# SCIENCE
# Teacher's Manual

## Grade 4

Papua New Guinea
Department of Education

From
the People of Japan

JICA

QUIS-ME
We love Mathe and Science !
Department of Education & JICA

**Issued free to schools by the Department of Education**

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# Acknowledgements

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The Science curriculum officers, textbook writers, pilot teachers from NCD and Central Provinces and the Subject Curriculum Group (SCG) are acknowledged for their contribution in writing, piloting and validating this teacher's manual.

The Curriculum Panel members, members of the Subject Advisory Committee (SAC) and the Basic Education Board of Studies (BEBOS) are also acknowledged for their advice, recommendation and endorsement of this teacher's manual.

**A special acknowledgement is given to the People and the Government of Japan for the partnership and support in funding and expertise through Japan International Cooperation Agency (JICA) - QUIS-ME Project with Curriculum Development Division (CDD).**

# Science
# Teacher's Manual

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# Secretary's Message

**Dear Teacher,**

I am aware that the teaching and learning of Science is a challenging experience in our schools today. Therefore it is my pleasure to inform all Grade 4 Teachers in our Primary Schools that a scoped and sequenced content-based curriculum resource, Teacher's Manual for Grade 4 Science has been developed to assist you in the delivery of quality, effective and meaningful Science lessons to the grade 4 students in our schools. The lessons are aimed at preparing and shaping our young scientists and equipping them with the relevant scientific skills for the 21st century.

This Teacher's Manual will facilitate the delivery of the science lessons prescribed in the National Science Textbook. It is designed to achieve the grade 4 content standards and benchmarks outlined in the syllabus. It promotes and maintains standard lessons for yearly, termly and daily teaching and learning activities for all teachers. It will help to guide teachers to plan and teach the Science lessons in line with the National Science Textbook. The Science syllabus for grades 3- 5 provides the curriculum content expanded in the Science Teacher's Manual and National Science Textbook respectively.

This Teacher's Manual guides critical thinking and problem solving approaches in which you can easily visualise concepts in the lesson flow, expanded in the textbook. The Teacher's Manual addresses areas of what to teach, how to teach and what to measure (assess). It is user friendly and reflects PNG contexts in daily situations to help students acquire key concepts; knowledge, skills, attitudes and values set out in the lesson objectives. Therefore, this Teacher's Manual was developed to guide all teachers with clear and precise step by step lesson flow and activity steps for all lessons and teacher notes to assist teachers' understanding of the science concepts.

This teacher resource was produced by the National Department of Education, in partnership with JICA our partners in global education. The development of these teacher and student materials took three years which started in 2016 and ended in 2019. I commend all personnel involved, science experts from Japan and the department's very own curriculum officers and textbook writers for the excellent work done.

You are encouraged to use this Teacher's Manual as a tool to effectively deliver the content of the textbook and other relevant resources such as science equipment recommended to generate creative teaching and interactive learning.

Teachers, Science can be fun if you tune in and engage with students in all the scientific ideas and concepts presented in the content of the lessons and activities that are in the textbook through this Teacher's Manual.

I approve this Teacher's Manual for Grade 4 Science to be used in all primary schools throughout Papua New Guinea.

**Dr. Uke Kombra, PhD**
**Secretary for Education**

# 1. How to use the Teacher's Manual

Teacher's Manual has been developed for teachers to teach learning contents to their students more effectively with using the National Science Textbook. As for the features of this Teacher's Manual, its contents correspond to that in the textbook according to the Grades 3-5 Science Syllabus. The syllabus sets the national standards that are taught by teachers in the classroom that all students should acquire throughout the country, regardless of the context. These standards outlined in the syllabus are reflected in this teacher's manual. Therefore, information in this teacher's manual will help teachers to prepare lesson plans and to conduct lessons in line with the syllabus.

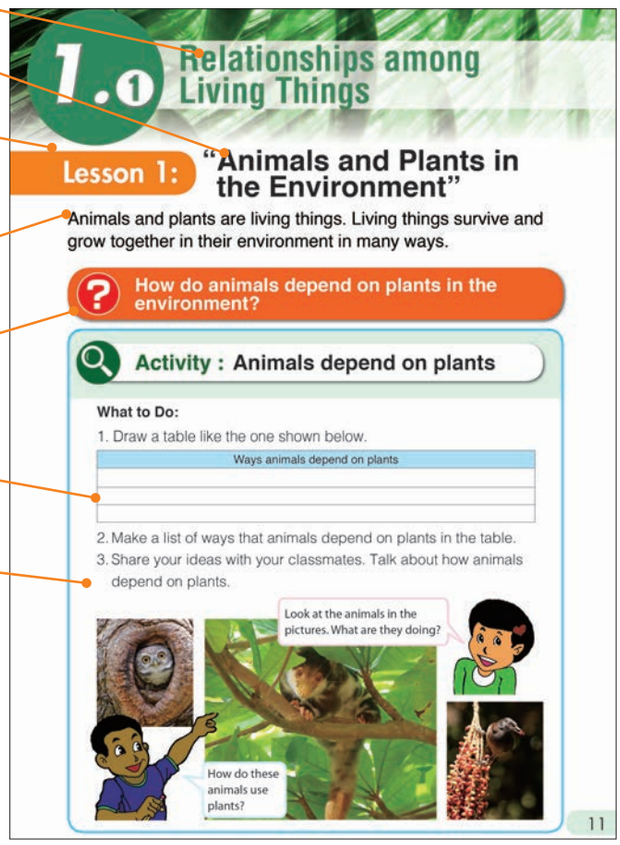
Firstly, the composition of the textbook is introduced, then, the components in this teacher's manual are introduced in the following section.

## 1.1 Composition of Science textbook

The Science textbook is designed like this to have its components to repeatedly appear in each chapter, as shown in the top-right box ('structure in a chapter'). Each component is shown in the right.

The teacher's manual is designed according to the structure of the textbook in order to help the teacher to easily refer to the teacher's manual for preparation and implementation of a lesson.

**Lesson**

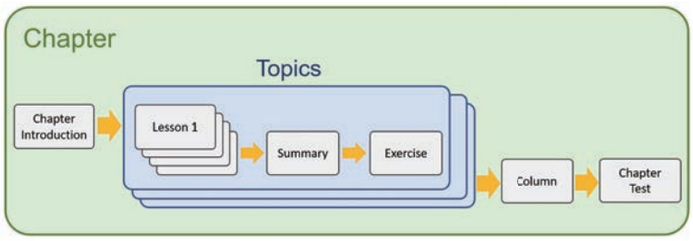



**Chapter Introduction**

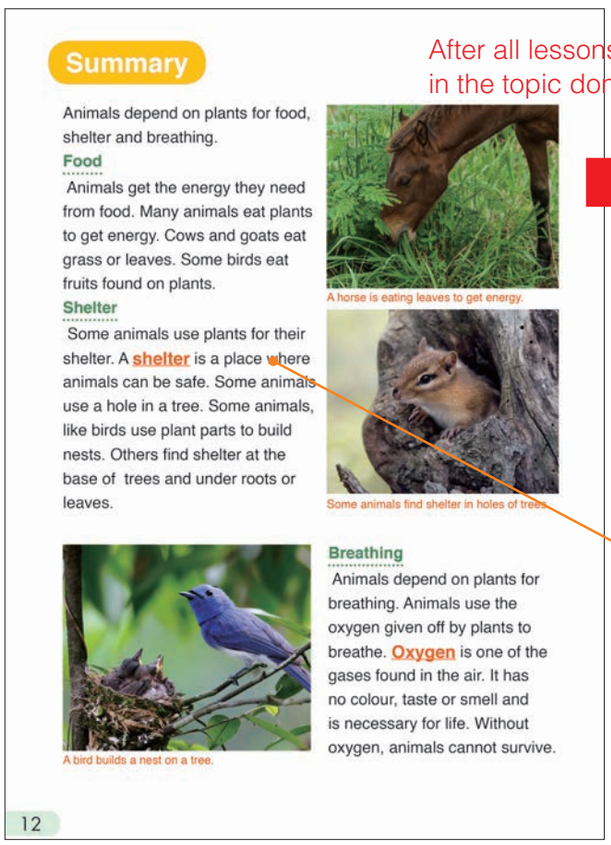
## Structure in a chapter

Science textbook consists of several chapters based on learning contents according to the syllabus. All chapters have regular components as shown in the diagram below.

1. Chapter Introduction
2. Main content pages
3. Summary
4. Exercise
5. Column
6. Chapter test




**(main content page)**



Summary

Animals depend on plants for food, shelter and breathing.

**Food**

Animals get the energy they need from food. Many animals eat plants to get energy. Cows and goats eat grass or leaves. Some birds eat fruits found on plants.

**Shelter**

Some animals use plants for their shelter. A **shelter** is a place where animals can be safe. Some animals use a hole in a tree. Some animals, like birds use plant parts to build nests. Others find shelter at the base of trees and under roots or leaves.

A horse is eating leaves to get energy.

Some animals find shelter in holes of trees.

A bird builds a nest on a tree.

**Breathing**

Animals depend on plants for breathing. Animals use the oxygen given off by plants to breathe. **Oxygen** is one of the gases found in the air. It has no colour, taste or smell and is necessary for life. Without oxygen, animals cannot survive.

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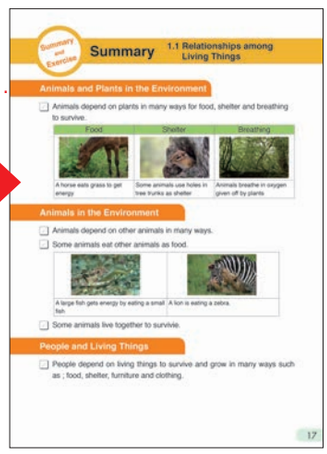
After all lessons in the topic done...

Summary of the lesson

**Summary**



Summary 1.1 Relationships among Living Things

Animals and Plants in the Environment

Animals depend on plants in many ways for food, shelter and breathing to survive.

Food | Shelter | Breathing

A horse eats grass to get energy | Some animals use holes in tree trunks as shelter | Animals breathe in oxygen given off by plants

Animals in the Environment

Animals depend on other animals in many ways.

Some animals eat other animals as food.

A large fish gets energy by eating a small fish. | A lion is eating a zebra.

Some animals live together to survive.

People and Living Things

People depend on living things to survive and grow in many ways such as ; food, shelter, furniture and clothing.

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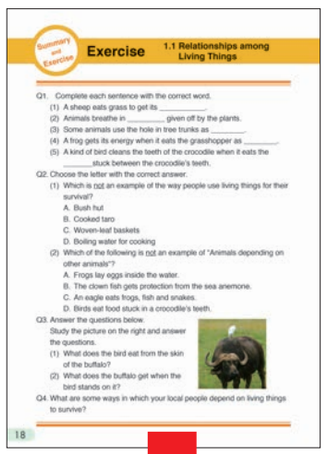
**Exercise**



Exercise 1.1 Relationships among Living Things

Q1. Complete each sentence with the correct word.

(1) A sheep eats grass to get its _____.

(2) Animals breathe in _____ given off by the plants.

(3) Some animals use the hole in tree trunks as _____.

(4) A frog gets its energy when it eats the grasshopper as _____.

(5) A kind of bird cleans the teeth of the crocodile when it eats the _____ stuck between the crocodile's teeth.

Q2. Choose the letter with the correct answer.

(1) Which is not an example of the way people use living things for their survival?

A. Bush hut

B. Cooked taro

C. Woven-leaf baskets

D. Boiling water for cooking

(2) Which of the following is not an example of "Animals depending on other animals"?

A. Frogs lay eggs inside the water.

B. The clown fish gets protection from the sea anemone.

C. An eagle eats frogs, fish and snakes.

D. Birds eat food stuck in a crocodile's teeth.

Q3. Answer the questions below.

Study the picture on the right and answer the questions.

(1) What does the bird eat from the skin of the buffalo?

(2) What does the buffalo get when the bird stands on it?

Q4. What are some ways in which your local people depend on living things to survive?

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**Column**

Chapter 1 •Science Extras•

**What is the shrimp doing at the mouth of the fish?**

Basically, fish eat shrimps as food to get energy. Look at the picture below. Is the fish trying to eat the shrimp? The answer is "No". In fact, the shrimp is cleaning food wastes from the teeth of the fish, so the fish keeps its mouth open. It is impossible for the fish to remove the food wastes since they do not have hands. Such shrimps also remove not only food wastes but also eat tiny animals living on the fish body that would cause diseases for the fish. As the picture shows, they depend on each other. The shrimp enjoys food that is easy to get and the fish becomes more comfortable and healthy.

The shrimp is removing food waste from the teeth of the fish.

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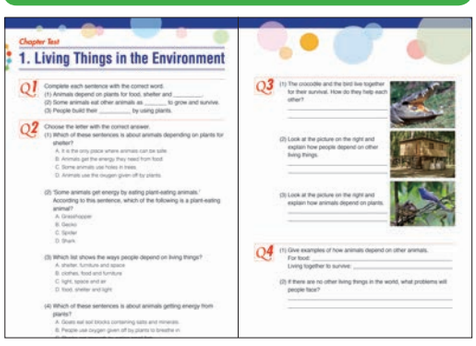
After all topics done...

**Chapter test**



Chapter Test

1. Living Things in the Environment

Q1 Complete each sentence with the correct word.

(1) Animals depend on plants for food, shelter and _____.

(2) Some animals eat other animals as _____ to grow and survive.

(3) People build their _____ by using plants.

Q2 Choose the letter with the correct answer.

(1) Which of these sentences is about animals depending on plants for shelter?

A. It is the only place where animals can be safe.

B. Animals get the energy they need from food.

C. Some animals use holes in trees.

D. Animals use the oxygen given off by plants.

(2) Some animals get energy by eating plant-eating animals. According to this sentence, which of the following is a plant-eating animal?

A. Grasshopper

B. Gecko

C. Spider

D. Shark

(3) Which list shows the ways people depend on living things?

A. shelter, furniture and space

B. clothes, food and furniture

C. light, space and air

D. food, shelter and light

(4) Which of these sentences is about animals getting energy from plants?

A. Goats eat soil blocks containing salts and minerals.

B. People use oxygen given off by plants to breathe in.

Q3 (1) The crocodile and the bird live together for their survival. How do they help each other?

(2) Look at the picture on the right and explain how people depend on other living things.

(3) Look at the picture on the right and explain how animals depend on plants.

Q4 (1) Give examples of how animals depend on other animals.

For food: _____

Living together to survive: _____

(2) If there are no other living things in the world, what problems will people face?

Go to next Chapter...

## 1.2 Main contents page in Teacher's Manual

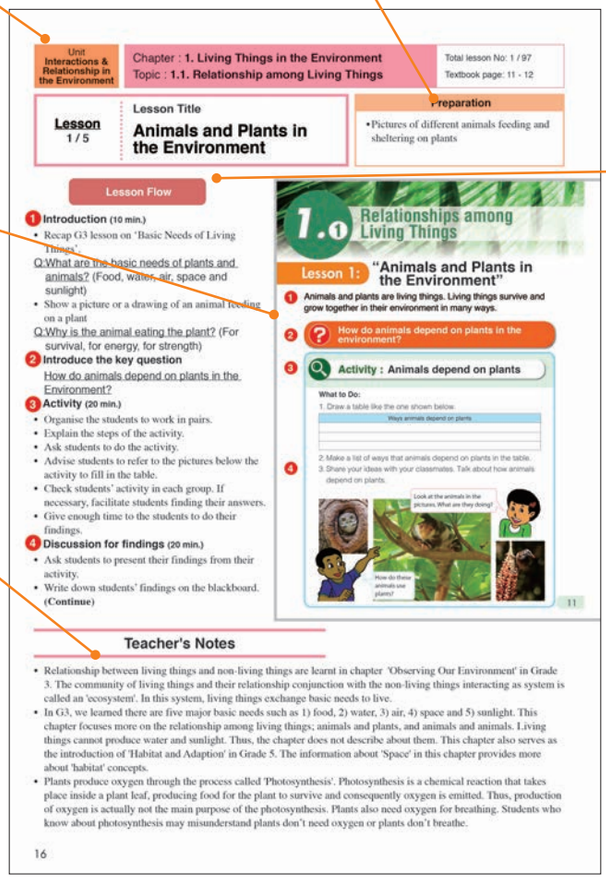
The main content page in this Teacher's manual has 8 components, Basic lesson information, Lesson objectives, Assessment, Preparation, Lesson flow, Teacher's note, Sample Blackboard Plan and a reduced textbook page.

**Basic lesson information**
Basic information such as name of the unit, chapter and topic in which the lesson is involved is shown. In addition, numbering (numerical code) and total number of lessons in the chapter are also shown to make teaching schedule easier.

**Textbook page of the lesson**
Corresponding textbook page number is shown at the center. The numbers in red circle on the page correspond to the 'Lesson Flow' to show where the content is in the lesson flow.

**Teacher's Notes**
Supplementary information that would be useful for teaching, such as background knowledge and more detailed explanation, is introduced.
In case of materials or equipment not accessible nationwide, the alternatives are mentioned and instructions on how to improvise are provided.

**Preparation**
Materials and apparatuses recommended for use in the lesson are shown.


Unit
Interactions & Relationship in the Environment
Chapter : 1. Living Things in the Environment
Topic : 1.1. Relationship among Living Things
Total lesson No: 1 / 97
Textbook page: 11 - 12
Lesson 1 / 5
Lesson Title
Animals and Plants in the Environment
Preparation
•Pictures of different animals feeding and sheltering on plants
Lesson Flow
1 Introduction (10 min.)
• Recap G3 lesson on 'Basic Needs of Living Things'.
Q:What are the basic needs of plants and animals? (Food, water, air, space and sunlight)
• Show a picture or a drawing of an animal feeding on a plant
Q:Why is the animal eating the plant? (For survival, for energy, for strength)
2 Introduce the key question
How do animals depend on plants in the Environment?
3 Activity (20 min.)
• Organise the students to work in pairs.
• Explain the steps of the activity.
• Ask students to do the activity.
• Advise students to refer to the pictures below the activity to fill in the table.
• Check students' activity in each group. If necessary, facilitate students finding their answers.
• Give enough time to the students to do their findings.
4 Discussion for findings (20 min.)
• Ask students to present their findings from their activity.
• Write down students' findings on the blackboard.
(Continue)
1.0 Relationships among Living Things
Lesson 1: "Animals and Plants in the Environment"
1 Animals and plants are living things. Living things survive and grow together in their environment in many ways.
2 How do animals depend on plants in the environment?
3 Activity : Animals depend on plants
What to Do:
1. Draw a table like the one shown below.
Ways animals depend on plants
2. Make a list of ways that animals depend on plants in the table.
3. Share your ideas with your classmates. Talk about how animals depend on plants.
4
Look at the animals in the pictures. What are they doing?
How do these animals use plants?
11
Teacher's Notes
• Relationship between living things and non-living things are learnt in chapter 'Observing Our Environment' in Grade 3. The community of living things and their relationship conjunction with the non-living things interacting as system is called an 'ecosystem'. In this system, living things exchange basic needs to live.
• In G3, we learned there are five major basic needs such as 1) food, 2) water, 3) air, 4) space and 5) sunlight. This chapter focuses more on the relationship among living things; animals and plants, and animals and animals. Living things cannot produce water and sunlight. Thus, the chapter does not describe about them. This chapter also serves as the introduction of 'Habitat and Adaption' in Grade 5. The information about 'Space' in this chapter provides more about 'habitat' concepts.
• Plants produce oxygen through the process called 'Photosynthesis'. Photosynthesis is a chemical reaction that takes place inside a plant leaf, producing food for the plant to survive and consequently oxygen is emitted. Thus, production of oxygen is actually not the main purpose of the photosynthesis. Plants also need oxygen for breathing. Students who know about photosynthesis may misunderstand plants don't need oxygen or plants don't breathe.
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**The lesson flow should be followed in line with the concept of textbook;**

**1 Introduction**
In the introduction, normally teacher makes students review the previous lesson to connect the new lesson through the key question. An example of the introduction is shown in the lesson flow.

**2 Showing a key question**
The key question is closely related to the core or main points of the lesson including the new knowledge, new concepts and new skills. The teacher delivers the key question by using the review of the previous lesson or a new phenomena at the beginning of a new lesson. In this particular lesson, students try to answer the key question by guessing or predicting based on their experiences.

