circuits if you remove one bulb from each circuit?

In the series circuit the light bulbs are connected to one another. The current only has one path to flow along so if a bulb is removed, the circuit will be broken, and all the bulbs will stop working. The bulbs share the energy, so each bulb gets less energy and glows less brightly than in the parallel circuit.

In the parallel circuit the current divides into two or more paths before going back to the battery, or the source of electricity. If you remove one bulb from this circuit, the others will stay lit up, because each path is a complete circuit. The bulbs do not share energy with one another, so each bulb glows more brightly than in a series circuit.

Concept Check

Unscramble these words from this unit and use them to label the diagram below.

CDELOS/CLOSED **CHISTW/SWITCH**

ABERTTY/BATTERY **EIRW/WIRE**

BBLU/BULB

Students will label the parts of the diagram. The label CLOSED should be used as part of a description or title – a closed circuit.

Exercises

1. Choose the correct answer.
   i. The materials which allow electricity to pass through them are called **b. conductors**.
   ii. The materials which do not allow electricity to pass through them are called **a. insulators**.
   iii. Which of the following is an example of an insulator? **a. rubber**
   iv. Which of the following is an example of a conductor? **b. copper**
   v. Which kind of circuit has two or more paths for the current to flow along? **b. parallel circuit**

vi. Which of the following describes the flow of current in a series circuit? **c. the current only has one path to flow along**

2. Fill in the blanks.
   i. Electricity which flows through a material is called **current**.
   ii. A complete path for electricity to flow is called a **circuit**.
   iii. If there is a gap or break in the circuit, it is called an **incomplete** circuit.
   iv. If there is no gap or break in the circuit, it is called a **closed (or complete)** circuit.
   v. The device which is used to turn on or off an electrical appliance is called a **switch**.
   vi. In a **series** circuit, the appliances are connected in a line, one after the other.
   vii. In a **parallel** circuit, the current flows through different branches or paths.
   viii. A substance which allows electricity to pass through is called a **conductor**.
   ix. A substance which does not allow electricity to pass through is called an **insulator**.
3. Match each definition in column A with the terms in column B and write the correct answers in the spaces given below.

Column A	Column B
i. the complete path along which electricity flows	c. circuit
ii. a device or connection used to turn on or off an electrical appliance	d. switch
iii. a material which allows electricity to pass through it	a. conductor
iv. a material which does not allow electricity to pass through it	b. insulator

4. Answer the following questions.
   i. Define the following terms.
      a. **A conductor is a material which allows electricity to pass through it.**
      b. **An insulator is a material which does not allow electricity to pass through it.**
      c. **An electric current is electricity which flows through a material.**
      d. **A circuit is the complete path along which electricity flows.**
   ii. What is a switch used for? **A switch is used to turn on or off an electrical appliance.**
   iii. Compare series and parallel circuits.

Students will use their own words.

In the series circuit the light bulbs are connected to one another. The current only has one path to flow along so if a bulb is removed, the circuit will be broken, and all the bulbs will stop working. The bulbs share the energy, so each bulb gets less energy and glows less brightly than in the parallel circuit.

In the parallel circuit the current divides into two or more paths before going back to the battery, or the source of electricity. If you remove one bulb from this circuit, the others will stay lit up, because each path is a complete circuit. The bulbs do not share energy with one another, so each bulb glows more brightly than in a series circuit.

   iv. Draw and label the following circuits with a battery, wire and two light bulbs in each.
      a. Series circuit

Answer given in the book.

b. Parallel circuit

Answer given in the book.

v. Make a list of electrical appliances in your home. Classify them into mains-powered and battery-powered. **Students will use their own words.**

Appliances at home	Mains-powered	Battery-powered
TV	✓	×
Remote control for TV	×	✓

Unit 11: Magnetism

Discuss and Answer

Find a range of objects. Which ones do you think are magnetic? Test your guesses by trying to pick up the objects using a magnet. Keep a record of which things are magnetic and which things are not. What materials are magnetic?

Try by experimentation, after making guesses.

Concept Check

Complete these sentences using the words given below.

A magnet has two **poles**. The unlike poles **attract** each other.

The area of force around a magnet is called the **magnetic** field.

Three magnetic materials are **steel**, **iron**, and **nickel**.

Exercises

1. Choose the correct answer.
   i. Which pair listed below would attract each other? **b. north pole and south pole**
   ii. Which of the following is magnetic? **d. iron nail**
   iii. Materials which a magnet can attract are called **b. magnetic**
   iv. A freely suspended magnet always points in which direction? **d. north-south**
   v. How can a magnet become demagnetised? **d. all of these**
2. Fill in each blank with the correct word from the bracket.
   i. All magnets have **two** poles.
   ii. An iron nail is not attracted to a magnet if it is **far from** the magnet's magnetic field.
   iii. **Some** materials are attracted to magnets.
   iv. A magnet's power is **strongest** at the poles.
3. Answer these questions.
   i. What is a magnetic field? **The magnetic field is the area of invisible force around a magnet.**
   ii. Where are the poles of a magnet situated? **The poles of a magnet are situated at the ends of it.**
   iii. Where is the magnetic force of a magnet the strongest? **At the poles.**

iv. How can we make temporary magnets? **Metals like iron or nickel can be made into temporary magnets by stroking them across magnets or by passing on electric current through them.**

v. How should magnets be stored? Why? **Magnets should be stored in pairs with unlike poles opposite and with keepers across the ends. Magnets can become demagnetised if they are heated, dropped or hammered, or not stored correctly.**

4. Use the table below to write a list of different objects. Are they magnetic or not? Guess first then test them. **Students can use their results from the Discuss and Answer activity and add to them.**

Object	Magnetic? (guess)	Magnetic? (tested)
nails	Yes	Yes

5. Think about it!

   The phrase 'finding a needle in a haystack' is used when something is almost impossible to find. How would you find a needle in a haystack? Discuss your answer with your friend or your teacher. **Students will come up with their own ideas. A magnet would help!**

6. Find out. **Students should conduct the research to develop an understanding beyond the examples given in the textbook.**

   i. How are magnets useful to us?

   ii. How are magnets used in a roller coaster?

Unit 12: Sound

Discuss and Answer

What is the difference between music and noise? Which kinds of music do you enjoy? What is it about the sound of that music that you like? Are there any kinds of music you dislike? What is it about the sound of that music that you dislike? Which kinds of noise are the most unpleasant?

Discuss each question in turn, listening to a range of views.

Discuss and Answer

Can you tell which of the sound waves shown below is showing high frequency and which one is showing low frequency?

The one on the left is a higher frequency than the one on the right.

Discuss and Answer

Which loud noises are you exposed to where you live? In which situations can the following help to reduce noise pollution? **Discuss each question in turn, listening to a range of suggestions.**

Planting more trees; Turning off machines that are not being used; Wearing earplugs; Using a quiet voice when speaking to friends; Not using horns and switching off car engines when waiting.

Concept Check

Fill in the blanks.

Sound travels in **waves**. Sound can travel through solids, **liquids** and gases. Sound cannot travel through outer space because it is a **vacuum**.

Exercises

1. Choose the correct answer.
   i. More vibrations per second produce **b. high sounds.**
   ii. Which of the following frequencies cannot be heard by the human ear? **a. 5 Hz**
   iii. The frequency of a sound wave is the **a. number of vibrations per second.**
   iv. An echo is produced when **b. sound waves bounce off a surface.**
   v. If an object vibrates 500 times in a second, its frequency will be **b. 500 Hz.**
2. Match each definition in column A with the terms in column B and write the correct answers in the spaces given below.