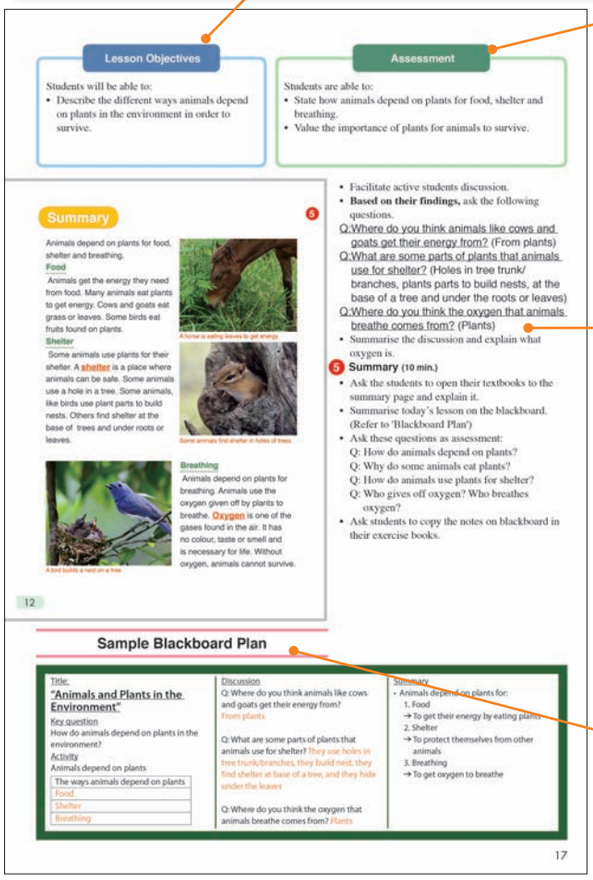
**3 Activity**
The activity is delivered to examine their guess and prediction to the key question. In some lessons, the teacher may deliver the activity without students' prediction or hypothesis. These two different ways are dependent on the lesson content. Activities are carried out by a group, individually or done by teacher's demonstration, which is dependent on the availability of the materials and contexts of the lesson topics. Teacher allows students to have enough time to do the activity.

## Lesson Flow

A lesson flow includes several teaching points. The main components are:
❶. Introduction, ❷. Key question, ❸. Activity, ❹. Discussion and ❺. Summary.
Lesson flow in some lessons contains additional information like "Result" or "Challenge", according to the content of the lesson in the textbook.

## Lesson Objectives

Objectives Objectives capturing the main knowledge and skills in the lesson are provided in the textbook.




## Assessment

Teacher should reflect own lesson along this criteria through the lesson. The three components of knowledge, thinking skills, attitude & values are also indicated in the teacher's manual.

'Knowledge' means new concepts, new findings and their relationships.

'Thinking skills' means scientific process skills, which contain observing, measuring, inferring, classifying, predicting and communicating.

'Attitude and Value' means the interests, curiosities and respect for nature and recognition on the importance and usefulness of the content.

Refer to Teachers Guide for detail information.

## Sample Blackboard Plan

A sample of blackboard of lesson notes writing is introduced. Contents of the blackboard sample are equivalent to the main teaching points of the lesson and can be utilised as a guide. In the sample blackboard plan, examples of the results in the activity and expected student's answers are written in coloured words.

### ❹ Discussion

In the discussion part, the teacher allows students to present their results or findings from the activity and to share with all other students. The teacher allows time to students to think and seek the answers for the key question by using the results or findings in the activity. The teacher must verify the results to the students to avoid misconceptions. In the case, for Grade 4, some of the results in the activity would be same as the conclusion of the lesson.

### ❺ Summary

The summary confirms the core points of the lesson. The teacher asks questions shown in the teacher's manuals as summative assessment to students in order to confirm if they have acquired the main knowledge and skills in the lesson. The summary points may be the students' findings or results in the discussion part of the textbook which the teacher would facilitate and direct students.

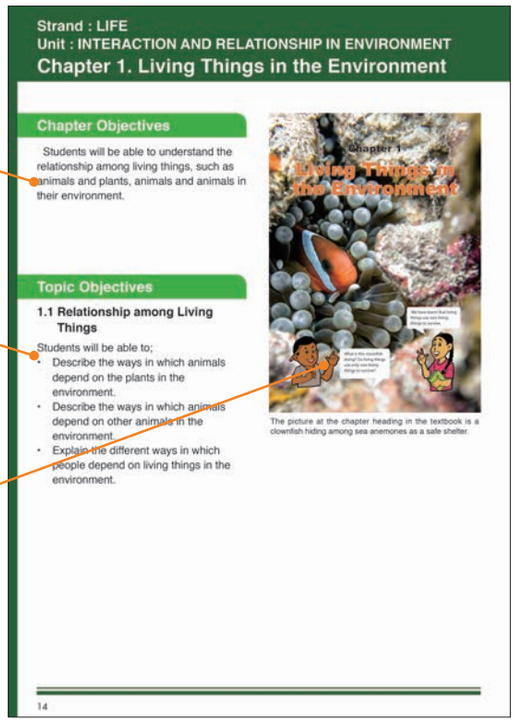
## 1.3 Chapter Introduction in Teacher's Manual

In the beginning of a chapter, the necessary information for the chapter such as chapter and topic objectives, linkages of the learning contents with other chapters and grades and a list of lessons are introduced. Student's prior knowledge learned in previous lesson or grade or experiences through their daily life are also provided.

**Chapter Objectives**
The objectives to achieve the chapter are introduced.

**Topic Objectives**
The objectives to achieve each topic are introduced.

**Chapter heading**
A picture of nature in Papua New Guinea or things in daily life related to the learning contents in the chapter is introduced with the list of lesson titles at each chapter heading in textbook.


Strand : LIFE
Unit : INTERACTION AND RELATIONSHIP IN ENVIRONMENT
Chapter 1. Living Things in the Environment

Chapter Objectives

Students will be able to understand the relationship among living things, such as animals and plants, animals and animals in their environment.

Topic Objectives

1.1 Relationship among Living Things

Students will be able to;
- Describe the ways in which animals depend on the plants in the environment.
- Describe the ways in which animals depend on other animals in the environment.
- Explain the different ways in which people depend on living things in the environment.

Chapter 1
Living Things in the Environment

The picture at the chapter heading in the textbook is a clownfish hiding among sea anemones as a safe shelter.

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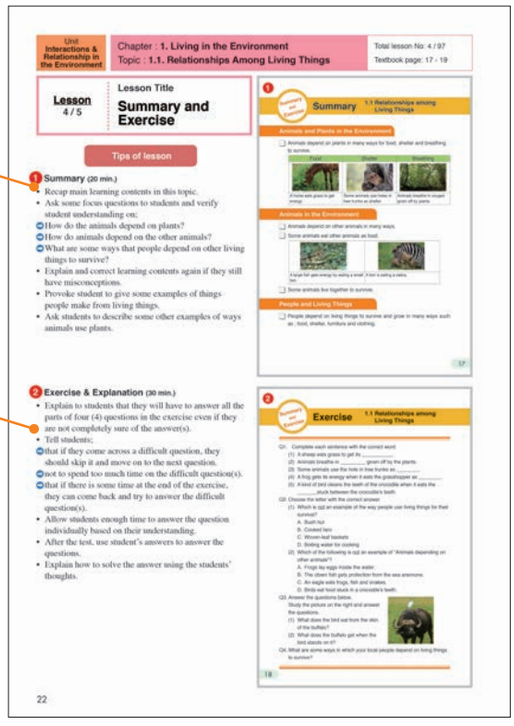
## 1.4 Summary and Exercise / Science Extras in Teacher's Manual

Summary and Exercise are inserted at the end of each topic, and column is inserted at the end of each chapter.

**Summary in the Topic**
The summary in the topic are shown with supplementary information.

**Exercise of the Topic**
Questions as student's exercise for learning contents in each topic are shown. To know students understanding, allow all students enough time to try solving the questions. After that, teacher must give the answer to students and teach how to solve each question.


Unit: Interactions & Relationship in the Environment
Chapter : 1. Living in the Environment
Topic : 1.1. Relationships Among Living Things
Total lesson No: 4 / 97
Textbook page: 17 - 19

Lesson 4 / 5
Lesson Title
Summary and Exercise

Tips of lesson

1 Summary (20 min.)
- Recap main learning contents in this topic.
- Ask some focus questions to students and verify student understanding on;
  - How do the animals depend on plants?
  - How do animals depend on the other animals?
  - What are some ways that people depend on other living things to survive?
- Explain and correct learning contents again if they still have misconceptions.
- Provoke student to give some examples of things people make from living things.
- Ask students to describe some other examples of ways animals use plants.

2 Exercise & Explanation (30 min.)
- Explain to students that they will have to answer all the parts of four (4) questions in the exercise even if they are not completely sure of the answer(s).
- Tell students;
  - that if they come across a difficult question, they should skip it and move on to the next question.
  - not to spend too much time on the difficult question(s).
  - that if there is some time at the end of the exercise, they can come back and try to answer the difficult question(s).
- Allow students enough time to answer the question individually based on their understanding.
- After the test, use student's answers to answer the questions.
- Explain how to solve the answer using the students' thoughts.

Summary 1.1 Relationships among Living Things

Animals and Plants in the Environment

Animals in the Environment

People and Living Things

Exercise 1.1 Relationships among Living Things

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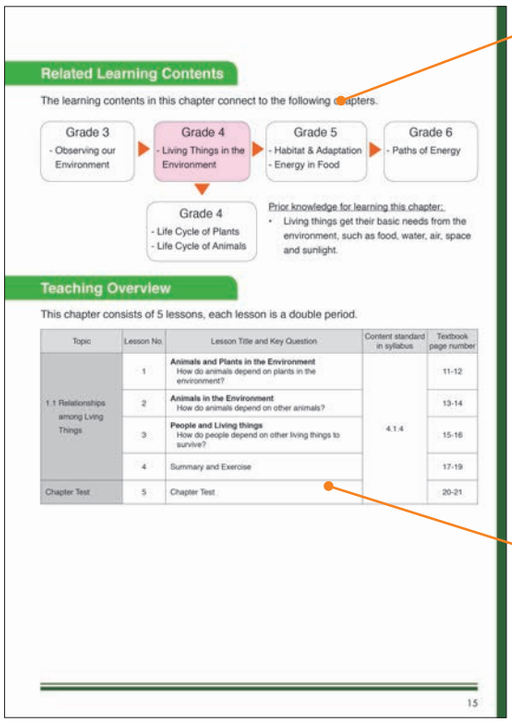

## Related Learning Contents

The learning contents in this chapter connect to the following chapters.

| Grade 3 | Grade 4 | Grade 5 | Grade 6 |
|---|---|---|---|
| - Observing our Environment | - Living Things in the Environment | - Habitat & Adaptation<br>- Energy in Food | - Paths of Energy |

Grade 4
- Life Cycle of Plants
- Life Cycle of Animals

Prior knowledge for learning this chapter:
- Living things get their basic needs from the environment, such as food, water, air, space and sunlight.

## Teaching Overview

This chapter consists of 5 lessons, each lesson is a double period.

| Topic | Lesson No. | Lesson Title and Key Question | Content standard in syllabus | Textbook page number |
|---|---|---|---|---|
| 1.1 Relationships among Living Things | 1 | **Animals and Plants in the Environment**<br>How do animals depend on plants in the environment? | 4.1.4 | 11-12 |
| | 2 | **Animals in the Environment**<br>How do animals depend on other animals? | | 13-14 |
| | 3 | **People and Living things**<br>How do people depend on other living things to survive? | | 15-16 |
| | 4 | Summary and Exercise | | 17-19 |
| Chapter Test | 5 | Chapter Test | | 20-21 |

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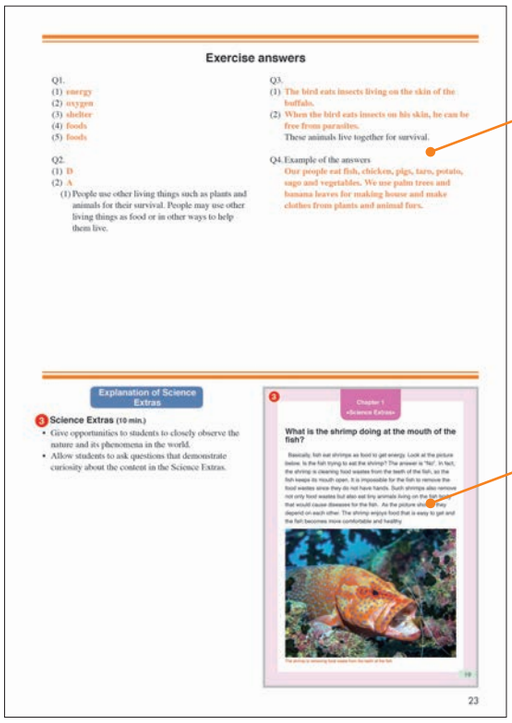
### Related Learning Contents

In the Syllabus, key learning contents are scoped and sequenced across all grades, from elementary to grade 12. The linkage of main learning contents of a chapter links to that in other chapters including other Grades from Grade 3 to Grade 6 are outlined as a concept map. Content in a chapter of a grade is necessary to be taught which links the contents to be learned in the same grade or the next grade. The concept map will help the teachers to visualise such a scope and sequence to teach in the classroom.

### Teaching Overview

Topic, lesson titles and key questions, lesson number in the chapter, textbook page number and numerical code of related content standards written in the syllabus are introduced



## Exercise answers

Q1.
(1) energy
(2) oxygen
(3) shelter
(4) foods
(5) foods

Q2.
(1) D
(2) A
(1) People use other living things such as plants and animals for their survival. People may use other living things as food or in other ways to help them live.

Q3.
(1) The bird eats insects living on the skin of the buffalo.
(2) When the bird eats insects on his skin, he can be free from parasites.
These animals live together for survival.

Q4. Example of the answers
Our people eat fish, chicken, pigs, taro, potato, sago and vegetables. We use palm trees and banana leaves for making house and make clothes from plants and animal furs.

Explanation of Science Extras

**Science Extras** (10 min.)
- Give opportunities to students to closely observe the nature and its phenomena in the world.
- Allow students to ask questions that demonstrate curiosity about the content in the Science Extras.

Chapter 1 «Science Extras»

**What is the shrimp doing at the mouth of the fish?**

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### Answer of Exercise question

Answers of the questions in exercise are provided.

### Science Extras (Column)

In column page, interesting information related to the chapter contents are introduced as 'Science Extras' to make students really interested in science.
Students are given time to read the column and discuss about the content with classmates.

# 2. How to deliver a Science lesson

Both the Textbook and the Teacher's Manual work hand in hand to deliver a meaningful and successful lesson. However, there are a few important things to consider before lessons are taught to avoid misconceptions. Teacher should consider:

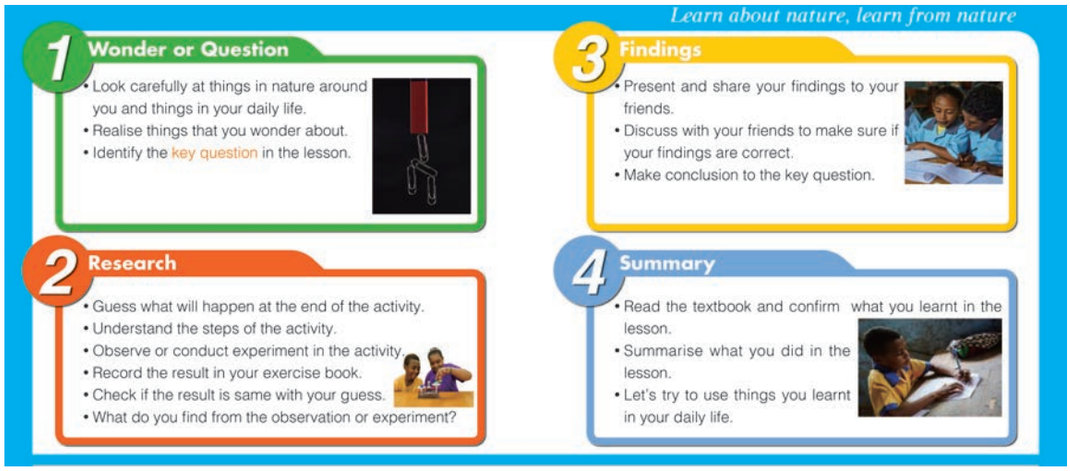
1. Having a Textbook and Teacher Manual on hand.
2. Knowing what was the previous and the next day's lesson contents before delivering the current lesson.
3. Preparing teaching materials prior to the lesson.
4. Reading the Lesson Objectives and understanding it very well.
5. Reading and understanding the Teacher's notes to have some background content knowledge of the lesson before teaching.
6. Following the sequence of the lesson carefully and consult the sample blackboard plan to confirm the lesson flow and notes.
7. Studying carefully the sample blackboard plan.

# 3. What to consider while presenting the lesson

Teacher should always consider the points mentioned above to help present the lesson effectively to the students. Everything that the teacher needs to know prior to the lesson is clearly written in the Teacher's Manual. The teacher would only have the manual while delivering the lesson because the reduced size of the textbook is inserted in the manual to help guide and follow with the class.

At the beginning of each lesson, all lessons have a key question that students are asked to think about ways on how to find out. Teachers will also realise that it encourages Problem Solving approach (Page 8-9) through the lesson. Teachers must be mindful that student's presentation of their findings is very rare and special. While doing problem solving, some findings presented may result in some misconceptions. However, when such arises consider those opinions or findings and always direct their attention back to the main focus of the lesson to flow with everyone in the class so that they learn and understand.

In several lessons, basic science instruments such as a thermometer, compass and simple electric circuit are required. For Grades 3 and 4 students, teachers must assist them to master how to use the instruments to develop their manipulative skills.



Concept of problem solving approach in the layout of studentstextbook (page 8 and 9)

# 4. What to do during Lesson Preparation

**1. Annual Overview (Page 12-13)**
The Yearly overview for Grade 4 Science lessons provides the links to the syllabus. The annual overview shows strand, unit, chapter, topics and lesson titles. The time allocation for each lesson in Science is recognised as a double period for 60 minutes (30 minutes x 2 lessons).

**2. Read Teacher's manual**
Necessary information for teaching is introduced in the Teacher's Manual. Teacher will read and understand the components of the teacher's manual as follows; lesson objectives, assessments, preparation, lesson flow, teacher's notes and sample blackboard.

**3. Test the activity**
Before the lesson, a teacher has to prepare the necessary materials and equipment written in teacher's manual. In addition, it is essential for teachers to do a trial of the activity involving on experiment before the lesson. Conditions such as temperature, humidity, materials and equipment used in the lesson may vary. If you are able to find that the result obtained differs or is incorrect, then you should be aware of how to adjust the ways of presenting the activity.The success of the lesson depends entirely on how well a teacher prepares and facilitates students learning to be concrete and effective.

**4. Prepare blackboard plan**
After understanding the lesson contents, teacher prepares the black board plans shown in the Teacher's Manual. The effective use of blackboard is important for student-friendly lessons because students can easily take notes.

# 5. How to use blackboard

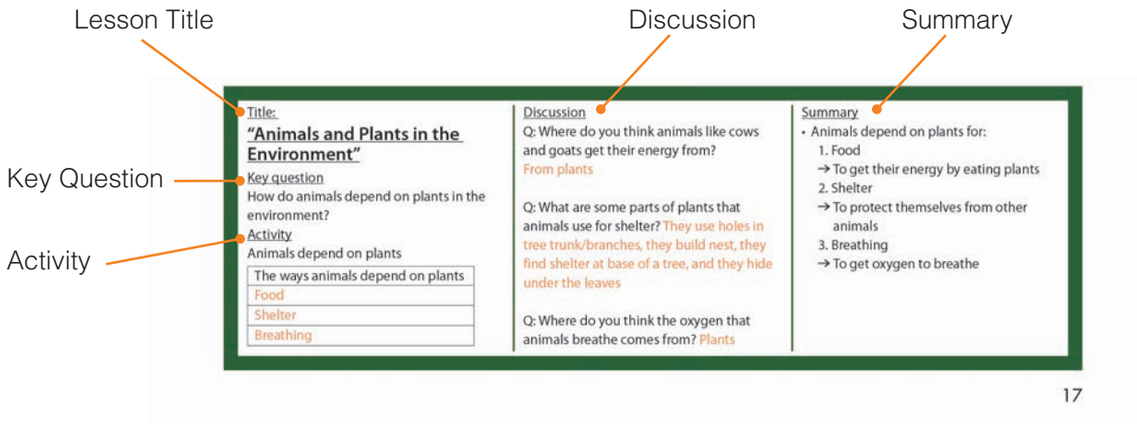
The common practice for the teachers utilising the blackboard is dividing it into sections for each subject. The Blackboard is an important teaching tool for teachers when utilised well. Therefore, in this Teacher's Manual it introduces the strategy for enhancing the effectiveness of blackboards for improving student learning.

1. To start a lesson, utilise the blackboard from the top left-hand corner of the blackboard to the right, top to the bottom chronologically as done in the Sample Blackboard Plan. The utilisation of the blackboard will accommodate the components of the blackboard plan below.

2. Encourage students to come out to the board to display their ideas and findings by writing and explaining what they have.

3. Allow students sufficient time to copy what you wrote before you erase it.

## Sample Blackboard Plan



# 6. Yearly Overview

Yearly overview is designed purposely for the systematic flow of the grade content. It is helpful in the preparation of the yearly program to effectively plan for teaching strategies. The strands, 'Life', 'Physical Science' and 'Earth and Space' are core strands of science in the syllabus.

| STRAND | UNIT | Chapter | Topic | Term | No | LESSON in chap. | Lesson Contents | Page Number |
|---|---|---|---|---|---|---|---|---|
| LIFE | INTERACTION AND RELATIONSHIP IN ENVIRONMENT | 1. Living Things in the Environment | 1.1 Relationships among Living Things | Term 1 | 1 | 1 | Animals and Plants in the Environment | 16 |
| | | | | | 2 | 2 | Animals in the Environment | 18 |
| | | | | | 3 | 3 | People and Living Things | 20 |
| | | | | | 4 | 4 | Summary and Exercise | 22 |
| | | | | | 5 | 5 | Chapter Test | 24 |
| LIFE | PLANTS | 2. Life Cycle of Plants 1 | 2.1 Stages of Life Cycle of Plants 1 | | 6 | 1 | Seeds | 28 |
| EARTH AND SPACE | OUR EARTH | 3. Soil for Human Beings | 3.1 Soil and Human Beings | | 7 | 1 | Uses of Soil for People | 44 |
| | | | | | 8 | 2 | Soil Pollution | 46 |
| | | | | | 9 | 3 | Effects of Soil Pollution | 48 |
| | | | | | 10 | 4 | Preventing Soil Pollution | 50 |
| | | | | | 11 | 5 | Summary and Exercise | 52 |
| | | | | | 12 | 6 | Chapter Test | 54 |
| LIFE | PLANTS | 4. Life Cycle Of Plants 2 | 4.1 Stages of Life Cycle of Plants 2 | | 13 | 1 | Sprouting | 30 |
| PHYSICAL SCIENCE | MATTER | 5. Properties of Matter | 5.1 Characteristics of Air (Gas) | | 14 | 1 | Air around Us | 58 |
| | | | | | 15 | 2 | Properties of Air 1 | 60 |
| | | | | | 16 | 3 | Properties of Air 2 | 62 |
| | | | | | 17 | 4 | Properties of Air 3 | 64 |
| | | | | | 18 | 5 | Summary and Exercise | 66 |
| | | | | | 19 | 6 | Chapter Test | 68 |
| EARTH AND SPACE | WEATHER AND CLIMATE | 6. Observing Weather | 6.1 Weather Descriptions and Changes | | 20 | 1 | Change in the Sky | 72 |
| | | | | | 21 | 2 | Measuring Weather | 74 |
| | | | | | 22 | 3 | Weather and People | 76 |
| | | | | | 23 | 4 | Summary and Exercise | 78 |
| | | | | | 24 | 5 | Chapter Test | 80 |
| LIFE | PLANTS | 7. Life Cycle of Plants 3 | 7.1 Stages of Life Cycle of Plants 3 | Term 2 | 25 | 1 | Flowering | 32 |
| PHYSICAL SCIENCE | ENERGY | 8. Electricity 1 | 8.1 Electricity in Our Life | | 26 | 1 | Electricity around Us | 84 |
| | | | | | 27 | 2 | Getting Electricity | 86 |
| | | | | | 28 | 3 | Summary and Exercise | 88 |
| | | | 8.2 Function of Electricity | | 29 | 4 | Lighting a Bulb | 90 |
| | | | | | 30 | 5 | Flow of Electricity | 92 |
| | | | | | 31 | 6 | Conductors and Insulators | 94 |
| | | | | | 32 | 7 | Uses of Conductors and Insulators | 96 |
| | | | | | 33 | 8 | Summary and Exercise | 98 |
| | | | | | 34 | 9 | Chapter Test | 100 |
| LIFE | PLANTS | 9. Life Cycle of Plants 4 | 9.1 Stages of Life Cycle of Plants 4 | | 35 | 1 | Fruits | 34 |
| | | | | | 36 | 2 | Life Cycle of Plants | 36 |
| | | | | | 37 | 3 | Summary and Exercise | 38 |
| | | | | | 38 | 4 | Chapter Test | 40 |
| LIFE | ANIMALS | 10. Life Cycle of Animals | 10.1 Stages of Life Cycle of Animals | | 39 | 1 | Life Cycle of Insects | 104 |
| | | | | | 40 | 2 | Life Cycle of Fish and Amphibians | 106 |
| | | | | | 41 | 3 | Life Cycle of Reptiles and Birds | 108 |
| | | | | | 42 | 4 | Life Cycle of Mammals | 110 |
| | | | | | 43 | 5 | Summary and Exercise | 112 |
| | | | | | 44 | 6 | Chapter Test | 114 |
| PHYSICAL SCIENCE | ENERGY | 11. Sound | 11.1 Properties of Sound | | 45 | 1 | Sound | 118 |
| | | | | | 46 | 2 | Sound Travelling | 120 |
| | | | | | 47 | 3 | Soft and Loud Sound | 122 |
| | | | | | 48 | 4 | High and Low Sound | 124 |
| | | | | | 49 | 5 | Summary and Exercise | 126 |
| | | | | | 50 | 6 | Chapter Test | 128 |

Chapters are arranged in sequential order from the first to the last. Each chapter contains one or more topics. The lesson number in the chapter is given to each lesson according to the students' textbook. Each lesson is recommended to be conducted as double periods (60 minutes). Finally, the page numbers are attached to each lesson to easily identify the lesson topics for planning and teaching.

| STRAND | UNIT | Chapter | Topic | Term | No | LESSON in chap. | Lesson Contents | Page Number |
|---|---|---|---|---|---|---|---|---|
| PHYSICAL SCIENCE | MATTER | 12. Matter Change | 12.1 Physical and Chemical Changes in Matter | Term 3 | 51 | 1 | Physical Properties | 132 |
| | | | | | 52 | 2 | Physical Changes in Matter | 134 |
| | | | | | 53 | 3 | Chemical Changes in Matter | 136 |
| | | | | | 54 | 4 | Comparing Physical and Chemical Change | 138 |
| | | | | | 55 | 5 | Summary and Exercise | 140 |
| | | | 12.2 States of Water | | 56 | 6 | Water around Us | 142 |
| | | | | | 57 | 7 | Heating Water | 144 |
| | | | | | 58 | 8 | What is Steam? | 146 |
| | | | | | 59 | 9 | Melting Ice | 148 |
| | | | | | 60 | 10 | Changes in States of Water | 150 |
| | | | | | 61 | 11 | Summary and Exercise | 152 |
| | | | | | 62 | 12 | Chapter Test | 154 |
| EARTH AND SPACE | WEATHER AND CLIMATE | 13. Water on the Earth | 13.1 Water in Natural World | | 63 | 1 | Sources of Water | 158 |
| | | | | | 64 | 2 | Puddle is Gone! | 160 |
| | | | | | 65 | 3 | Water in Air | 162 |
| | | | | | 66 | 4 | Water Cycle | 164 |
| | | | | | 67 | 5 | Summary and Exercise | 166 |
| | | | 13.2 Water and Human | | 68 | 6 | Importance of Water for Our Life | 168 |
| | | | | | 69 | 7 | Water Pollution | 170 |
| | | | | | 70 | 8 | Keeping Water Clean | 172 |
| | | | | | 71 | 9 | Summary and Exercise | 174 |
| | | | | | 72 | 10 | Chapter Test | 176 |
| LIFE | HUMAN BODY | 14. Structures and Movement of Human | 14.1 Bones and Muscle | Term 4 | 73 | 1 | Our Bones | 180 |
| | | | | | 74 | 2 | Bending Body Parts | 182 |
| | | | | | 75 | 3 | Animals with or without Bones | 184 |
| | | | | | 76 | 4 | Our Muscles | 186 |
| | | | | | 77 | 5 | Moving Body Parts | 188 |
| | | | | | 78 | 6 | Summary and Exercise | 190 |
| | | | | | 79 | 7 | Chapter Test | 192 |
| EARTH AND SPACE | SPACE | 15. The Moon | 15.1 Moon in the Sky | | 80 | 1 | Moon | 196 |
| | | | | | 81 | 2 | Movement of the Moon in the Sky | 198 |
| | | | | | 82 | 3 | Changing Moon | 200 |
| | | | | | 83 | 4 | Summary and Exercise | 202 |
| | | | | | 84 | 5 | Chapter Test | 204 |
| PHYSICAL SCIENCE | FORCE AND MOTION | 16. Force and Motion | 16.1 Describing and Measuring Motion | | 85 | 1 | Position and Motion of Objects | 208 |
| | | | | | 86 | 2 | Describing Motion of an Object | 210 |
| | | | | | 87 | 3 | Measuring Motion of an Object | 212 |
| | | | | | 88 | 4 | Summary and Exercise | 214 |
| | | | 16.2 Machine and its Work | | 89 | 5 | Six Simple Machines | 216 |
| | | | | | 90 | 6 | Lever | 218 |
| | | | | | 91 | 7 | Inclined Plane | 220 |
| | | | | | 92 | 8 | Pulleys | 222 |
| | | | | | 93 | 9 | Wheel and Axle | 224 |
| | | | | | 94 | 10 | Wedge | 226 |
| | | | | | 95 | 11 | Screw | 228 |
| | | | | | 96 | 12 | Summary and Exercise | 230 |
| | | | | | 97 | 13 | Chapter Test | 232 |

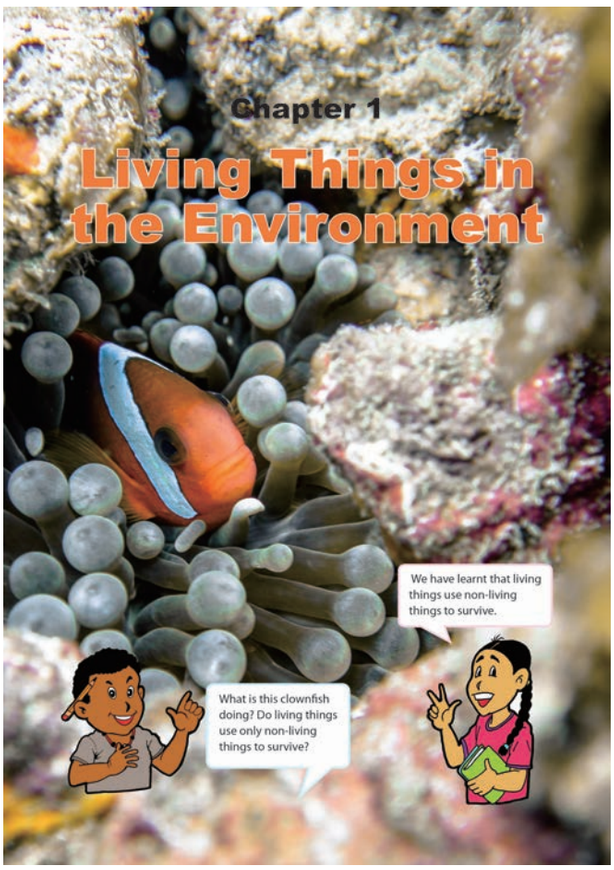
**Strand : LIFE**

**Unit : INTERACTION AND RELATIONSHIP IN ENVIRONMENT**

# Chapter 1. Living Things in the Environment

## Chapter Objectives

Students will be able to understand the relationship among living things, such as animals and plants, animals and animals in their environment.




The picture of the chapter heading in the textbook is a clownfish hiding among sea anemones as a safe shelter.

## Topic Objectives

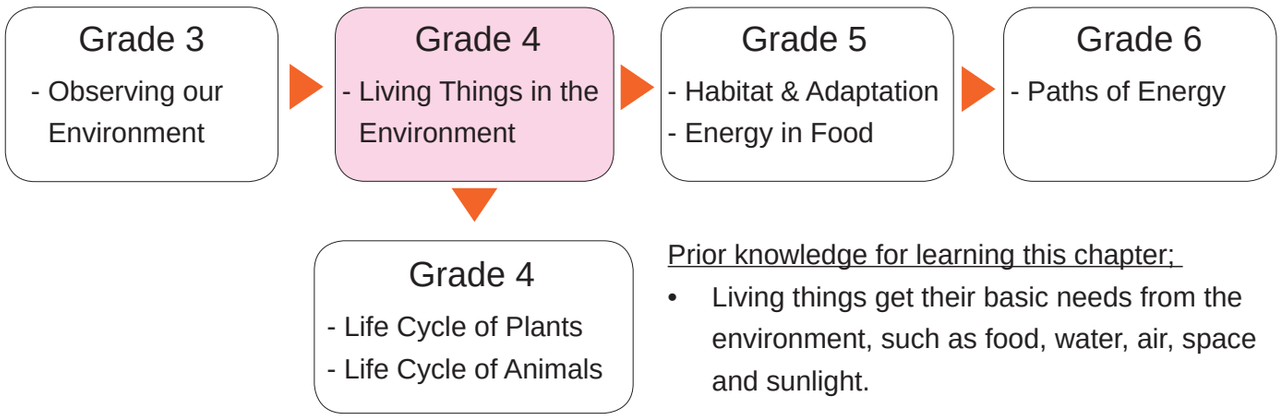
### 1.1 Relationship among Living Things

Students will be able to;

- Describe the ways in which animals depend on the plants in the environment.
- Describe the ways in which animals depend on other animals in the environment.
- Explain the different ways in which people depend on living things in the environment.

## Related Learning Contents

The learning contents in this chapter connect to the following chapters.




Prior knowledge for learning this chapter;

- Living things get their basic needs from the environment, such as food, water, air, space and sunlight.

## Teaching Overview

This chapter consists of 5 lessons, each lesson is a double period.

| Topic | Lesson No. | Lesson Title and Key Question | Content standard in syllabus | Textbook page number |
|---|---|---|---|---|
| 1.1 Relationships among Lving Things | 1 | **Animals and Plants in the Environment**<br>How do animals depend on plants in the environment? | 4.1.4 | 11-12 |
| | 2 | **Animals in the Environment**<br>How do animals depend on other animals? | | 13-14 |
| | 3 | **People and Living things**<br>How do people depend on other living things to survive? | | 15-16 |
| | 4 | Summary and Exercise | | 17-19 |
| Chapter Test | 5 | Chapter Test | | 20-21 |

Unit
**Interactions & Relationship in the Environment**

Chapter : **1. Living Things in the Environment**
Topic : **1.1. Relationship among Living Things**

Total lesson No: 1 / 97
Textbook page: 11 - 12

**Lesson**
**1 / 5**

**Lesson Title**

# Animals and Plants in the Environment

**Preparation**

- Pictures of different animals feeding and sheltering on plants

## Lesson Flow

**1 Introduction (10 min.)**

- Recap Gr.3 lesson on 'Basic Needs of Living Things'.

Q:What are the basic needs of plants and animals? (Food, water, air, space and sunlight)

- Show a picture or a drawing of an animal feeding on a plant

Q:Why is the animal eating the plant? (For survival, for energy, for strength)

**2 Introduce the key question**

How do animals depend on plants in the Environment?

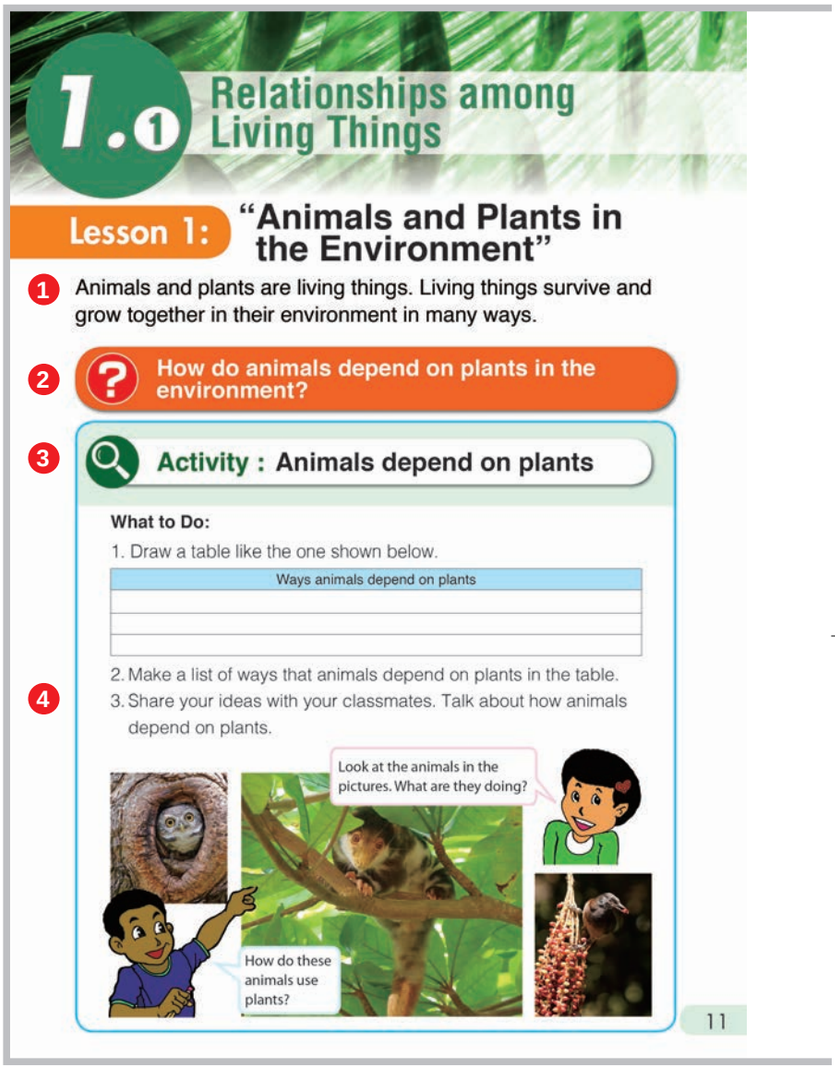
**3 Activity (20 min.)**

- Organise the students to work in pairs.
- Explain the steps of the activity.
- Ask students to do the activity.
- Advise students to refer to the pictures below the activity to fill in the table.
- Check students' activity in each group. If necessary, facilitate students finding their answers.
- Give enough time to the students to do their findings.

**4 Discussion for findings (20 min.)**

- Ask students to present their findings from their activity.
- Write down students' findings on the blackboard.

**(Continue)**




## Teacher's Notes

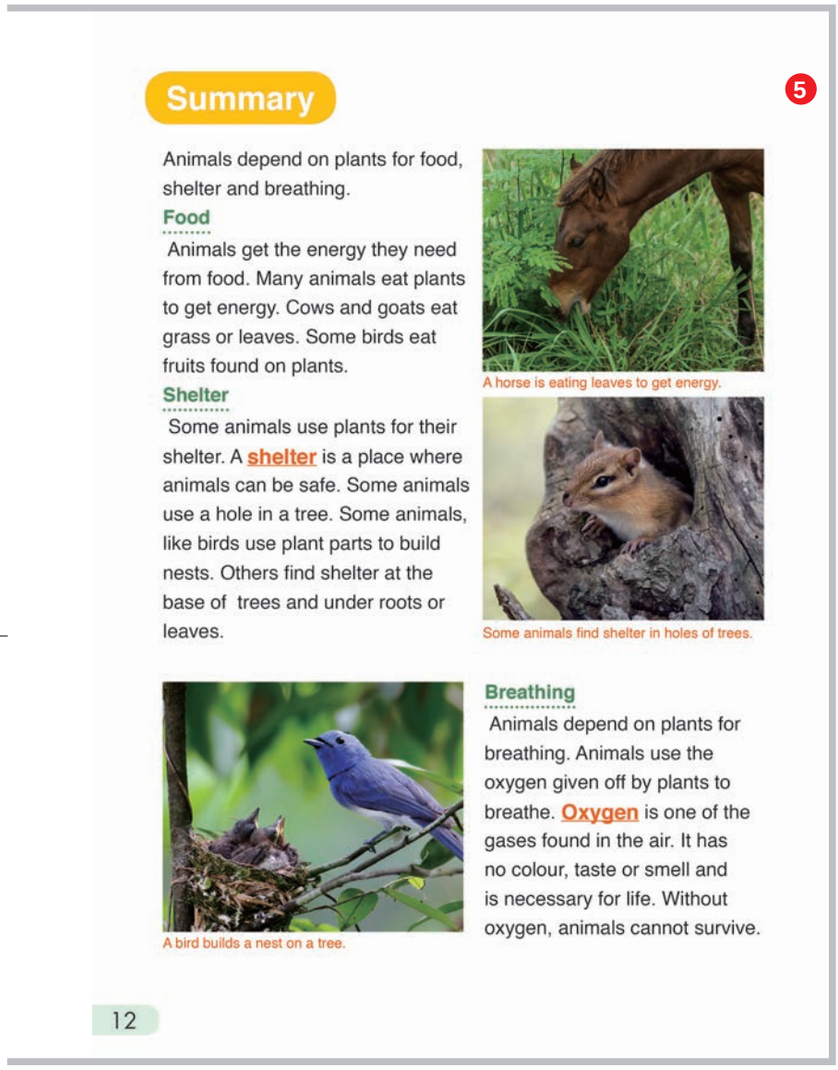
- Relationship between living things and non-living things are learnt in chapter 'Observing Our Environment' in Grade 3. The community of living things and their relationship with the non-living things interacting as system is called an 'ecosystem'. In this system, living things exchange basic needs to live.
- In Gr.3, we learned that there are five major basic needs such as 1) food, 2) water, 3) air, 4) space and 5) sunlight. This chapter focuses more on the relationship among living things; animals and plants, and animals and animals. Living things cannot produce water and sunlight. Thus, the chapter does not describe about them. This chapter also serves as the introduction of 'Habitat and Adaption' in Grade 5. The information about 'Space' in this chapter provides more about 'habitat' concepts.
- Plants produce oxygen through the process called 'Photosynthesis'. Photosynthesis is a chemical reaction that takes place inside a plant leaf, producing food for the plant to survive and consequently oxygen is emitted. Thus, production of oxygen is actually not the main purpose of the photosynthesis. Plants also need oxygen for breathing. Students who know about photosynthesis may misunderstand plants don't need oxygen or plants don't breathe.