Column A	Column B
i. repeated motion of an object	c. vibration
ii. the unit of measuring frequency	d. hertz
iii. the bouncing back of a sound wave from one surface to another	a. echo
iv. vibration passing from particle to particle	b. sound wave

3. Fill in the blanks.
   i. Sound waves cannot travel in a **vacuum**.
   ii. The number of vibrations per second is called **frequency**.
   iii. The number of vibrations is measured in units called **hertz**.
   iv. A recurring disturbance, or movement that transfers energy through matter is called a **vibration**.
   v. Most humans can hear sounds ranging between **20 and 16,000 hertz**.
   vi. Sound needs a **medium** to travel through.
   vii. Sound travels fastest through a **solid** medium.
   viii. Sound travels most slowly through a **gaseous** medium.
   ix. Bats use a property of sound called **echoes** to tell where they are going.
   x. A mouse can hear a sound up to **102,000** Hz.
4. Answer the following.
   i. Define the following terms.
      a. sound **is a form of energy. It is produced by vibrations and travels in waves.**
      b. **A vibration is a recurring disturbance or movement that transfers energy through matter.**
      c. **An echo is the bouncing back of a sound wave from one surface to another**.
      d. frequency **is the number of vibrations per second.**

ii. Explain in your own words how sounds are made and how they travel through the air. **Students will use their own words.**

iii. In what conditions do sounds echo? **A sound made in a large, empty room or space produces an echo.**

iv. In terms of their waves, how are noise and musical notes different from each other? **Irregular, repetitive sound waves create noise, while regular, repetitive waves produce musical notes.**

v. Can sound travel in a vacuum? Explain your answer. **No, sound cannot travel in a vacuum because sound needs a medium to travel through.**

5. Unscramble the following words:

i. itvrinoba **vibration**

ii. saewv **waves**

iii. tzrhe **hertz**

iv. rqueefcyn **frequency**

v. hoce **echo**

vi. odsun **sound**

vii. yeerng **energy**

Fun pages

1. Make a cotton reel car.

You will need: A cotton reel, a small stick, some tape, a longer stick, an elastic band.

Put the elastic band through the middle of the cotton reel.

Secure it at one end using the small stick and some tape.

Place the longer stick through the other end of the elastic band.

Turn the longer stick to twist the elastic band.

Set it down and watch it roll!

Students will enjoy making and racing their cars.

2. Find 14 words from the unit on heat in the grid below.

Here are the first letters of the words you are looking for:

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

3. How can we reduce noise pollution?

Look at the picture below. How many kinds of noise pollution can you find in it?

Make a display for your school about it. Make sure you find out about different kinds of noise pollution and how it can be reduced. Then present your campaign to reduce noise pollution in a bright, attractive way (shhhhh!).

Display the students' work.

Unit 13: The Movement of the Earth

Discuss and Answer

The Earth takes 365.25 days to orbit the Sun. This period is called the solar year. What solution do we have to the 'problem' of that extra ¼ of a day per year? **The leap year. Make sure students know what a leap year is.**

Concept Check

1. Use these three words: day, short, night in the first three blanks. In the final space complete the sentence with appropriate words of your own.

   Places on the equator have an equal amount of **night** and **day**.

   In the northern hemisphere, in the winter, the days are **short** because **northern hemisphere is tilted away from the Sun**.

2. Look at a world map with the equator marked on it. Based on the weather and the amount of night and day, which one would you most like to live in? **Students will give their own opinions and reasons.**

Exercises

1. Choose the correct answer.
   i. How many days does the Earth take to complete one orbit around the Sun? **c. 365**
   ii. How many hours does the Earth take to complete one turn on its axis? **a. 24 hours**
   iii. Which of the following is correct? Seasons are caused due to the **c. revolution and tilted axis of the Earth.**
   iv. The fixed path of the Earth on which it moves around the Sun is called its **b. orbit.**
   v. The time the Earth takes to rotate once on its axis is called a **d. day.**
2. Match each definition in column A with the terms in column B

Column A	Column B
i. the spinning of a body on its axis	d. rotation
ii. the orbiting of one object around another	c. revolution
iii. to lean, incline, slope, or slant	e. tilt
iv. the path in space of one body as it goes around another body	b. orbit
v. the time the Earth takes to complete one rotation on its axis	a. a day