## Lesson Objectives

Students will be able to:
- Describe the different ways animals depend on plants in the environment in order to survive.

## Assessment

Students are able to:
- State how animals depend on plants for food, shelter and breathing.
- Value the importance of plants for animals to survive.



## Summary

Animals depend on plants for food, shelter and breathing.

**Food**

Animals get the energy they need from food. Many animals eat plants to get energy. Cows and goats eat grass or leaves. Some birds eat fruits found on plants.

**Shelter**

Some animals use plants for their shelter. A **shelter** is a place where animals can be safe. Some animals use a hole in a tree. Some animals, like birds use plant parts to build nests. Others find shelter at the base of trees and under roots or leaves.

A horse is eating leaves to get energy.

Some animals find shelter in holes of trees.

A bird builds a nest on a tree.

**Breathing**

Animals depend on plants for breathing. Animals use the oxygen given off by plants to breathe. **Oxygen** is one of the gases found in the air. It has no colour, taste or smell and is necessary for life. Without oxygen, animals cannot survive.

12

- Facilitate active students discussion.
- **Based on their findings,** ask the following questions.

Q:Where do you think animals like cows and goats get their energy from? (From plants)

Q:What are some parts of plants that animals use for shelter? (Holes in tree trunk/ branches, plants parts to build nests, at the base of a tree and under the roots or leaves)

Q:Where do you think the oxygen that animals breathe comes from? (Plants)

- Summarise the discussion and explain what oxygen is.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard. (Refer to 'Blackboard Plan')
- Ask these questions as assessment:
  Q: How do animals depend on plants?
  Q: Why do some animals eat plants?
  Q: How do animals use plants for shelter?
  Q: Who gives off oxygen? Who breathes oxygen?
- Ask students to copy the notes on blackboard in their exercise books.

## Sample Blackboard Plan

Title:

**"Animals and Plants in the Environment"**

Key question

How do animals depend on plants in the environment?

Activity

Animals depend on plants

| The ways animals depend on plants |
|---|
| Food |
| Shelter |
| Breathing |

Discussion

Q: Where do you think animals like cows and goats get their energy from? From plants

Q: What are some parts of plants that animals use for shelter? They use holes in tree trunk/branches, they build nest, they find shelter at base of a tree, and they hide under the leaves

Q: Where do you think the oxygen that animals breathe comes from? Plants

Summary

- Animals depend on plants for:
  1. Food
  → To get their energy by eating plants
  2. Shelter
  → To protect themselves from other animals
  3. Breathing
  → To get oxygen to breathe

Unit
**Interactions & Relationship in the Environment**

Chapter : **1. Living Things in the Environment**
Topic : **1.1. Relationship among Living Things**

Total lesson No: 2 / 97
Textbook page: 13 - 14

**Lesson**
**2 / 5**

**Lesson Title**

# Animals in the Environment

**Preparation**

- Some pictures/drawings that animals depend on other animals

## Lesson Flow

**1 Introduction (10 min.)**

- Revise the last lesson on 'Animals and Plants in the Environment'.

Q:How do animals depend on plants for their survival? (For food, shelter and breathing)

**2 Introduce the key question**

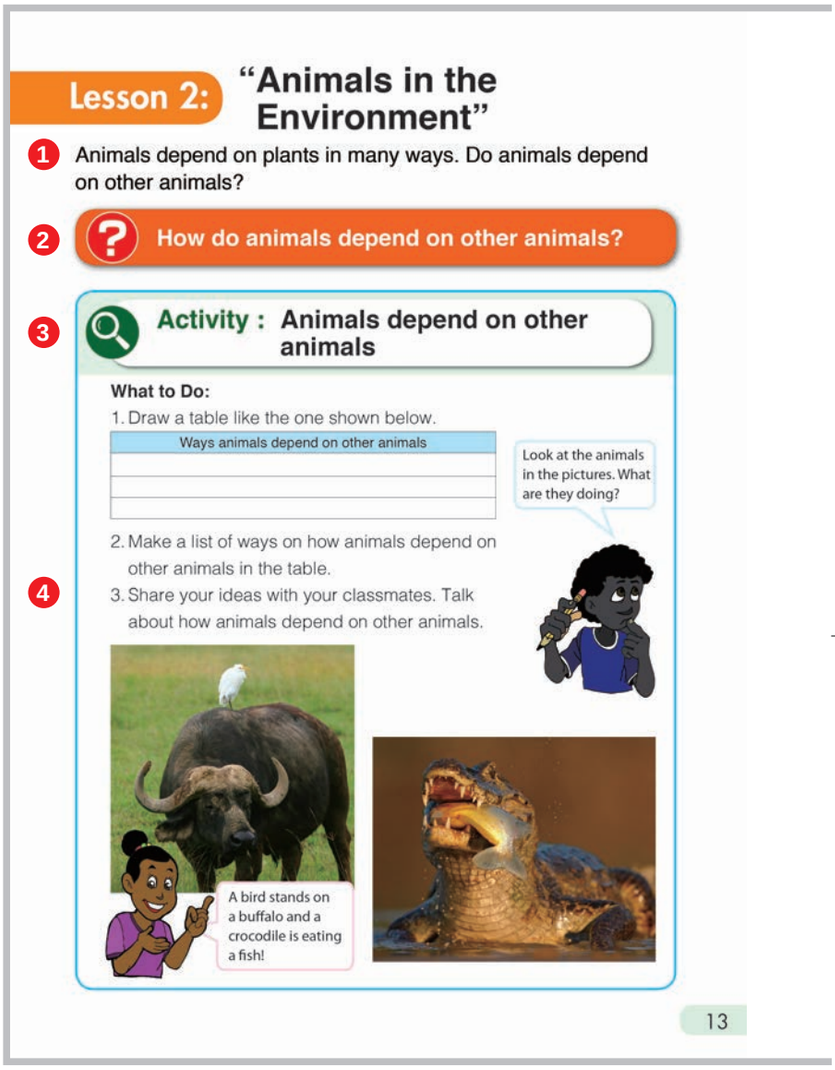
How do animals depend on other animals?

**3 Activity (20 min.)**

- Organise the students into groups.
- Explain the steps of the activity.
- Ask students to do the activity.
- Advise students to refer to the pictures and characters' talking for their investigation.
- Give enough time to the students to do their investigation.
- This activity is a little difficult for students to come up with some ideas.

**4 Discussion for findings (20 min.)**

- Ask students to present their findings from the activity.
- Facilitate active students' discussion. **(Continue)**


Lesson 2: "Animals in the Environment"

1 Animals depend on plants in many ways. Do animals depend on other animals?

2 How do animals depend on other animals?

3 Activity : Animals depend on other animals

What to Do:

1. Draw a table like the one shown below.

| Ways animals depend on other animals |
|---|
| |
| |
| |

2. Make a list of ways on how animals depend on other animals in the table.
3. Share your ideas with your classmates. Talk about how animals depend on other animals.

4

Look at the animals in the pictures. What are they doing?

A bird stands on a buffalo and a crocodile is eating a fish!

13

## Teacher's Notes

### Explanation of Pictures in a Textbook

Allowing students to see the pictures in the text book will widen students mind to recall experiences of what they see around their environment.

- The bird on the cattle picks the insects that live on the skin of the cattle as food thus cleaning the skin of the cattle.
- Carnivores are meat eaters because they feed on other animals. Normally a bigger animal eats a smaller animal.
- Small animals which are usually called parasites (worms) can find shelter in other animals. For worms, they live in intestines of larger animals
- Some smaller animal like the clown fish get protection in the poisonous tentacles of the sea anemone as its shelter whilst keeping the anemone cleaned.

## Lesson Objectives

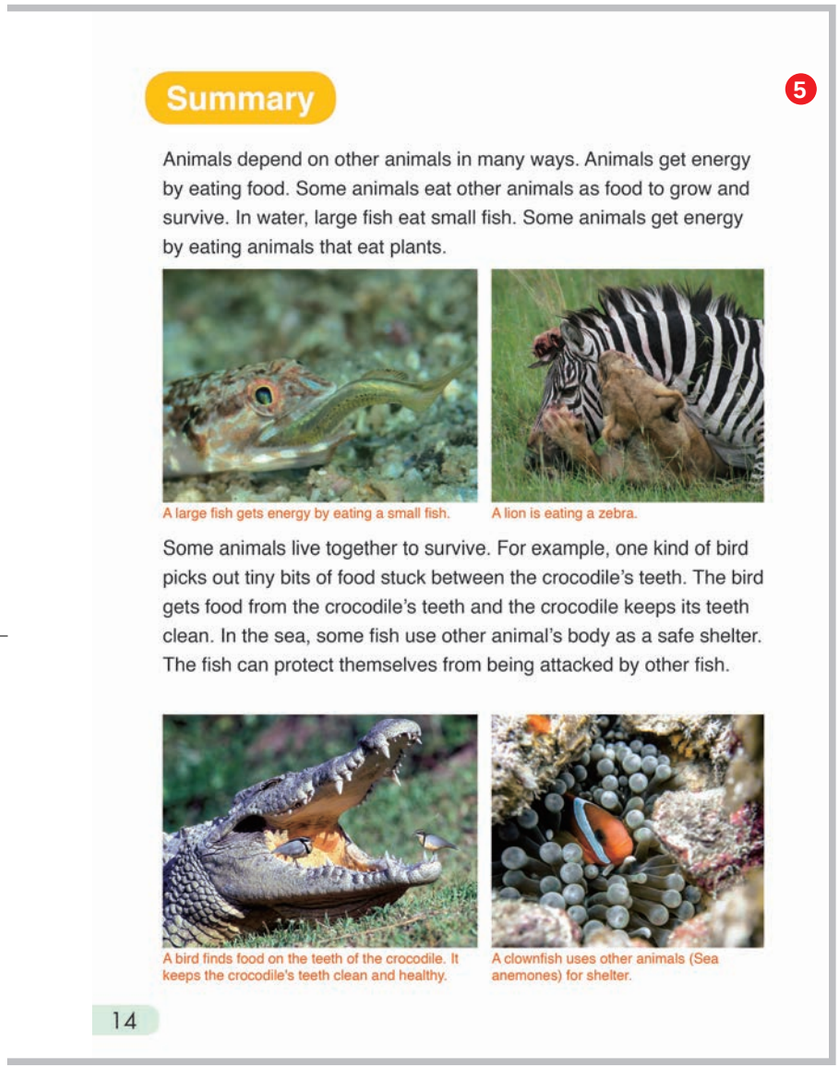
Students will be able to:

- Describe the ways in which animals depend on other animals in the environment for survival.

## Assessment

Students are able to:

- Explain how animals depend on other animals for survival.
- List some examples of different animals that depend on other animals for food and shelter.



Summary

5

Animals depend on other animals in many ways. Animals get energy by eating food. Some animals eat other animals as food to grow and survive. In water, large fish eat small fish. Some animals get energy by eating animals that eat plants.

A large fish gets energy by eating a small fish.

A lion is eating a zebra.

Some animals live together to survive. For example, one kind of bird picks out tiny bits of food stuck between the crocodile's teeth. The bird gets food from the crocodile's teeth and the crocodile keeps its teeth clean. In the sea, some fish use other animal's body as a safe shelter. The fish can protect themselves from being attacked by other fish.

A bird finds food on the teeth of the crocodile. It keeps the crocodile's teeth clean and healthy.

A clownfish uses other animals (Sea anemones) for shelter.

14

- Write down students' findings on the blackboard. (Accept students' ideas even if their ideas are wrong!)
- **Based on their findings,** pose the following questions on the pictures in the activity.

Q:What do you think the bird is doing? (The bird is picking up and eating some insects on the back of the cattle.)

Q:How do the bird and the cattle depend on each other? (The bird gets food to get energy and the cattle can keeps its skin healthy.)

Q:What is the crocodile doing? (It is eating fish.)

Q:How does the crocodile depend on the fish? (The crocodile eats fish to get energy .)

- Summarise the discussion.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard. (Refer to 'Blackboard Plan')
- Ask these questions as assessment:
  Q: How do animals depend on other animals?
  Q: Why do animals depend on other animals?
- Ask students to copy the notes on blackboard in their exercise books.

## Sample Blackboard Plan

Title:

**"Animals in the Environment"**

Key question

How do animals depend on other animals?

Activity

Animals depend on other animals

| The ways animals depend on other animals |
|---|
| For shelter |
| For food |
| ... |

Discussion

Q: What do you think the bird is doing?
The bird is picking up and eating some insects on the back of the cattle.

Q: How do the bird and the cattle depend on each other?
The bird can get food to get energy and the cattle can keep its skin health.

Q: What is the crocodile doing?
It is eating fish.

Q: How does the crocodile depend on the fish? The crocodile eats fish to get energy.

Summary

- Animals depend on other animals for:
  1. Food
  → To get energy by eating other animals
  2. Shelter
  → To protect themselves from other animals
  3. Breathing
  → To get benefits from each other for survival.

Unit
**Interactions & Relationship in the Environment**

Chapter : **1. Living Things in the Environment**
Topic : **1.1. Relationship among Living Things**

Total lesson No: 3 / 97
Textbook page: 15 - 16

**Lesson**
**3 / 5**

**Lesson Title**

# People and Living Things

**Preparation**

- Samples of meat, timber, leaves used as roof, beaten clothing barks, animal skins

## Lesson Flow

**1 Introduction (10 min.)**

- Revise previous lesson on 'Animals in the Environment'.

Q:How do animals depend on other animals?
(Food, Shelter and living together)
Q:Why do animals depend on other animals?
(To get energy and protect)

**2 Introduce the key question**

How do people depend on other living things to survive?

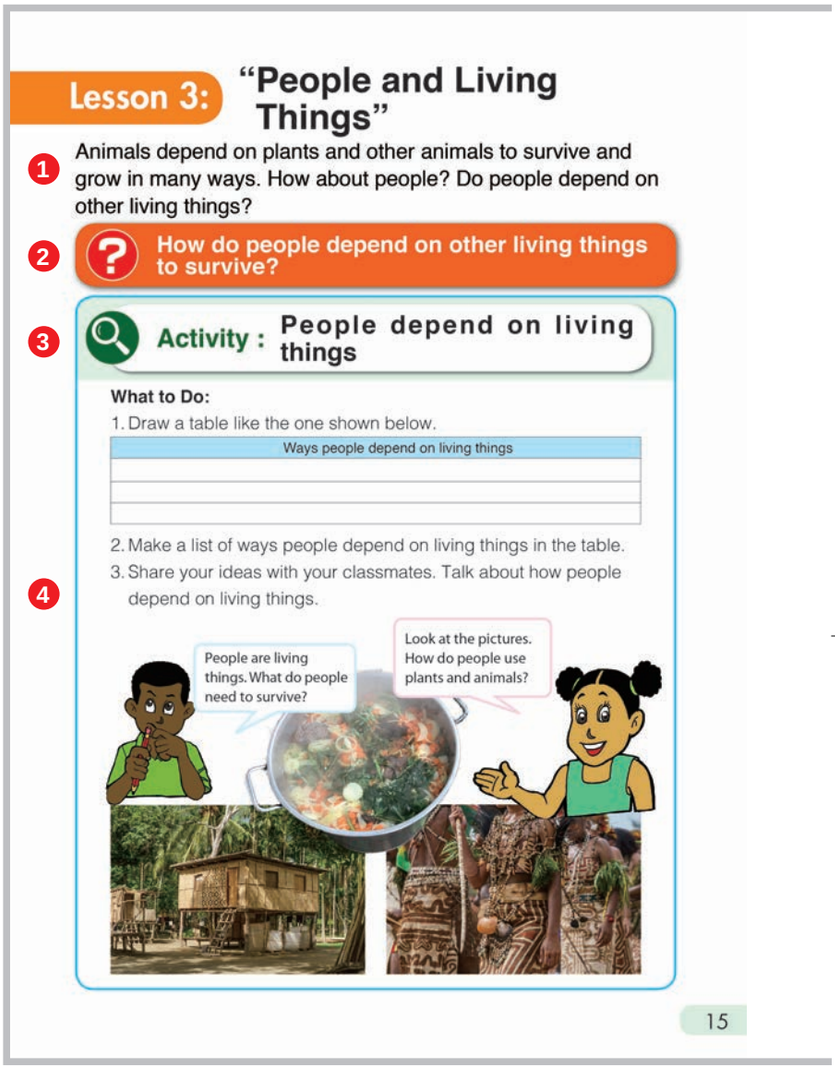
**3 Activity (20 min.)**

- Organise students to work in pairs.
- Explain the steps of the activity.
- Give an example of how to fill the table together with the students.
- Ask students to do the activity.
- Advise students to refer to the pictures and what characters are saying in the activity for their investigation.
- Give enough time to the students to do their activity.

**4 Discussion for findings (20 min.)**

- Ask students to present their findings from the activity.
- Facilitate active students' discussion.
- Write down students' findings on the blackboard.

**(Continue)**




## Teacher's Notes

People as well as other animals use other living things to survie. However, unlike other animals, people often process living things to make them easier to use.
For example:
- Food: To eat plants or animals as food, people cook them by boiling, burning and being steamed by using fire. It would contribute to avoid food poisoning.
- Shelter: To build a house, people cut tree and process it to timbers. The framework of the building using the timbers would make their house stronger.
- Clothing: Tapa Cloth is typical for the Oro Province. It is made from beaten bark of the paper mulberry tree and decorated with natural plant dyes and charcoal.

## Lesson Objectives

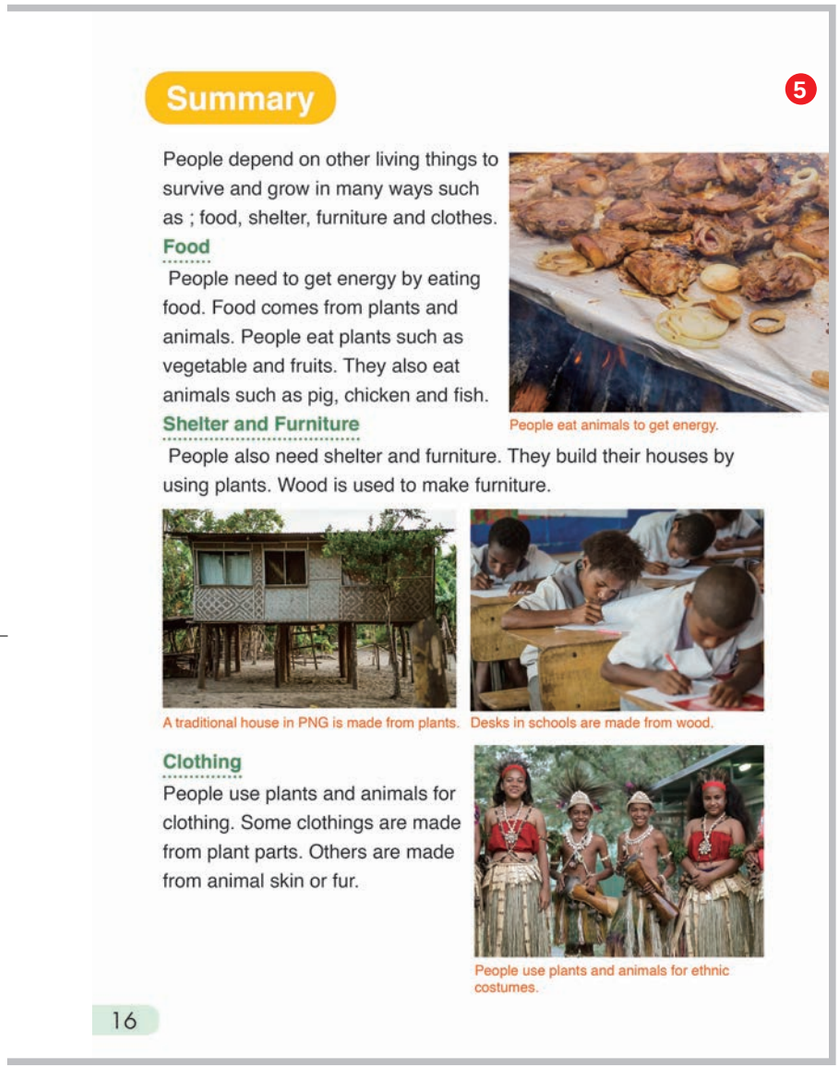
Students will be able to:

- Explain the different ways that people depend on living things in the environment for survival.

## Assessment

Students are able to:

- State that people depend on other living things for food, shelter, furniture and clothes.
- Describe different ways that people use plants and animals in their daily life for survival.



**Summary** 5

People depend on other living things to survive and grow in many ways such as ; food, shelter, furniture and clothes.

**Food**

People need to get energy by eating food. Food comes from plants and animals. People eat plants such as vegetable and fruits. They also eat animals such as pig, chicken and fish.

People eat animals to get energy.

**Shelter and Furniture**

People also need shelter and furniture. They build their houses by using plants. Wood is used to make furniture.

A traditional house in PNG is made from plants.

Desks in schools are made from wood.

**Clothing**

People use plants and animals for clothing. Some clothings are made from plant parts. Others are made from animal skin or fur.

People use plants and animals for ethnic costumes.

16

- **Based on their findings,** ask the following question.

Q:How do people depend on plants? (e.g. For Food, house, furniture and clothing)

Q:How do people depend on animals? (e.g. For food, clothing, pet and security)

Q:What are the plant parts that people use to build their house and furniture? (Wood, sticks, grass, bamboo stem, palm stem and leaves)

Q:What are the plant and animal parts that people use to make their clothing? (Leaves, barks, feathers and animals' skins or fur)

- Summarise the discussion.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard. (Refer to 'Blackboard Plan')
- Ask these questions as assessment:
  Q: How do people depend on living things?
  Q: What are some examples of how people use plants and animals for survival?
- Ask students to copy the notes on blackboard in their exercise books.

## Sample Blackboard Plan

Title:

**"People and Living Things"**

Key question

How do people depend on living things to survive?

Activity

People depend on living things

| The ways people depend on living things |
|---|
| Food to eat |
| House to build |
| Clothing to make |
| etc |

Discussion

Q: How do people depend on plants?
e.g. For food, house, furniture and clothing

Q: How do people depend on animals?
e.g. For food, clothing pet and security

Q: What are the plant parts that people use to build their house and furniture with?
Wood, sticks, grass, bamboo stem, palm stem and leaves

Q: What are the plant and animals parts that people use to make their clothing with?
Leaves, barks, feathers and animals' skins or fur

Summary

- People depend on living things for:
  1. Food
  2. Shelter (home)
  3. Furniture
  4. Clothing
  5. Others: e.g. medicine, pet, musical instrument, hunting, etc.

Unit
**Interactions & Relationship in the Environment**

Chapter : **1. Living in the Environment**
Topic : **1.1. Relationships Among Living Things**

Total lesson No: 4 / 97
Textbook page: 17 - 19

**Lesson**
**4 / 5**

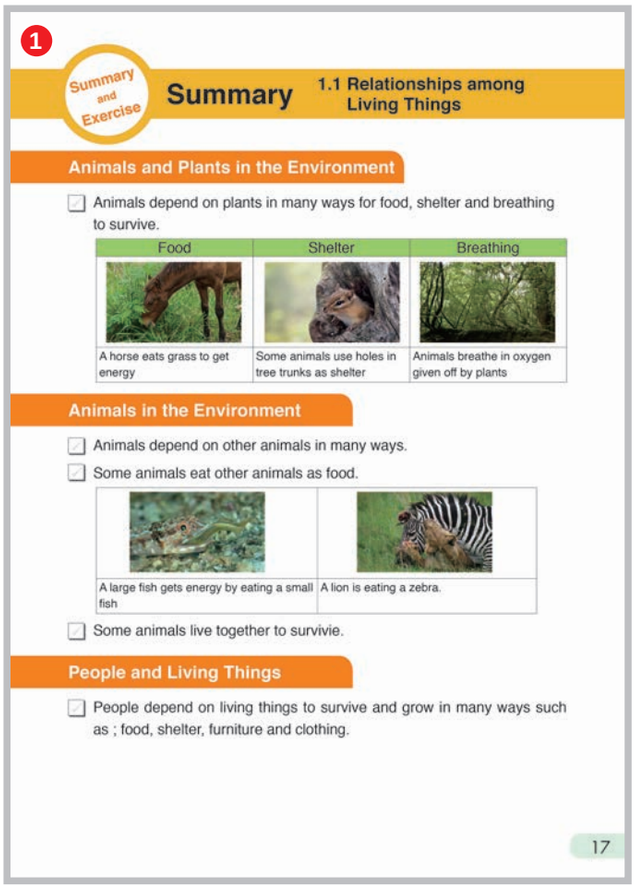
**Lesson Title**

# Summary and Exercise

## Tips of lesson

### 1 Summary (20 min.)

- Recap main learning contents in this topic.
- Ask some focus questions to students and verify student understanding on;
  - How do the animals depend on plants?
  - How do animals depend on other animals?
  - What are some ways that people depend on other living things to survive?
- Explain and correct learning contents again if they still have misconceptions.
- Provoke student to give some examples of things people make from living things.
- Ask students to describe some other examples of ways animals use plants.



1

Summary and Exercise

**Summary** 1.1 Relationships among Living Things

**Animals and Plants in the Environment**

- Animals depend on plants in many ways for food, shelter and breathing to survive.

| Food | Shelter | Breathing |
|---|---|---|
|  |  |  |
| A horse eats grass to get energy | Some animals use holes in tree trunks as shelter | Animals breathe in oxygen given off by plants |

**Animals in the Environment**

- Animals depend on other animals in many ways.
- Some animals eat other animals as food.


A large fish gets energy by eating a small fish


A lion is eating a zebra.

- Some animals live together to survivie.

**People and Living Things**

- People depend on living things to survive and grow in many ways such as ; food, shelter, furniture and clothing.

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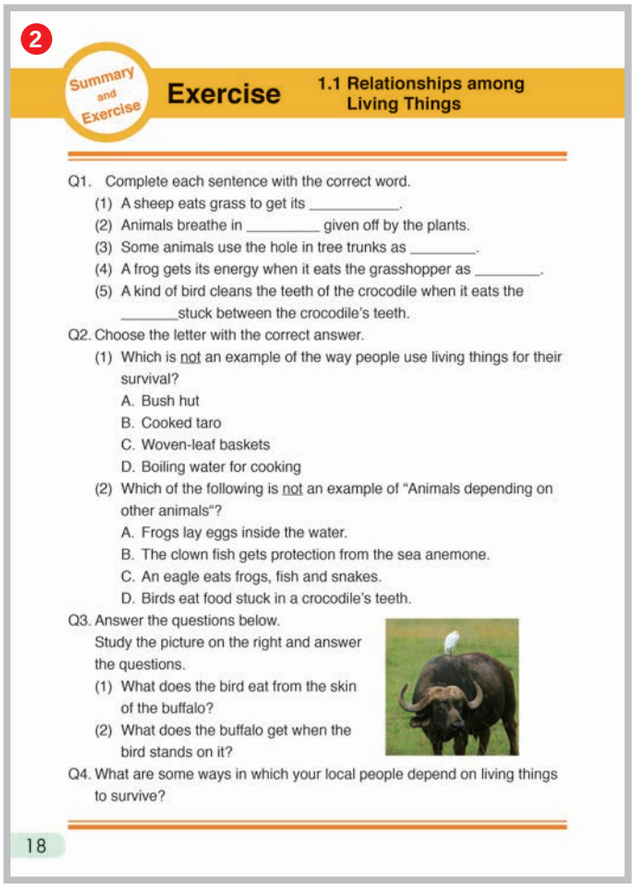
### 2 Exercise & Explanation (30 min.)

- Explain to students that they will have to answer all the questions in the exercise even if they are not completely sure of the answer(s).
- Tell the students;
  - that if they come across a difficult question, they should skip it and move on to the next question.
  - not to spend too much time on the difficult question(s).
  - that if there is some time at the end of the exercise, they can come back and try to answer the difficult question(s).
- Allow students enough time to answer the question individually based on their understanding.
- After the test, use student's answers to answer the questions.
- Explain how to solve the answer using the students' thoughts.



2

Summary and Exercise

**Exercise** 1.1 Relationships among Living Things

Q1. Complete each sentence with the correct word.
(1) A sheep eats grass to get its _____.
(2) Animals breathe in _____ given off by the plants.
(3) Some animals use the hole in tree trunks as _____.
(4) A frog gets its energy when it eats the grasshopper as _____.
(5) A kind of bird cleans the teeth of the crocodile when it eats the _____stuck between the crocodile's teeth.

Q2. Choose the letter with the correct answer.
(1) Which is not an example of the way people use living things for their survival?
A. Bush hut
B. Cooked taro
C. Woven-leaf baskets
D. Boiling water for cooking
(2) Which of the following is not an example of "Animals depending on other animals"?
A. Frogs lay eggs inside the water.
B. The clown fish gets protection from the sea anemone.
C. An eagle eats frogs, fish and snakes.
D. Birds eat food stuck in a crocodile's teeth.

Q3. Answer the questions below.
Study the picture on the right and answer the questions.
(1) What does the bird eat from the skin of the buffalo?
(2) What does the buffalo get when the bird stands on it?



Q4. What are some ways in which your local people depend on living things to survive?

18

## Exercise answers

Q1.
(1) **energy**
(2) **oxygen**
(3) **shelter**
(4) **foods**
(5) **foods**

Q2.
(1) **D**
(2) **A**
(1) People use other living things such as plants and animals for their survival. People may use other living things as food or in other ways to help them live.

Q3.
(1) **The bird eats insects living on the skin of the buffalo.**
(2) **When the bird eats insects on his skin, he can be free from parasites.**
These animals live together for survival.

Q4. Example of the answers
**Our people eat fish, chicken, pigs, taro, potato, sago and vegetables. We use palm trees and banana leaves for making house and make clothes from plants and animal furs.**

**Explanation of Science Extras**

### 3 Science Extras (10 min.)

- Give opportunities to students to closely observe the nature and its phenomena in the world.
- Allow students to ask questions that demonstrate curiosity about the content in the Science Extras.


3

Chapter 1
•Science Extras•

**What is the shrimp doing at the mouth of the fish?**

Basically, fish eat shrimps as food to get energy. Look at the picture below. Is the fish trying to eat the shrimp? The answer is "No". In fact, the shrimp is cleaning food wastes from the teeth of the fish, so the fish keeps its mouth open. It is impossible for the fish to remove the food wastes since they do not have hands. Such shrimps also remove not only food wastes but also eat tiny animals living on the fish body that would cause diseases for the fish. As the picture shows, they depend on each other. The shrimp enjoys food that is easy to get and the fish becomes more comfortable and healthy.

The shrimp is removing food waste from the teeth of the fish.

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**Lesson**
**5 / 5**

**Lesson Title**

# Chapter Test

**Answer of the Chapter Test**

*Chapter Test*

## 1. Living Things in the Environment

**Q1** Complete each sentence with the correct word.

(1) Animals depend on plants for food, shelter and Oxygen (or Breathing)
(2) Some animals eat other animals as Foods to grow and survive.
(3) People build their Homes (Houses or shelters) by using plants.

**Q2** Choose the letter with the correct answer.

(1) Which of these sentences is about animals depending on plants for shelter?

A. It is the only place where animals can be safe.
B. Animals get the energy they need from food.
C. Some animals use holes in trees.
D. Animals use the oxygen given off by plants.

(2) 'Some animals get energy by eating plant-eating animals.' According to this sentence, which of the following is a plant-eating animal?

A. Grasshopper
B. Gecko
C. Spider
D. Shark

(3) Which list shows the ways people depend on living things?

A. shelter, furniture and space
B. clothes, food and furniture
C. light, space and air
D. food, shelter and light

(4) Which of these sentences is about animals getting energy from plants?

A. Goats eat soil blocks containing salts and minerals.
B. People use oxygen given off by plants to breathe in.
C. Sharks get strength by eating small fish.
D. Small fish eat sea weeds in the sea.

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## Q3

(1) The crocodile and the bird live together for their survival. How do they help each other?

The crocodile lets the bird eat the food pieces stuck in its teeth to get its teeth cleaned.

(2) Look at the picture on the right and explain how people depend on other living things.

People use plants for shelter. Roof of house is made by grasses and pillars are made by hard woods.

(3) Look at the picture on the right and explain how animals depend on plants.

The bird builds nests on a tree by using dried plants. Upper parts of tree can be safer than on the ground by avoiding other animals eating eggs and chick.

## Q4

(1) Give examples of how animals depend on other animals.

For food: (example) Crocodile eats fishes to get the energy they need.

Living together to survive: (example) Small shrimps clean the mouth of big fish. The shrimp can get food from fish's teeth and the fish can keep his mouth cleaned.

(2) If there are no other living things in the world, what problems will people face?

People cannot use plants for building houses and furniture, and have to use rocks, clays and so on. Building houses will be difficult. People cannot wear clothes. More serious problem is there will be no foods to eat and people will starve. Moreover, plants cannot produce oxygen and people cannot breathe and die.

**Strand : LIFE**
**Unit : PLANTS**

# Chapter 2, 4, 7, 9. Life Cycle of Plants

The learning contents about 'Life Cycle of Plants' are covered in chapters 2, 4, 7 and 9.
The contents are allocated to the corresponding chapters as shown in 'Teaching overview' on the next page.
It is expected that students grow a real plant in the school and observe each stage of life cycle of the plant by using their five senses.

The content is separated into four chapters in the textbook. Teacher should modify the yearly lesson plans according to the growth of the plant because the growing speed and stages depends on plant species and environmental factors such as temperature, humidity, rainfall and soil condition.


The pictures of the heading of these chapters in the textbook show the stages of life cycle of a tomato plant.

## Chapter Objectives

Students will be able to understand life cycle of plants through the observation of the growth of a plant.

Students will be able to sketch plant parts at each stage of its life cycle.

## Topic Objectives

### Stages of Life Cycle of Plants

Students will be able to;

- Observe the properties of seeds.
- Observe how seedlings grow.
- Identify the parts of a flower.
- Describe the structure of a fruit.
- Describe the life cycle of plants.

## Related Learning Contents

The learning contents in this chapter connect to the following chapters.

| Grade 3 | Grade 4 | Grade 5 | Grade 6 |
|---|---|---|---|
| - Characteristics of Plants | - Life Cycle of Plants | - Plant Growth | - Reproduction and Heredity in Plants |

Prior knowledge for learning this chapter;

- Most plants have the same parts in common such as roots, stems, leaves and flowers.

## Teaching Overview

Chapter 2 consists of 1 lesson, the lesson is a double period.

| Topic | Lesson No. | Lesson Title and Key Question | Content standard in syllabus | Textbook page number |
|---|---|---|---|---|
| 2.1 Stages of Life Cycle of Plants 1 | 1 | **Seeds**<br>How do seeds look like? | 4.1.1 | 23-24 |

Chapter 4 consists of 1 lesson, the lesson is a double period.

| Topic | Lesson No. | Lesson Title and Key Question | Content standard in syllabus | Textbook page number |
|---|---|---|---|---|
| 4.1 Stages of Life Cycle of Plants 2 | 1 | **Sprouting**<br>How do young plants grow and change? | 4.1.1 | 41-42 |

Chapter 7 consists of 1 lesson, the lesson is a double period.

| Topic | Lesson No. | Lesson Title and Key Question | Content standard in syllabus | Textbook page number |
|---|---|---|---|---|
| 7.1 Stages of Life Cycle of Plants 3 | 1 | **Flowering**<br>What is a flower made up of? | 4.1.1 | 71-72 |

Chapter 9 consists of 4 lessons, each lesson is a double period.

| Topic | Lesson No. | Lesson Title and Key Question | Content standard in syllabus | Textbook page number |
|---|---|---|---|---|
| 9.1 Stages of Life Cycle of Plants 4 | 1 | **Fruits**<br>What is a fruit made up of? | 4.1.1 | 95-96 |
| | 2 | **Life Cycle of Plants**<br>How do plants grow and change during their life cycle? | | 97-98 |
| | 3 | Summary and Exercise | | 99-101 |
| Chapter Test | 4 | Chapter Test | | 102-103 |

| Unit | Chapter : **2. Life Cycle of Plants 1** | Total lesson No: 6 / 97 |
|---|---|---|
| **PLANTS** | Topic : **2.1. Stages of Life Cycle of Plants 1** | Textbook page: 23 - 24 |

**Lesson** 1 / 1

**Lesson Title**

# Seeds

**Preparation**

- Different kinds of Seeds
- Try it – tomato seed

## Lesson Flow

**1 Introduction (5 min.)**

- Explain what students will study in this chapter and topic.
- By showing a seed, ask the question:

Q:Do you know what it is? (seed)

Q:What is a seed?

- Encourage students to think about a seed using the key question.

**2 Introduce the key question**

How do seeds look like?

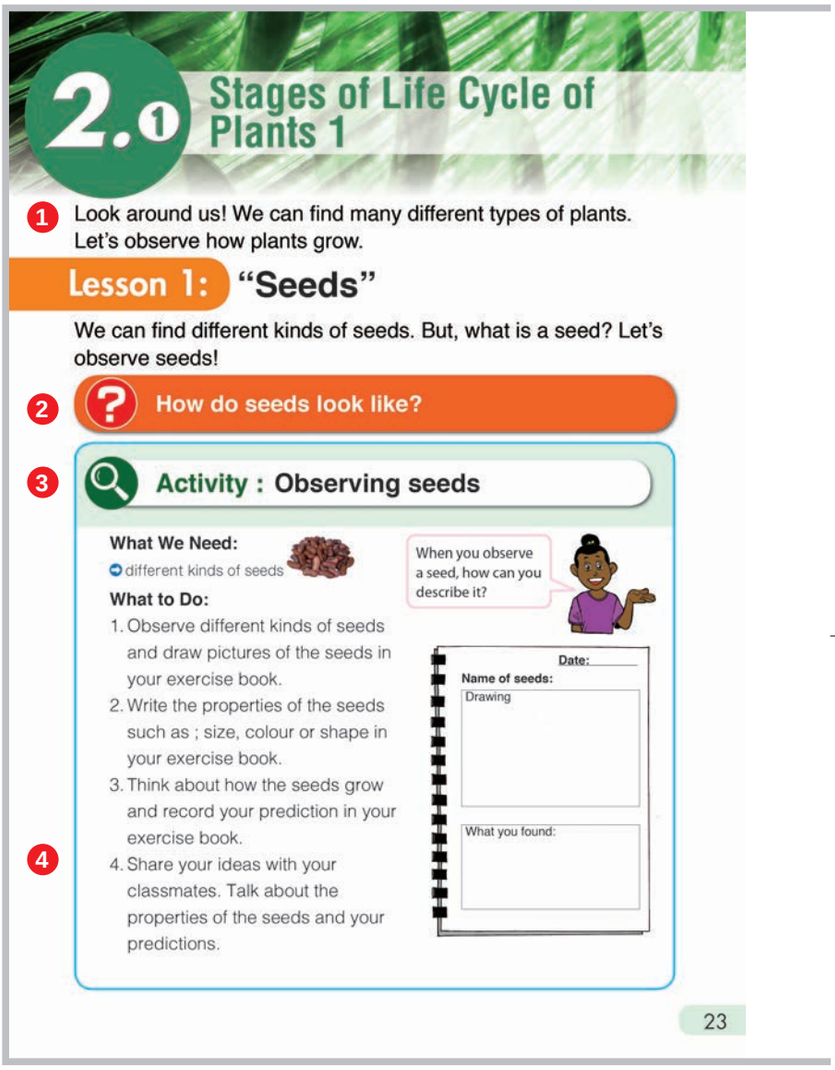
**3 Activity (20 min.)**

- Organise students into groups.
- Explain the steps of the activity.
- Instruct students on what to observe from the seeds. (The points of observation are the properties of the seeds such as size, colour, shape, etc.)
- Allow students to do the activity and ask them to record their observations in their exercise books.
- Ask students to predict how the seed grows and record their predictions.
- Give enough time for them to complete the activity.

**4 Discussion for findings (15 min.)**

- Ask students to present their findings of the properties of the seeds from their activity.
- Write down students' findings on the blackboard.

**(Continue)**




## Teacher's Notes

Some More Information for "Try it!"

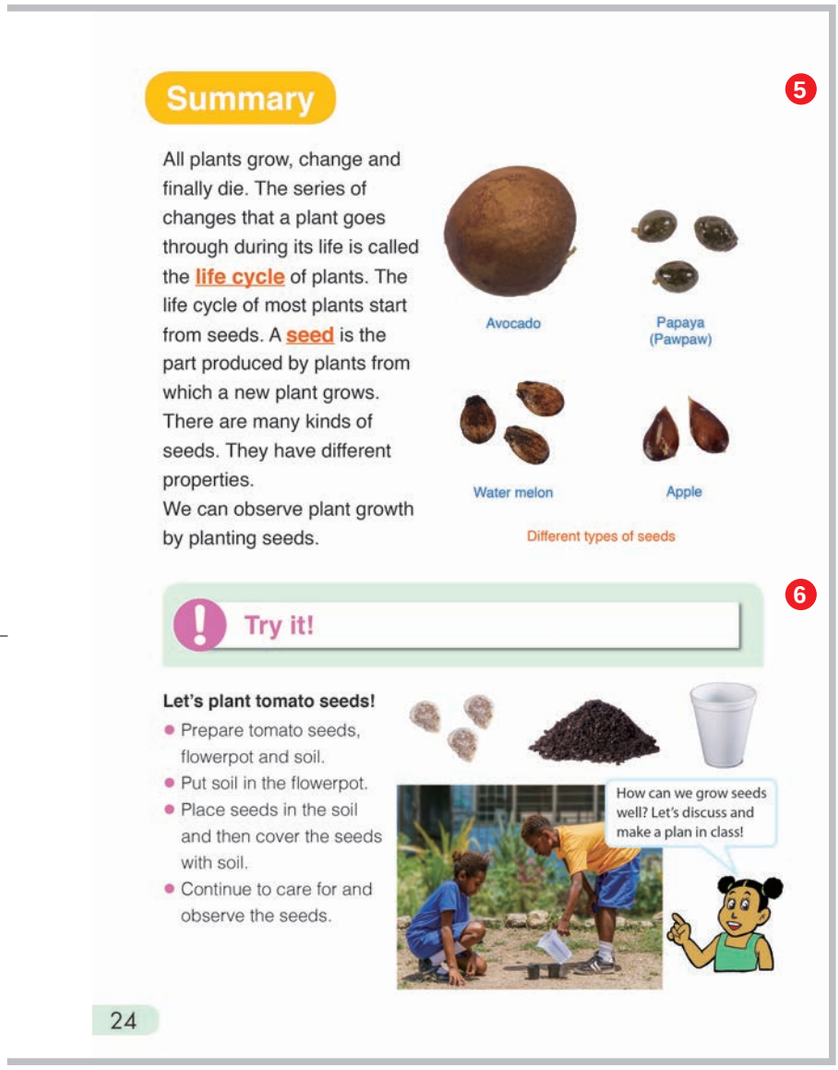
- Tomato seeds are recommended because it goes through the cycle of plant developments (seeds, sprouting, flowering, fruits)
- Prepare dry seeds of tomato for planting
- Seeds can be substituted depending on the availability of seeds.
- Students will be responsible to take care of the seeds until they germinate.
- This lesson will continue after a week.
- In the next lesson students should have seen their seeds germinating so they can be able to measure heights.
- Specify what particular banana produce seeds (name the banana) yava
- Not all plants that produce seeds grow from seeds (e.g. banana, pineapple)
- Pineapple seeds are located under the skin
- Student's prediction will be confirmed in the next lesson on 'Sprouting'.
- **When the seeds sprout, the next lesson on 'Sprouting' should be conducted!**

## Lesson Objectives

Students will be able to:
- Explain a life cycle of plant.
- Observe the properties of seeds.
- Sketch the different kinds of seed.
- Define what a seed is.
- Predict how a seed grows.