3. Fill in the blanks.
   i. The imaginary line on which the Earth rotates is called the **axis**.
   ii. The movement of the Earth, causing day and night, is called **rotation**.
   iii. The Earth moves around the Sun and this movement is called **revolution**.
   iv. The Earth takes **one** day to spin once on its axis.
   v. The Earth takes **365** days to complete one orbit around the Sun.
   vi. The path in space of one body as it goes around another body is called an **orbit**.
   vii. Changing seasons on the Earth are caused by the Earth's tilt on its **axis**.
   viii. The area of the Earth which leans towards the Sun has the **summer/warmer** season.
   ix. The area of the Earth which leans away from the Sun has the **winter/cooler** season.
   x. The time the Earth takes to rotate once on its axis is called a **day**.
4. Answer the following questions.
   i. Why is summer hotter than winter? **The Earth is tilted on its axis as it orbits the Sun, which causes different parts of the Earth to receive different amounts of heat and light. This tilt of the Earth's axis creates the seasons. When the North Pole is tilted towards the Sun, the northern half, or hemisphere, is hot and has summer, while the southern hemisphere is tilted away from the Sun.**
   ii. How many seasons are there? Name them. **There are four main seasons: spring, summer, autumn and winter.**
5. Mark these sentences with ✓ or ×.
   i. The Earth takes 364 days to revolve around the Sun. ×
   ii. The Earth spins on its axis. ✓
   iii. The rotation and revolution of the Earth is what causes seasons. ×

iv. The equator is an imaginary line running between the north and south poles. ×

v. The Earth is divided by its axis into two hemispheres. ×

vi. The Earth rotates from east to west. ✓

Correct the sentences that are wrong and write them all in your notebook.

i. The Earth takes 365 days to revolve around the Sun.

iii. The tilt and revolution of the Earth is what causes seasons.

iv. The axis is an imaginary line running between the north and south poles.

v. The Earth is divided by its equator into two hemispheres.

6. Write the labels for the diagram.

Answer in the student book

7. Think about it!

i. A person starts walking on a long journey. He walks and walks and walks; every day and every night! How long will he take to walk round the Sun?

It will take the person one year because in that time the Earth will have orbited the Sun.

ii. Does a person standing on a point on the equator rotate at the same speed as someone standing exactly on the north pole?

Yes, but the person will not travel such a long distance!

iii. If the Earth is spinning round on its axis, why don't we fall off the Earth? **We do not fall off because of the force of gravity.**

iv. If we are standing upright on one part of the world, why don't people standing on the other side fall off the Earth? **Again this is due to gravity. There is no 'upside down' as far as the Earth in space is concerned.**

8. Tell your teacher in your own words.

Students will use their own words.

i. How the seasons come about.

ii. What life might be like in a country that is always cold.

Fun pages

1. Complete this crossword.

ACROSS

1. The path of the Earth round the Sun is its ….
2. The Earth is divided by the equator into two halves. Each half is called a ….
7. The season in which leaves start to fall off the trees.

DOWN

1. The warmest season.
2. We usually sleep at this time.
3. The Earth …. on its axis.
4. The season between winter and summer.

5. There are twelve of these in a year.
6. Our planet.
7. The imaginary line through the middle of the Earth.

												1S
			2N									U
1O	3R	B	I	T								M
	O		G					4S				M
	T		2H	E	5M	I	S	P	H	6E	R	E
	A		T		O			R		A		R
	T				N			I		R		
	E		7A	U	T	U	M	N		T		
	S		X		H			G		H		
			I									
			S									

2. Make your own crossword or word search using key words from this unit.

Students can swap their crosswords with others in the class.

3. Mr Astronomer (not a very clever one and related to Mr Scientist) made these statements. Was Mr Astronomer right or wrong?

Mark the sentences ✓ or ×.

The light of the Earth shines on the moon. ×

The sun is a star. ✓

The planets revolve round the Earth. ×

The Earth takes one year to rotate on its axis. ×

There are eight planets. ✓

The Earth rotates on its orbit. ×

4. Make a collage of the four seasons.

Draw four large circles on a chart paper to represent the four seasons.

Cut out pictures from old magazines or newspapers which represent scenes, activities, and foods of different seasons. Glue the pictures in these circles. Ask your friends to identify with the help of the pictures, which season is represented in each circle.