## Assessment

Students are able to:
- Draw a picture of a seed.
- Identify the properties of a seed such as the size, colour and shape.
- State what a seed is.
- Explain the meaning of a life cycle of plants.
- Plant tomato seeds with classmates cooperatively.



Summary

All plants grow, change and finally die. The series of changes that a plant goes through during its life is called the life cycle of plants. The life cycle of most plants start from seeds. A seed is the part produced by plants from which a new plant grows. There are many kinds of seeds. They have different properties.
We can observe plant growth by planting seeds.

Avocado
Papaya (Pawpaw)
Water melon
Apple
Different types of seeds

Try it!

Let's plant tomato seeds!
- Prepare tomato seeds, flowerpot and soil.
- Put soil in the flowerpot.
- Place seeds in the soil and then cover the seeds with soil.
- Continue to care for and observe the seeds.

How can we grow seeds well? Let's discuss and make a plan in class!

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- **Based on their findings,** let students compare the properties of seeds and ask the questions as discussion point;

Q:What properties do seeds have? (Use result.)

Q:What did you discover from your findings? (There are different kinds of seeds. The different seeds have different properties.)

- Ask students to present their prediction and write them down on the blackboard.
- Confirm their predictions with students.
- Conclude the discussion.

**5 Summary (5 min.)**
- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard. (Refer to 'Blackboard Plan')
- Ask these questions as assessment:
  Q: What is a seed?
  Q: What is a life cycle of plants?
- Ask students to copy the notes on blackboard in their exercise books.

**6 Try it! (15 min.)**
- Explain how to plant tomato seeds.
- Plant the seeds with students.
- Give all students assignment to take care of the seed.
- Ask students to observe the seeds every day until the seed sprout.

## Sample Blackboard Plan

Title:
"Seeds"
Key question
How do seeds look like?
Activity
Observing seeds
• Properties of the seed.

| | Bean seed | ….. |
|---|---|---|
| Size | ….. | …… |
| Colour | ….. | …… |
| Shape | ….. | …… |
| Others | ….. | ….. |

Discussion
Q: What properties do seeds have?
Use results.

Q: What did you discover from your findings?
There are different kinds of seeds. The different seeds have different properties.

Prediction: "How does the seed grow?"
e.g. young plant grows from a seed, a seed becomes bigger and bigger, etc.

Summary
1. What is "Life Cycle of Plants"?
The series of changes that a plant goes through during its life is called life cycle of plants.
2. What is a seed?
The part produced by plants from which a new plant grows
Try it!
Observe the seeds every day.
Our Assignment
➤ Watering the seeds every day
➤ Monday: Group 1, Tuesday: …….

| Unit | Chapter : **4. Life Cycle of Plants 2** | Total lesson No: 13 / 97 |
|---|---|---|
| **Plants** | Topic : **4.1. Stages of Life Cycle of Plants 2** | Textbook page: 41 - 42 |

**Lesson** 1 / 1

**Lesson Title**

# Sprouting

**Preparation**

- Young plant, ruler

## Lesson Flow

**1 Introduction (5 min.)**

- This lesson should be delivered when the tomato seeds sprout.
- Review the previous lesson on 'Seeds' in chapter 2:

Q:What does most plant life begin with?
Q:What is a seed?

- By showing the pot plants, encourage students to think about how the young plants change and grow to introduce the key question.

**2 Introduce the key question**

How do young plants grow and change?

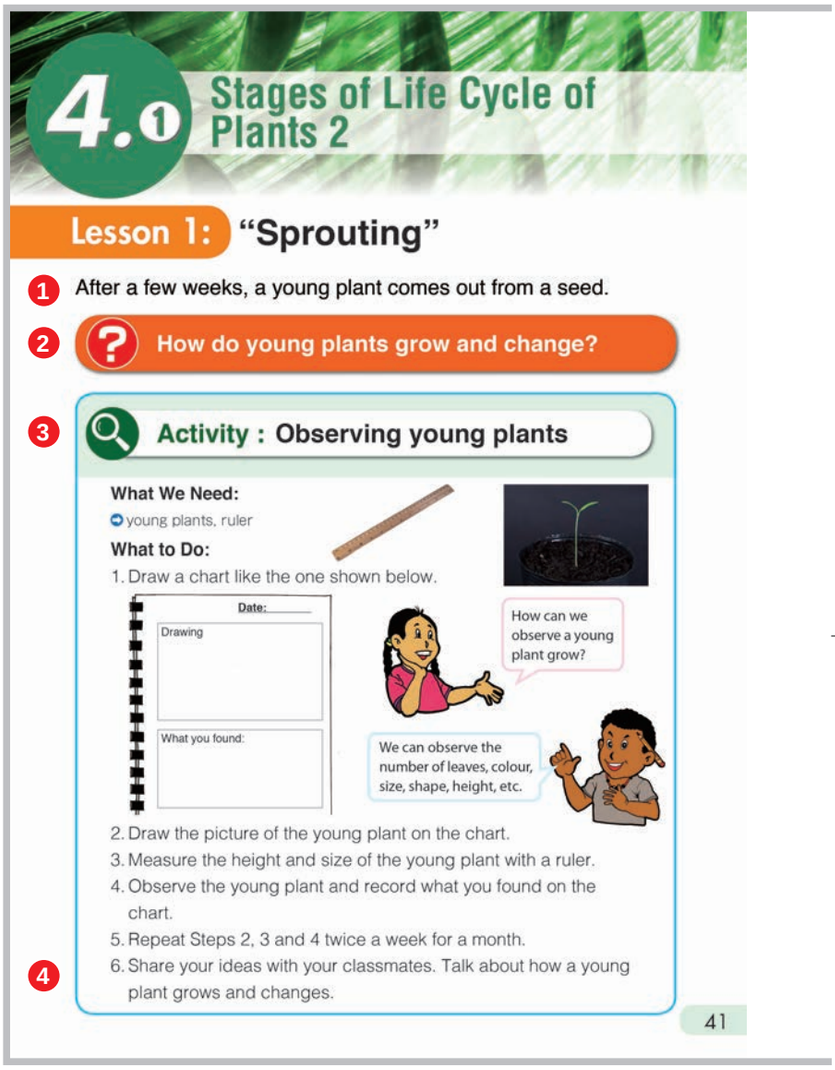
**3 Activity (20 min.)**

- Explain the steps of the activity.
- Explain how to measure the height of the young plant with a ruler.
- Instruct students on what to observe from the young plants. →the size, shape, number of leaves and the height of the plants
- Allow students to bring along their pot plants and observe their tomato plants.
- As for 'Step 5', remind students that they should continue to do step 2, 3 and 4 twice a week for a month after this lesson.

**4 Discussion for findings (15 min.)**

- Ask students to present their findings of the size, colour, number of leaves and the height of the plants from their activity.

**(Continue)**




## Teacher's Notes

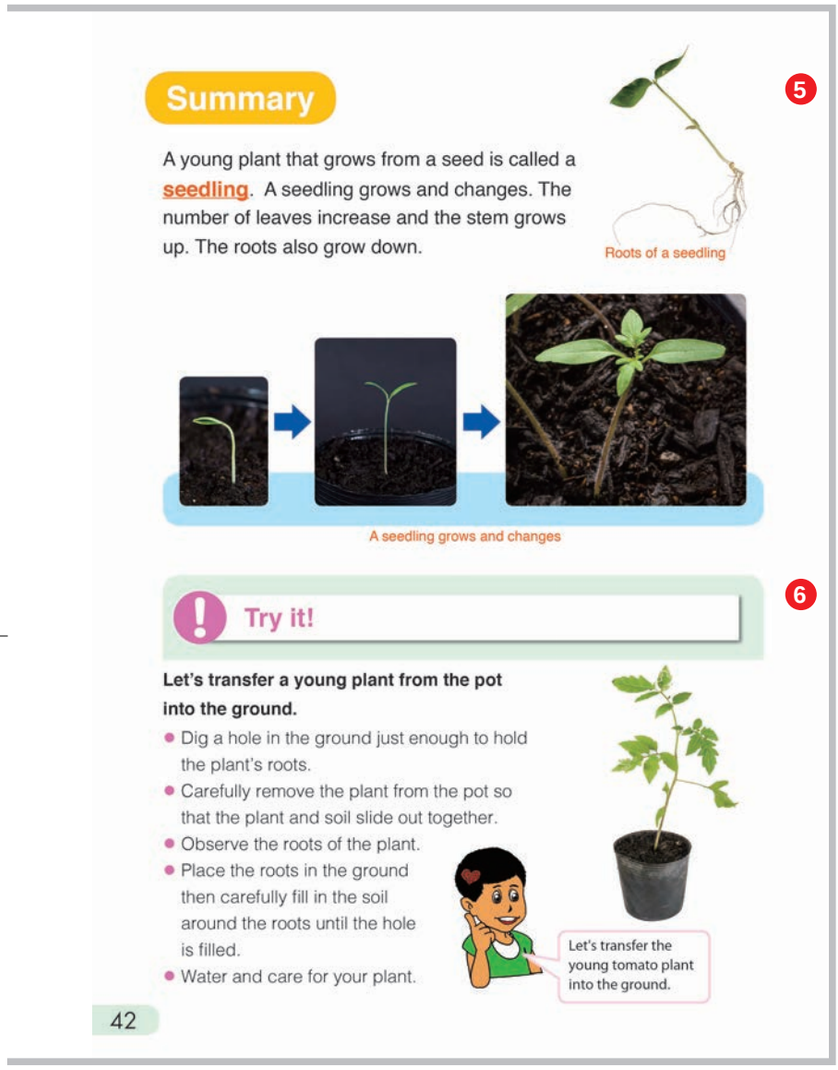
- Be sure not to miss times set for the observations.
- In the lesson, students observe tomato that they planted in the previous lesson.
- Keep students records in this activity. The records will be used in Chapter 9.
- A sprout is a small growth on a plant- a little new bud.
  When seeds are planted, they first grow roots. Once the roots take hold, a small plant will begin to emerge and eventually break through the soil, we say the plant has sprouted and the scientific process is called germination.
- The length of time it takes for your seeds to germinate is heavily related to soil moisture and temperature.
- Tomato seeds should germinate within 5-6 days if you maintain the soil moisture and temperature.
- When corn seeds sprout, they typically break the surface of the ground within 10 - 14 days depending on the soil moisture and temperature.
  ➡ Selected site should be ready for transplanting which will take place at the end of the lesson.
  ➡ Do transplanting after lesson summary and follow up lesson will be after a month.

## Lesson Objectives

Students will be able to:
- Define seedling.
- Observe how the seedlings grow.
- Measure the height and size of seedling.

## Assessment

Students are able to:
- State the meaning of the term seedling.
- Sketch the growth of a seedling.
- Record the change in the growth of the seedling such as height and size, number of leaves and roots.



Summary

A young plant that grows from a seed is called a **seedling**. A seedling grows and changes. The number of leaves increase and the stem grows up. The roots also grow down.

Roots of a seedling

5

A seedling grows and changes

Try it!

6

**Let's transfer a young plant from the pot into the ground.**

- Dig a hole in the ground just enough to hold the plant's roots.
- Carefully remove the plant from the pot so that the plant and soil slide out together.
- Observe the roots of the plant.
- Place the roots in the ground then carefully fill in the soil around the roots until the hole is filled.
- Water and care for your plant.

Let's transfer the young tomato plant into the ground.

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- Write down students' findings on the blackboard.
- **Based on their findings,** ask the following questions:

Q:How many leaves does the young plant have? (Use results.)

Q:What is the height of the young plant? (Use results.)

Q:Did you find anything else around the young plant? (A seed coat can be found around the young plant, etc)

Q:How has the young plant grown? (It has come out from a seed. It has grown and come into leaves, etc)

- Conclude the discussion.

**5 Summary (5 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: What is a seedling?
  Q: How does the young plant grow?
- Ask students to copy the notes on blackboard in their exercise books.

**6 Try it! (15 min.)**

- Explain how to transfer a young tomato plant from the pot plant into the ground.
- Transfer the seedling into the ground with students.
- Give all students assignment to take care of the seedling.

## Sample Blackboard Plan

Title:
"Sprouting"
Key question
How do young plants grow and change?
Activity
Observing young plants
What did you find?
The plants have two leaves.
The height of the plants is 5cm, 6 cm, etc
Shape of first two leaves and others are different.
A seed coat is found on the plants or on the ground, etc.

Discussion
Q: How many leaves does the young plant have?
(Use results.)
Q: What is the height of the young plant?
(Use results.)
Q: Did you find anything else around the young plant?
A seed coat can be found around the young plant, etc
Q: How has the young plant grown?
It has come out from a seed. It has grown and come into leaves, etc

Summary
1. What is a seedling?
➤ Seedling is a young plant that grows from a seed.
2. How does a seedling grow from a seed?
➤ Watering the seeds every day
➤ Monday: Group 1s
Try it!
Observe and record the growth of a seedling twice a week.
Our Assignment
➤ Watering the seeds every day
➤ Monday: Group 1, Tuesday: ……

| Unit | Chapter : **7. Life Cycle of Plants 3** | Total lesson No: 25 / 97 |
|---|---|---|
| **Plants** | Topic : **7.1. Stages of Life Cycle of Plants 3** | Textbook page: 71 - 72 |

**Lesson** 1 / 1

**Lesson Title**

# Flowering

**Preparation**

- Flower samples(tomato, hibiscus or lily), magnifying glass (lens)

## Lesson Flow

**1 Introduction (5 min.)**

- This lesson should be delivered when the tomato plants grow flowers.
- Review the previous lesson on 'Sprouting' in Chapter 4:

Q:What is a seedling?

Q:How does the young tomato plant grow?

- Show students tomato plants with flowers and provoke their thinking by asking questions:

Q:What are flowers?

Q:How are flowers formed?

**2 Introduce the key question**

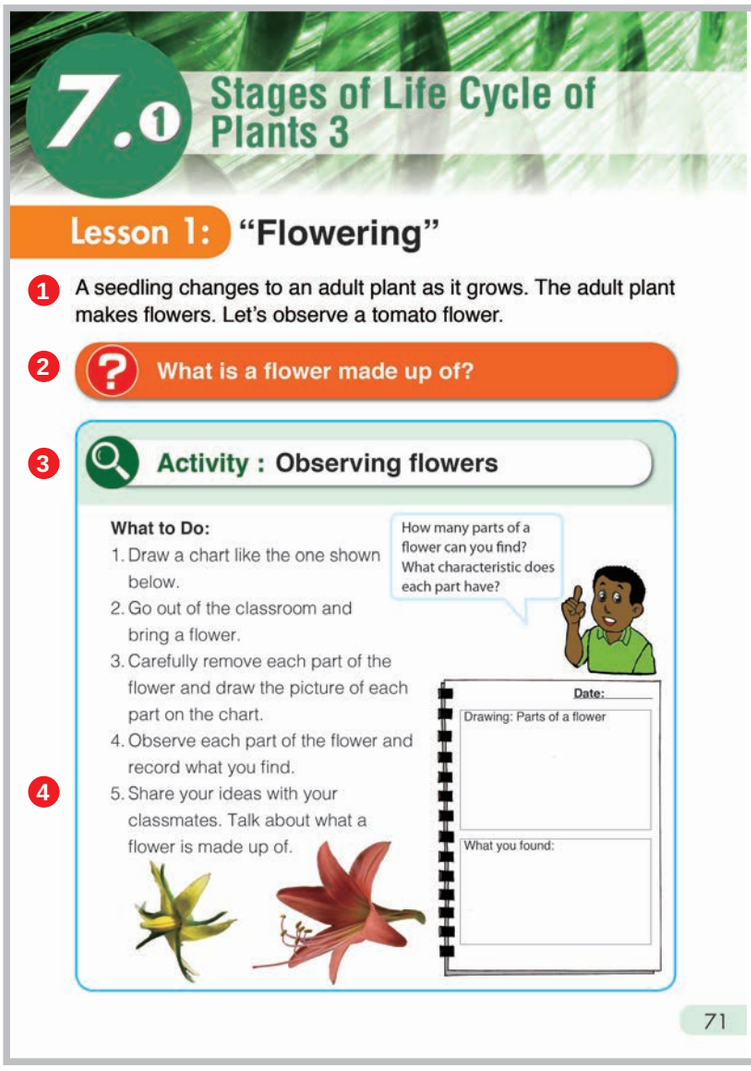
What is a flower made up of?

**3 Activity (25 min.)**

- Explain the steps of the activity.
- Let students to collect some tomato flowers. It is sometimes difficult to observe the stamen of a tomato flower. Other kinds of flowers such as hibiscus and lily can be also used.
- Ask the students to remove the parts of the flower carefully.
- Let the students to observe and draw each part of the flower.

**4 Discussion for findings (25 min.)**

- Ask students to present their findings of the flower parts such as the number of flower parts, the characteristics of each part, etc **(Continue)**




## Teacher's Notes

a tube-shaped stamen of a tomato flower

- A flower is attached to the long, tube-like structure called the style.
- The style leads to the ovary that contains the female egg cells called ovules.
- The male parts are called stamens and usually surround the pistil. The stamen is made up of two parts: the anther and filament.
- In tomato flowers, the stamens are fused into a tube-shaped structure. They are also yellow like the petals.

Safety rules

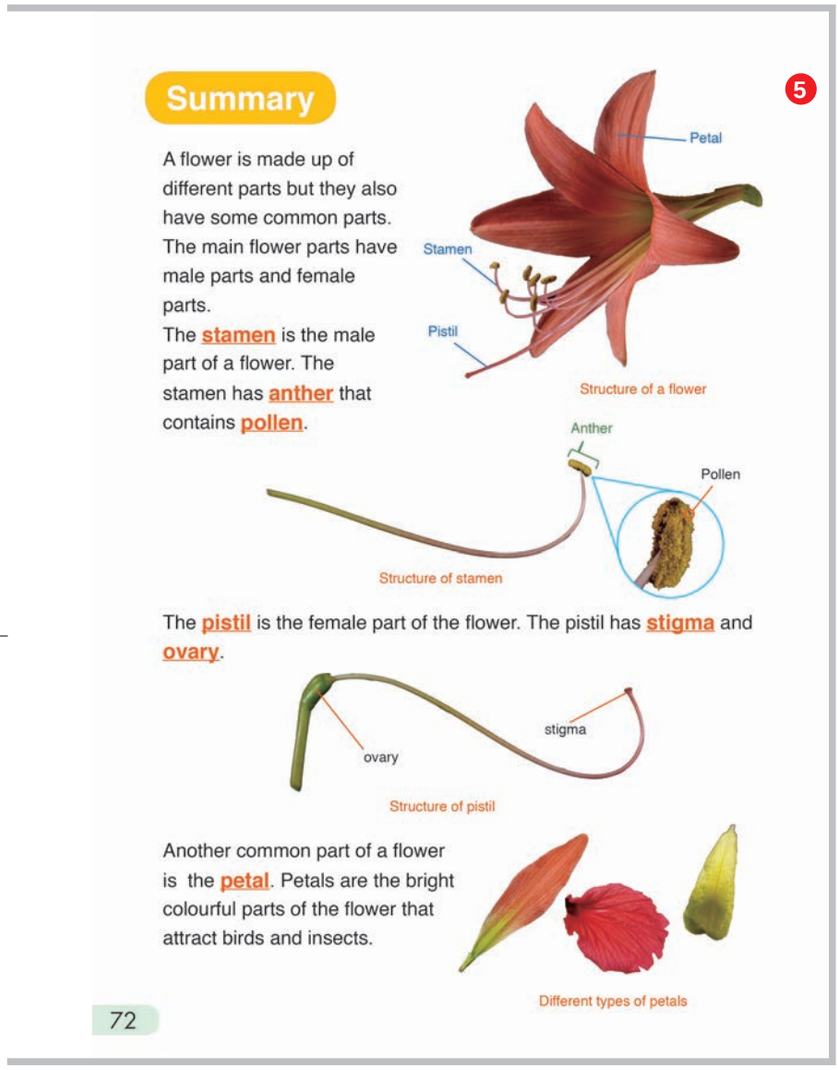
- Be careful when using the blade during the activity
- Be careful of insects that may maybe dangerous when picking flowers outdoors

## Lesson Objectives

Students will be able to:
- Identify the parts of a flower.
- Observe the different parts of a flower.

## Assessment

Students are able to:
- Describe the common parts of the flower.
- Illustrate different parts of the flower.
- Investigate the different parts of a flower with interest.



**Summary**

A flower is made up of different parts but they also have some common parts. The main flower parts have male parts and female parts.
The **stamen** is the male part of a flower. The stamen has **anther** that contains **pollen**.

Petal
Stamen
Pistil
Structure of a flower

Anther
Pollen
Structure of stamen

The **pistil** is the female part of the flower. The pistil has **stigma** and **ovary**.

stigma
ovary
Structure of pistil

Another common part of a flower is the **petal**. Petals are the bright colourful parts of the flower that attract birds and insects.

Different types of petals

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- Write down students' findings on the blackboard.
- **Based on their findings,** ask the question as discussion point:

Q:How many kinds of parts did you find? (Three)

- Explain the common parts of plants; pistil, stamen and petal.
- Ask the questions:

Q:What characteristics does each part of a flower have? (Pistil: they are swollen base and top, etc. Stamen: It includes pollens, etc. Petal: it's yellow in colour, etc.)

- Conclude the discussion.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: What are the common parts of a flower?
  Q: Explain the characteristics of a stamen, pistil and petal.
- Ask students to copy the notes in the blackboard in their exercise books.
- Give all students assignment to take care for the seedling.
- Ask students to continue observing the growth and change of the tomato plants.

## Sample Blackboard Plan

Title:
"Flowering"

Key question
What is a flower made up of?

Activity: Observing flowers

1. Sketch (Depending on kind of the flower)

2. What you found (Characteristics)
There are three parts of a flower.
There are five parts of petal
There is one pistil, etc

Discussion
Q: How many kinds of parts did you find?
Three
Q: What is common in all flowers? Stamen, pistil and petals
Q: What characteristics does each part of a flower have?
Pistil: they are swollen base and top, etc.
Stamen: It includes pollens, etc.
Petal: it's yellow in colour, etc.

Summary
- There are common parts of flower: stamen, pistil and petal
- The male part is the stamen.
- A stamen is made up of two parts which are called anther and filament.
- The pistil is the female part.
- The pistil is made up the stigma and ovary.
- The petals are colourful parts of a flower that attract birds and insects.

| Unit | Chapter : **9. Life Cycle of Plants 4** | Total lesson No: 35 / 100 |
|---|---|---|
| **Plants** | Topic : **9.1. Stages of Life Cycle of Plants 4** | Textbook page: 95 - 96 |

**Lesson** 1 / 4

**Lesson Title**

# Fruits

**Preparation**

- tomato, fruits, knife, tray / hard board

## Lesson Flow

**1 Introduction (5 min.)**

- This lesson should be delivered when the Tomato fruits are ripe.
- Review the previous lesson on 'Flowering' in Chapter 7 and ask:

Q:What are the common parts of a flower?

- By showing local fruits to the students, encourage students to think about fruits by asking question:

Q:Which part of the plant does this fruit come from?

Q: How are fruits formed?

**2 Introduce the key question**

What is a fruit made up of?

**3 Activity (25 min.)**

- Prior to this lesson, ask students to bring a fruit from home.
- Arrange the students in pairs.
- Explain the steps of the activity.
- Ask students to collect some tomato fruits from their tomato plant.
- Teacher should carefully cut the tomato fruit in half and let students observe and sketch what they see.
- Ask students to record their findings on the chart.
- If time permits, ask students to observe the different kinds of fruits and to compare the characteristics of fruits.


## Teacher's Notes

### Fruits

- A fruit is a seed bearing structure in flowering plants also known as angiosperm which is formed from the ovary after flowering.
- In common language usage fruit normally means fleshy seed. Fruits can be edible as raw or cooked.
- There are two main types of fruit: fleshy and dry. Fleshy fruits are soft and juicy. Peaches, plums, tomatoes and apples are all fleshy fruits. Dry fruits are thin and hard. Grains like wheat and rice, or nuts like chestnuts or almonds are dry fruits.

### Safety rules

- Be carefully when using the blade or knife during the activity
- Use tissue or cloth to dry any juice from the fruit on the table while cutting.
- Do not play with the knife or blade.

### To Sketch Fruit

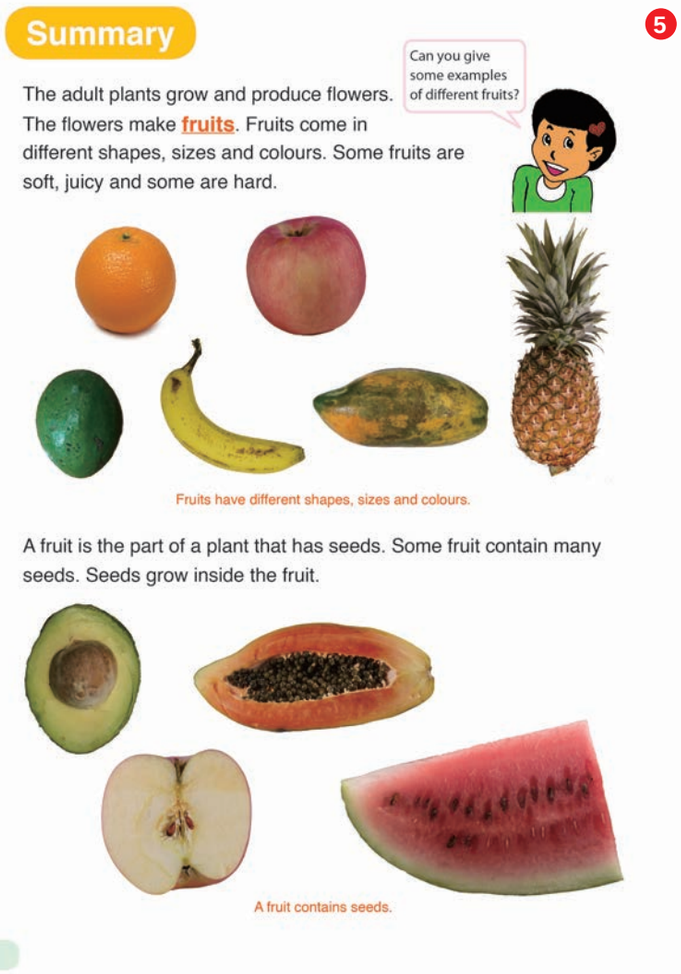
- Cut the fruit in half and draw what is seen inside the fruit
- When drawing, make sure to show seeds if they are seen clearly in the fruit.

## Lesson Objectives

Students will be able to:
- Identify the characteristics of fruits.
- Describe the structure of fruits.

## Assessment

Students are able to:
- Draw the inside part of the fruit.
- Record the characteristics of fruits such as colour, size, shape and texture on the chart.
- State that a fruit is made of seeds, flesh and juice.
- Show curiosty in characteristics of different fruits.




**4 Discussion for findings (20 min.)**

- Ask students to present their findings about a tomato fruit such as colour, size, shape and texture, etc.
- Write down students' findings on the blackboard.
- If students observed the different kinds of fruits, Ask students to present their findings about other fruits.
- **Based on their findings,** ask the question as discussion point.

Q:What characteristics did you find about tomato (or other fruits)? (They are soft (or hard), (yellow or) red, (rough or) smooth, juicy, seeds included, etc)

Q:(If students observed the different kinds of fruits) What is the common characteristic of fruits? (Most fruits have seeds.)

- Conclude the discussion.

**5 Summary (5 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: Which part of the plant become fruits?
  Q: What are commonly found in fruits?
- Ask students to copy the notes on the blackboard in their exercise books.

## Sample Blackboard Plan

Title:
"Fruits"

Key question
What is a fruit made up of?

Activity: Observing tomatoes.

1. Drawing

2. What you found.
   - Colour_____
   - Shape_____
   - Size _____
   - Soft/hard ____
   - etc.

Discussion

Q: What characteristics did you find about tomato (or other fruits)?
They are soft (or hard), (yellow or) red, (rough or) smooth, juicy, seeds included, etc

Q: (If students observed the different kinds of fruits) What is the common characteristic of fruits?
Most fruits have seeds.

Summary

- Flowers make fruits.
- There are different kinds of fruits.
- Different fruits have different characteristics:
  - Size, colour, texture, etc
- Seeds are found in fruits.
- Seeds grow inside fruits.

| Unit | Chapter : **9. Life Cycle of Plants 4** | Total lesson No: 36 / 97 |
|---|---|---|
| **Plants** | Topic : **9.1. Stages of Life Cycle of Plants 4** | Textbook page: p. 99 - 98 |

**Lesson** 2 / 4

**Lesson Title**

# Life Cycle of Plants

**Preparation**

- Picture of plant life cycle
- Chart showing records of plant growth.

## Lesson Flow

**1 Introduction (5 min.)**

- Revise the previous lesson:

Q:Which part of the plant become fruits?

Q:What is commonly found in fruits ?

- Encourage students to recall the growth and changes of tomato plants by asking;

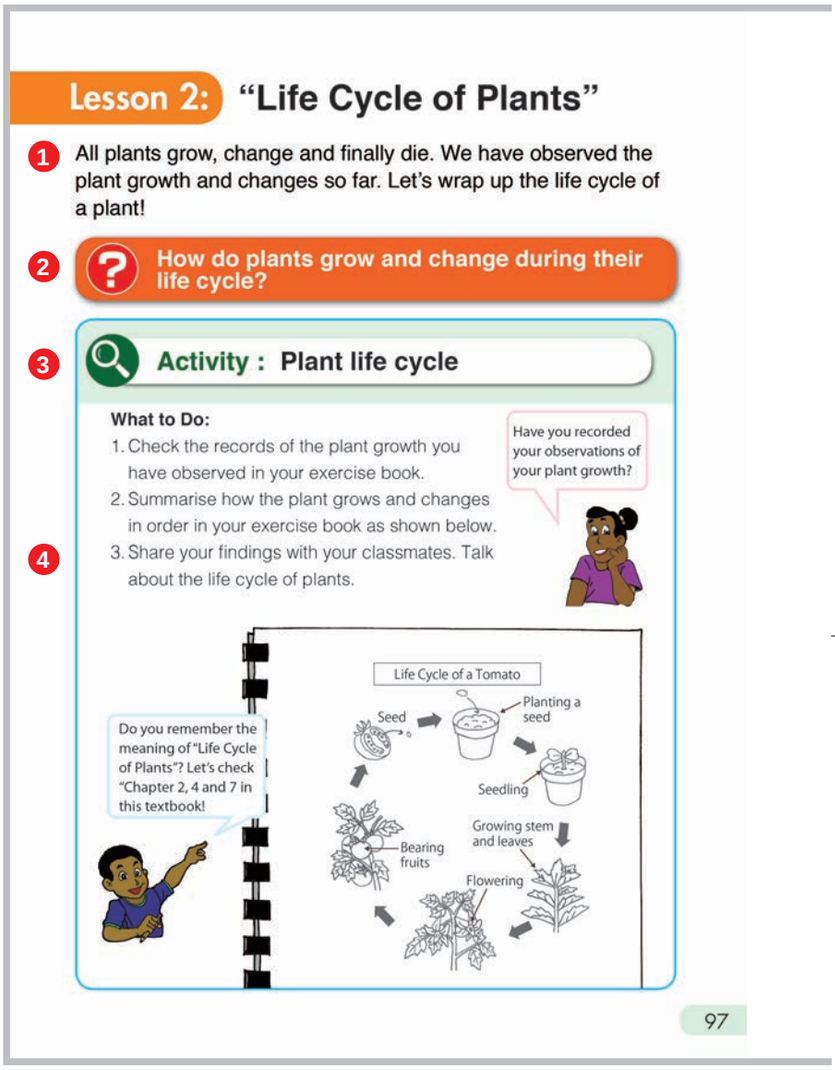
Q:We have grown tomato plants from seeds. How did tomato plants grow and change from seeds?

**2 Introduce the key question**

How do plants grow and change during their life cycle?

**3 Activity (20 min.)**

- Organise students into groups.
- Explain the steps of the activity.
- Have students to summarize the growth and changes of the tomato plants in order in their exercise books.
- Refer students to the records of their observation on tomato plant growth and changes.
- Ask students to discuss their ideas in their groups and summarise the life cycle of tomato on a large sheet of paper.




## Teacher's Notes

### Life cycle of Plants

- From previous lesson students should have observed that plant life cycle begins with a seed. The seed will sprout and produce a tiny, immature plant called a seedling. The seedling will grow and become a mature plant. The mature plant will reproduce by forming new seeds which begin the next plant life cycle.
- In flowering plants there are male and female structure inside the flower and that produces seeds. Other plants such as ferns and mosses that do not produce seed have reproductive cells called spores. These lower plants do not produce flowers but they also have a cycle.

### Students' records

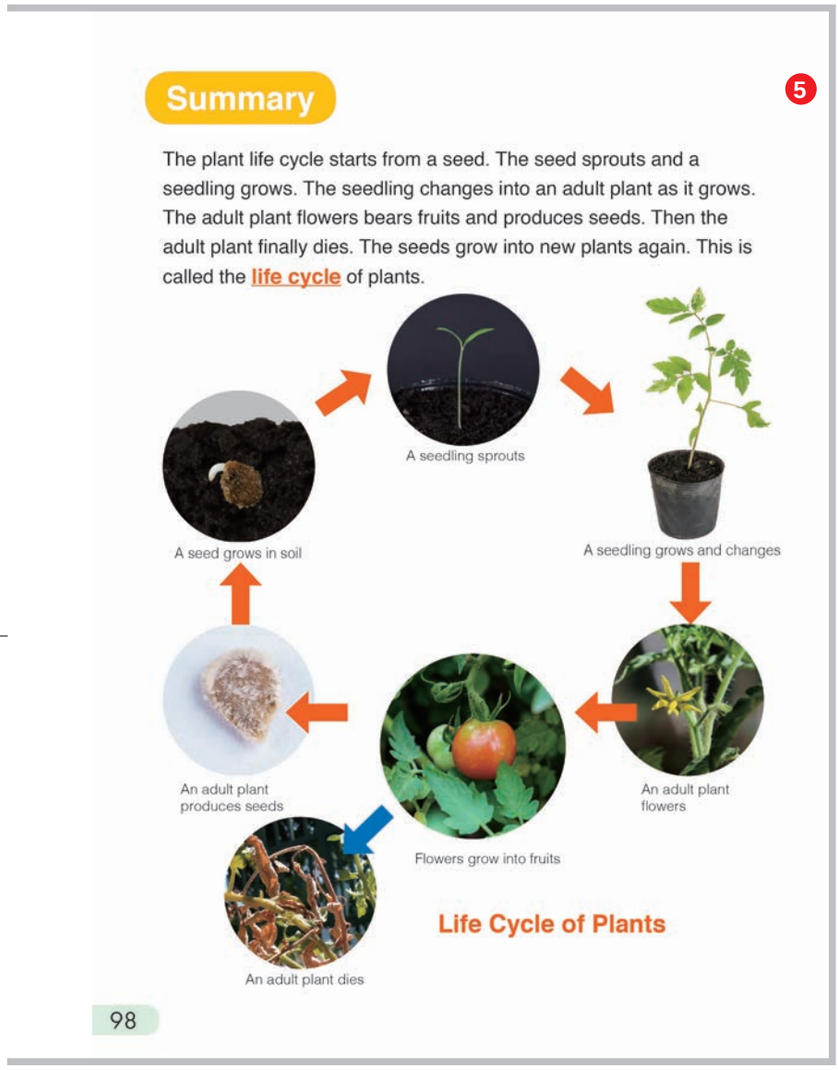
- Check and display students' charts against teachers' record.
- Students can express the growth of their plants to see what stages their plants have gone through.

## Lesson Objectives

Students will be able to:
- Describe the life cycle of plants.
- Explain each stage of plant life cycle.

## Assessment

Students are able to:
- Illustrate the changes in growth of a plant in order based on their record of observations.
- State the characteristics of each stage of plant life cycle.
- Value the importance of plant life.




**4 Discussion for findings (25 min.)**
- Ask each group to present their summary of the plant life cycle.
- After the presentation from all groups, confirm their findings.
- **Based on their findings,** ask the following questions.

Q:What does the life cycle of plants begin with? (Seeds)

Q:How does the plant go through its life cycle? (Seeds, sprouting (young plants), adult plants, flowering and fruiting)

Q:What are the characteristics of each stage in a life cycle of plants? (Seeds: They grow in soil. sprouting: A seedling grows from a seed. Adult plants: They grow and change. Flowering: Adult plants grow flowers. Fruiting: Flowers grow into fruits. Fruits include seeds.)

- Conclude the discussion.

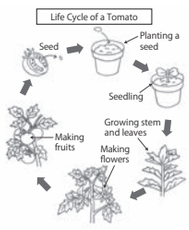
**5 Summary (10 min.)**
- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on a blackboard.
- Ask these questions as assessment:
  Q: What is the life cycle of plants?
  Q: Explain the characteristics of each stage of the plant life cycle.
- Ask students to copy the notes on the blackboard in their exercise books.

## Sample Blackboard Plan

Title:
"Life Cycle of Plants"

Key question
Q: How do plants grow and change during their life cycle?

Activity:
Plant life cycle




Discussion
Q: What does the life cycle of plants begin with?
Seeds
Q: How does the plant go through its life cycle?
Seeds, sprouting (young plants), adult plants, flowering and fruiting
Q: What are the characteristics of each stage in a life cycle of plants?
Seeds: They grow in soil.
Sprouting: A seedling grows from a seed.
Adult plants: They grow and change.
Flowering: Adult plants grow flowers.
Fruiting: Flowers grow into fruits. Fruits include seeds.

Summary
- Life cycle of plants

(5) Fruiting → (1) Seeds
(4) Flowering ← (2) Sprouting
(3) Adult plants

| Unit | Chapter : **2,4,7,9. Life Cycle of Plants** | Total lesson No: 37 / 97 |
|---|---|---|
| **Plant** | Topic : **2,4,7,9.1. Stages of Life Cycle of Plants** | Textbook page: p. 99 - 101 |

**Lesson**
**3 / 4**

**Lesson Title**

# Summary and Exercise

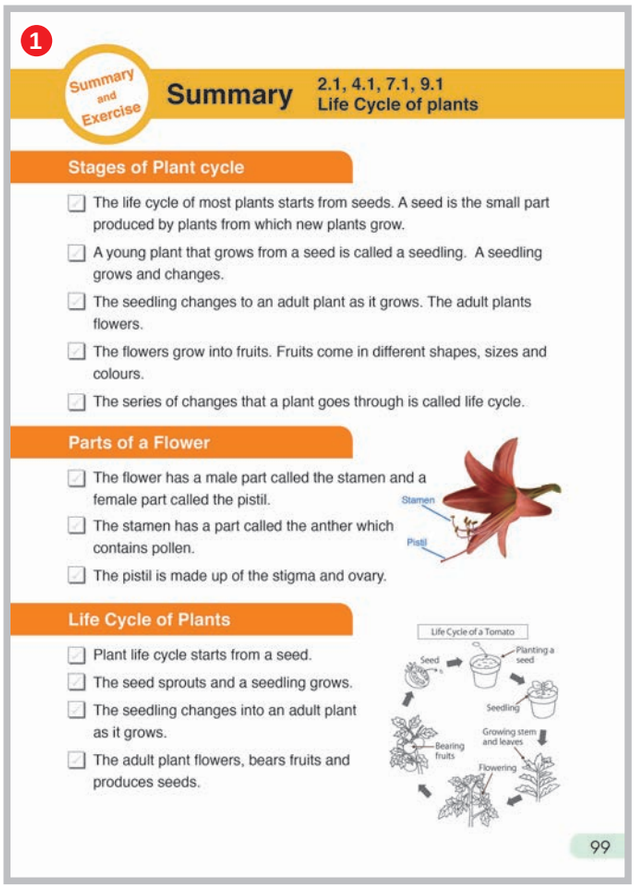
**Tips of lesson**

## 1 Summary (20 min.)

- Recap main learning contents in this topic 'Life cycle of Plants'.
- Ask some questions and verify students understanding.

Q:What is a Plant life cycle?
Q:What are the stages in the plant life cycle?
Q:What are the common parts in every flower?

- Explain and correct learning contents again if they still have misconceptions.
- Provoke student to explain more about flower part of male and female part of a flower.



1

Summary and Exercise

**Summary** 2.1, 4.1, 7.1, 9.1 Life Cycle of plants

**Stages of Plant cycle**

- The life cycle of most plants starts from seeds. A seed is the small part produced by plants from which new plants grow.
- A young plant that grows from a seed is called a seedling. A seedling grows and changes.
- The seedling changes to an adult plant as it grows. The adult plants flowers.
- The flowers grow into fruits. Fruits come in different shapes, sizes and colours.
- The series of changes that a plant goes through is called life cycle.