Students will make their own collages. They can work in groups.

Sample Assessment Paper

Maximum marks: 50 | 1st Term Examination | Time Allowed: 1 hour

Q1.Fill in the blanks: [1 mark each= 5 marks]

i. The stomach is an example of _____ muscles.

ii. Vitamin D is made by the _____ in sunlight.

iii. New substances are not formed in a _____ change.

iv. _____ is the measure of the average energy of particles in a substances.

v. _____ has a sloping surface that reduces the force needed to raise a load.

Q2. Choose the correct answers: [1 mark each= 5 marks]

i. A door hinge is an example of a

A. lever B. screw

C. wedge D. wheel and axel

ii. The bulb of thermometer contains a liquid which can be

A. milk B. mercury

C. water D. juice

iii. Which muscles perform their jobs without your instructions?

A. voluntary muscles B. biceps

C. involuntary muscles D. skeletal muscles

iv. When ice cube is melting what type of change has taken place?

A. change of colour B. chemical change

C. physical change D. none of the above

v. The normal human body temperature on the Celsius scale is

A. 37 °C B. 40 °C

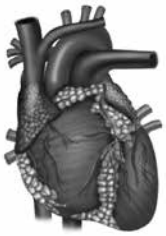
C. 98.6 °C D. 0 °C

Q3.Label the following diagram: [1 mark each= 4 marks]

A. 

organ _____

system _____

B. 

organ _____

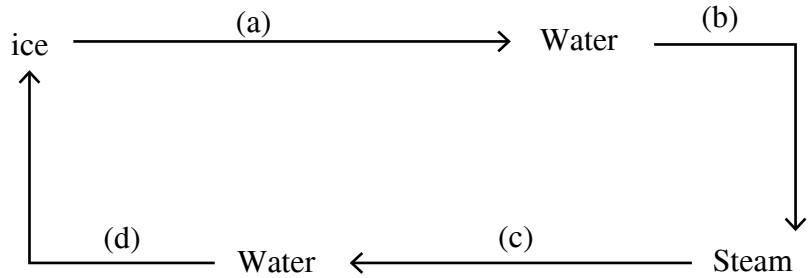
system _____

Q4.Complete this table to show what each Food groups does in the body.

[1 mark each= 4 marks]

What is its job?	Food groups
source of quick energy	
	Proteins
give us energy and help to keep the body warm	
	Dietary fibre

Q5.Write the name of the processes: [1 mark each= 4 marks]



Q6. Give reasons of the following: [1 mark each= 5 marks]

i. Solids do not change shape and size.

_____

_____

ii. A screw is an inclined plane.

_____

_____

iii. All joints cannot move in all directions.

_____

_____

iv. Dietary fibre has no food value.

_____

_____

v. A wheelbarrow is made up of several simple machines.

_____

_____

Q7. Identify the simple machines in a bicycle: [1 mark each= 3 marks]

Q8.Circle the correct word to complete the statements: [1 marks each = 5 marks]

i. Melting is caused when particles gain/lose energy. _____

ii. A decrease / an increase in size or volume occurs when a substance is heated. _____

iii. An increase / a decrease in volume occurs when a solid changes into a liquid. _____

iv. The change of state from a liquid to a solid is caused by heating / cooling. _____

v. The change of state from a liquid to a gas is caused by heating / cooling. _____

Q9.Draw and label a clinical thermometer. [2 marks]

Q 10. Use the formula: speed = distance/time, [2.5 marks each = 5 marks]

i. Calculate the speed of a car which travels 200 km in 4 hours.

ii. Calculate the distance travelled by a car moving at a speed of 100 km/h for 2 hours.

Q11. List two things that force can do: [1 marks each = 2 marks]

Q12. Draw the arrangement of particles in the boxes below. [1 marks each = 3 marks]

solid liquid gas

Q13. Name the type of simple machine: [1 marks each = 3 marks]

i. It has a long arm which can lift a heavy load by applying very little effort.

ii. It is a sloping surface along which a heavy load can be pulled in order to raise it.

iii. It is two inclined planes that increase and change the direction of the force.

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