**Parts of a Flower**

- The flower has a male part called the stamen and a female part called the pistil.
- The stamen has a part called the anther which contains pollen.
- The pistil is made up of the stigma and ovary.

Stamen
Pistil

**Life Cycle of Plants**

- Plant life cycle starts from a seed.
- The seed sprouts and a seedling grows.
- The seedling changes into an adult plant as it grows.
- The adult plant flowers, bears fruits and produces seeds.

Life Cycle of a Tomato
Seed
Planting a seed
Seedling
Growing stem and leaves
Flowering
Bearing fruits

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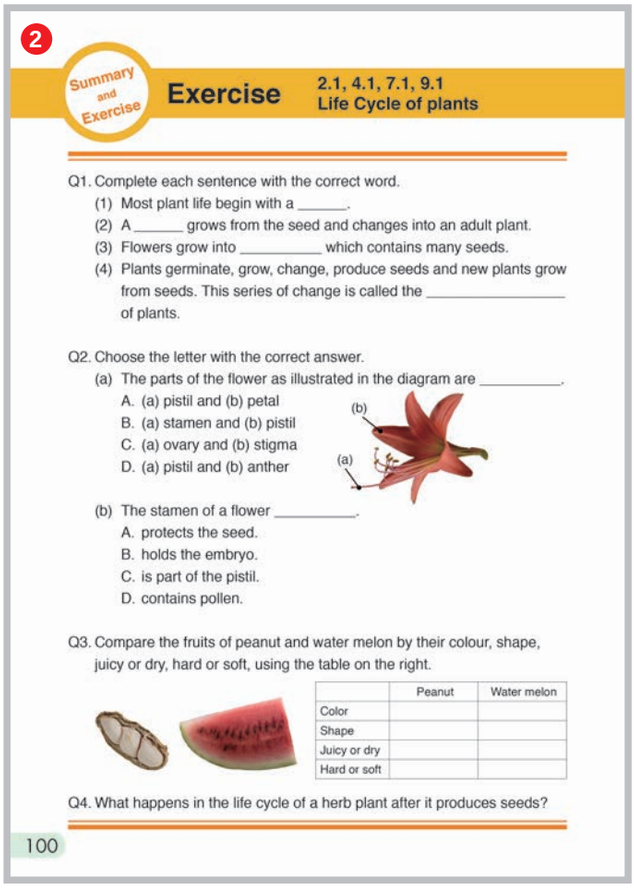
## 2 Exercise & Explanation (30 min.)

- Allow students to try answering questions individually with enough time in response to students understanding
- Explain to students each question;
  Question 1: Completion Item. Ask students to recall their lessons and think of a suitable word to write in the blank space.
  Question 2: Multiple choice – 2 questions
  Question 3: Short answer - 1 question.
  Question 4: Comprehension question. Allow students to think and answer the question in their own words.
- After the exercise, give students the answer of the questions and explain how to solve the answer using the students' ideas.



2

Summary and Exercise

**Exercise** 2.1, 4.1, 7.1, 9.1 Life Cycle of plants

Q1. Complete each sentence with the correct word.
(1) Most plant life begin with a _____.
(2) A _____ grows from the seed and changes into an adult plant.
(3) Flowers grow into _____ which contains many seeds.
(4) Plants germinate, grow, change, produce seeds and new plants grow from seeds. This series of change is called the _____ of plants.

Q2. Choose the letter with the correct answer.
(a) The parts of the flower as illustrated in the diagram are _____.
A. (a) pistil and (b) petal
B. (a) stamen and (b) pistil
C. (a) ovary and (b) stigma
D. (a) pistil and (b) anther

(b)
(a)

(b) The stamen of a flower _____.
A. protects the seed.
B. holds the embryo.
C. is part of the pistil.
D. contains pollen.

Q3. Compare the fruits of peanut and water melon by their colour, shape, juicy or dry, hard or soft, using the table on the right.

| | Peanut | Water melon |
|---|---|---|
| Color | | |
| Shape | | |
| Juicy or dry | | |
| Hard or soft | | |

Q4. What happens in the life cycle of a herb plant after it produces seeds?

100

## Exercise answers

Q1.
(1) **seed**
(2) **plants(seedling)**
(3) **Fruits**
(4) **Life cycle**

Q2.
(1) **A**
(2) **D**

Q3. **Examples of the answer**

| | Peanuts | water melon |
|---|---|---|
| Color | Brown color | Green skin and red fruits |
| Shape | Beans shape | Ball shape |
| Juicy or dry | Dry | Juicy |
| Hard or soft | Hard | Soft |

Q4. **Herbs normally die after producing seeds, but many new herbs will grow from their seeds.**

**Explanation of Science Extras**

### 3 Science Extras (10 min.)

- Give opportunities to students to closely observe the nature and its phenomena in the world.
- Allow students to ask questions that demonstrate curiosity about the content in the science extras.

| Unit | Chapter : **2,4,7,9. Life Cycle of Plants** | Total lesson No: 38 / 97 |
|---|---|---|
| **Plant** | Topic : **2,4,7,9.1. Stages of Life Cycle of Plants** | Textbook page: p.102 - 103 |

**Lesson** 4 / 4

**Lesson Title**

# Chapter Test

**Answer of the Chapter Test**

*Chapter Test*

## 2, 4, 7, 9. Life Cycle of Plants

**Q1** Complete each sentence with the correct word.

(1) A fruit contains many Seeds which grow inside it.

(2) The female part of the flower is called the Pistil.

(3) A young plant that grows from a seed is called a Seedling.

(4) A flower pollen is stored in the Stamen (or Anther).

**Q2** Choose the letter with the correct answer.

(1) The part of a plant that bears fruit and seeds is the _____.

(A) flower
B. stem
C. root
D. leaf

(2) What do we call the series of changes that a plant goes through from seedlings to bearing fruits and seeds?

A. Organ system
B. Nutrient
C. Energy
(D) Life cycle

(3) The female part of the flower has two parts called the _____.

A. pistil and ovary
(B) stigma and ovary
C. anther and stigma
D. ovary and petals

(4) Which of the following shows the life cycle of flowering plants?

(A) adult plant → seed → seedling → adult plant
B. seed → bud → fruit → adult plant → seed
C. adult plant → seedling → seed → adult plant
D. flower → seed → spore → adult plant → flower

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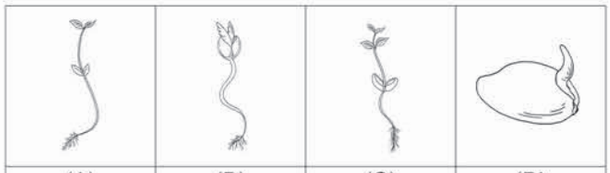
**Q3** The diagram below shows the different stages in the growth of a bean seedling but they are not in the correct order. Arrange the pictures in the correct order, by filling in the letters in the boxes.



| (A) | (B) | (C) | (D) |
|---|---|---|---|

The stages in the correct order.

D → B → A → C

**Q4** (1) The diagrams below show a seedling and an adult plant. Describe the similarities and differences between them.

Similarities: Both seedling and adult plant have root, stem and leaves and they can survive by themselves.

Differences: Adult plant is bigger than seedling and can bear flower, fruits and reproduce by seeds.

(2) Valerie observed the guava tree bearing flowers next to her house but there were some insects eating the flowers of the guava plant. What would she mostly observed on the guava plant in the near future? Give reasons for answer.

There would be no fruits on the guava plant because flowers changes into fruits.

Strand : EARTH AND SPACE
Unit : OUR EARTH

# Chapter 3. Soil for Human Beings

## Chapter Objectives

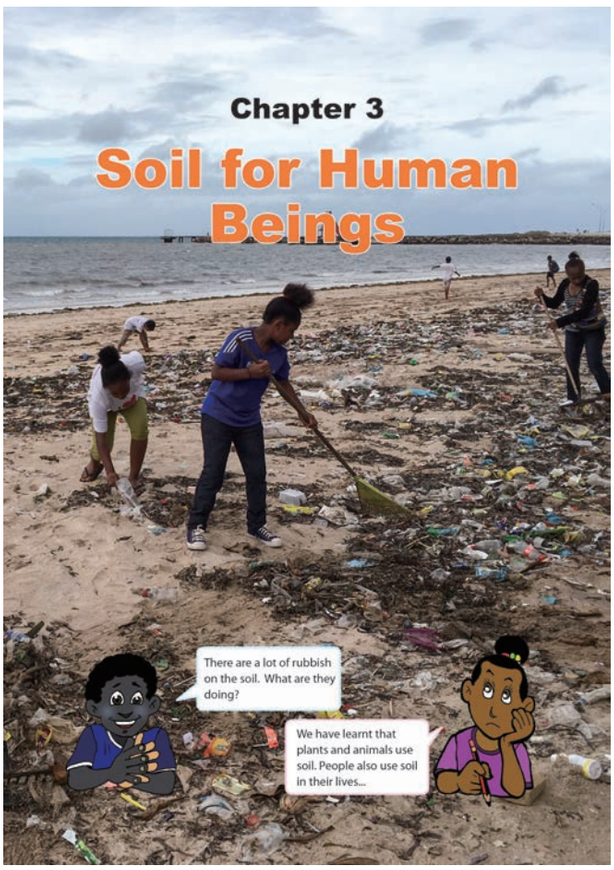
Students will be able to understand the importance of soil for living things and the ways of how we can prevent the soil pollution by human activities.

## Topic Objectives

### 3.1 Soils and Human Beings

Students will be able to;

- Identify different ways in which people use soil.
- Explain the causes of soil pollution.
- Identify the effects of soil pollution on plants, animals and human.
- Describe the different ways of preventing soil pollution.




The picture of the chapter heading in the textbook shows an activity to clean the beach.

## Related Learning Contents

The learning contents in this chapter connect to following chapters.

| Grade 3 | Grade 4 | Grade 5 | Grade 6 |
|---|---|---|---|
| - The Earth | - Soil for Human Being | - Rocks, Minerals and Fossils | - Formation and Change of Land |

Prior knowledge for learning this chapter;

- A soil is the top layer that covers the Earth's surface.

## Teaching Overview

This chapter consists of 6 lessons, each lesson is a double period.

| Topic | Lesson No. | Lesson Title and Key Question | Content standard in syllabus | Textbook page number |
|---|---|---|---|---|
| 3.1 Soils and Human Beings | 1 | **Uses of Soil for People**<br>How do we use soil in our lives? | 4.3.1 | 27-28 |
| | 2 | **Soil Pollution**<br>What causes soil pollution? | | 29-30 |
| | 3 | **Effects of Soil Pollution**<br>What are the effects of soil pollution on living things? | | 31-32 |
| | 4 | **Preventing Soil Pollution**<br>How can we help prevent soil pollution? | | 33-34 |
| | 5 | Summary & Exercise | | 35-37 |
| Chapter Test | 6 | Chapter Test | | 38-39 |

| Unit | Chapter : **3. Soil for Human Beings** | Total lesson No: 7 / 97 |
|---|---|---|
| **Our Earth** | Topic : **3.1. Soils and Human Beings** | Textbook page: 27 - 28 |

**Lesson** 1 / 6

**Lesson Title**

# Uses of Soil for People

**Preparation**

- Pictures showing how people use soil in daily life

## Lesson Flow

**1 Introduction (10 min.)**

- Recap Gr.3 lesson on 'Importance of Soil for Plants and Animals.'

Q:What are some ways in which plants use soil?

Q:How do animals depend on the soil to survive?

Q:Do people also depend on soil?

- Encourage students to think about the last question by introducing the key question.

**2 Introduce the key question**

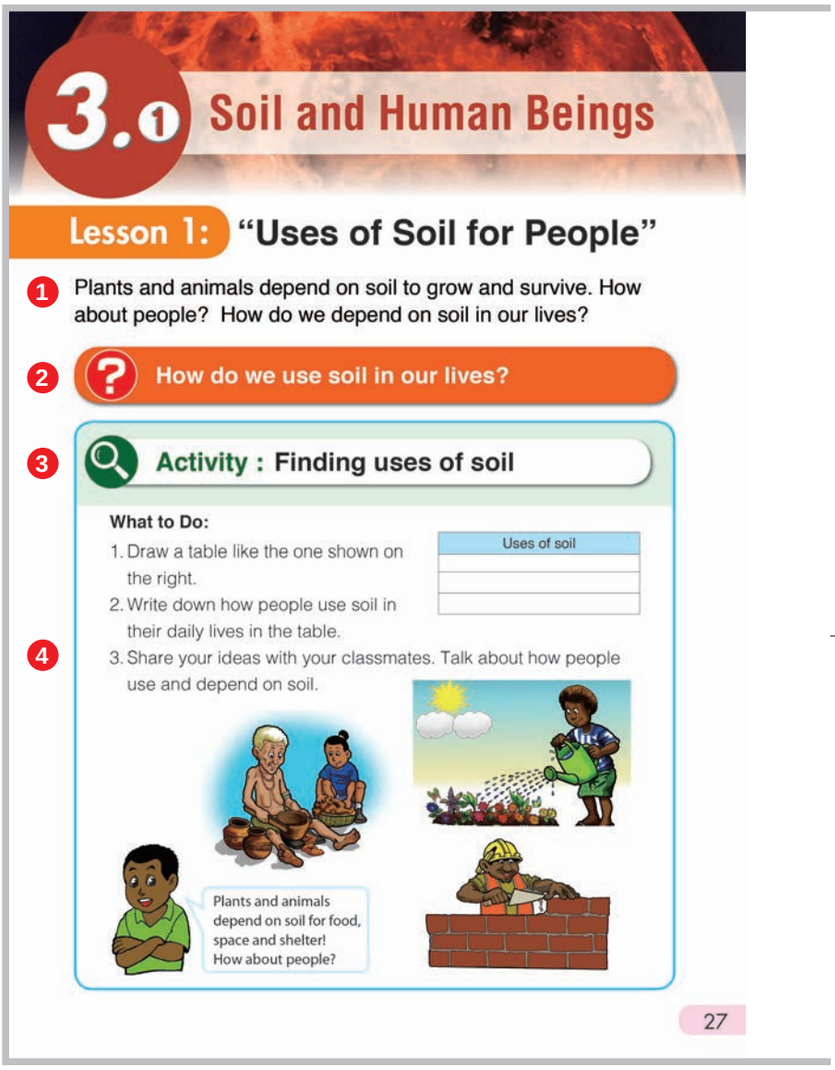
How do we use soil in our lives?

**3 Activity (20 min.)**

- Organise the students into pairs.
- Explain the steps of the activity.
- Ask students to refer to the pictures and characters' talking in the activity for their investigation.
- Give an example on how to fill the table with the whole class.
- Assist students by making them think of more ways humans use soil.
- Give enough time to the students to find new ideas through the activity by themselves.

**4 Discussion for findings (20 min.)**

- Ask students to present their findings from their activity.
- Write down students' findings on the blackboard.
- Confirm the findings with students. **(Continue)**




## Teacher's Notes

Why is soil important?

Soil is one of the most valuable natural resources available to us. It is very important to sustain life on the Earth.

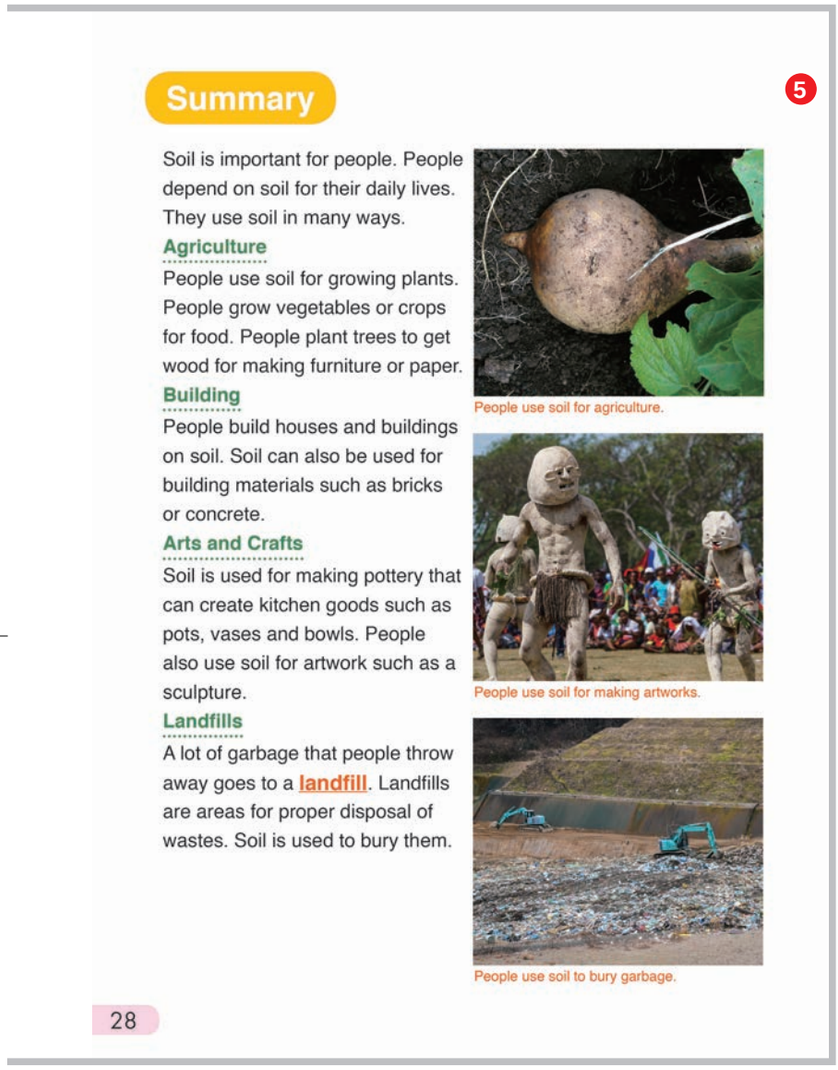
1. Fertile soil supports growth of plants. In-turn these plants produce vital needs to humans like food, clothing, furniture, medicine etc.
2. Soil keeps the atmosphere cool: Soil absorbs water when there is rain. When there is a lot of heat from the Sun, the water evaporates from the soil and makes the air cooler.
3. Soil provides both the foundation and base materials for buildings, roads and other built infrastructure.
4. Soil filters our water and maintains its quality. After rainfall and snowmelts, much of water soaks into the ground and it is filtered by soil. Filtered water also provides people with clean and unpolluted water.

## Lesson Objectives

Students will be able to:
- Identify different ways in which people use soil.
- Realize the important of soil for people in daily life.

## Assessment

Students are able to:
- Give some examples of the ways that people use soil for agriculture, building, craft and arts and landfills.
- Explain why soil is important for people in daily life
- Value the importance of soil in daily life..



**Summary** 5

Soil is important for people. People depend on soil for their daily lives. They use soil in many ways.

**Agriculture**

People use soil for growing plants. People grow vegetables or crops for food. People plant trees to get wood for making furniture or paper.

**Building**

People build houses and buildings on soil. Soil can also be used for building materials such as bricks or concrete.

**Arts and Crafts**

Soil is used for making pottery that can create kitchen goods such as pots, vases and bowls. People also use soil for artwork such as a sculpture.

**Landfills**

A lot of garbage that people throw away goes to a **landfill**. Landfills are areas for proper disposal of wastes. Soil is used to bury them.

People use soil for agriculture.

People use soil for making artworks.

People use soil to bury garbage.

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- **Based on their findings,** ask students to classify their findings into some groups such as agriculture, building, etc.
- Ask the following questions:

Q:In what groups did you classify your findings? (Agriculture, building, art and craft, landfill, etc)

Q:How do people use soil for agriculture? (e.g. Growing crops etc)

Q:How do people use soil for building? (e.g. Bricks, concrete, etc)

Q:How do people use soil for art and craft? (e.g. Pottery, sculpture, etc)

Q:How do people use soil for landfills? (e.g. Burying rubbish, etc)

Q:How do people use soil for other purpose?

- Conclude the discussion.

**5 Summary (20 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard (Refer to 'Blackboard Plan').
- Ask these questions as assessment:
  Q: How do people use soil in daily life?
  Q: Why is soil important for people?
  Q: Give examples of how to use soil for agriculture, crafts and art and building.
- Ask students to copy the notes on the blackboard in their exercise books.

## Sample Blackboard Plan

Title:

"Uses of Soil for People"

Key question

Q: How do we use soil in our lives?

Activity

Finding uses of soil

| Uses of Soil |
|---|
| 1. Growing plants |
| 2. Plant trees to get wood |
| 3. People build houses on soil. |
| 4. Making pottery |
| 5. Bury rubbish |

Discussion

Q: In what groups did you classify your findings?
Agriculture, building, art and craft, landfill, etc

Q: How do people use soil for agriculture?
For growing vegetables, crops and plant trees to get wood

Q: How do people use soil for building?
Some building materials are made from soil too, such as bricks or concrete

Q: How do people use soil for art and craft?
For making pottery, sculpture, etc

Q: How do people use soil for landfills? For burying rubbish

Q: How do people use soil for other purpose? For burying the dead, etc.

Summary

- We use soil in many ways such as:
  1.Agriculture- People use soil for growing plants.
  2.Buildings- People build houses on soil.
  3.Art and craft- Soil is used for making kitchen goods such as pots, vases and bowl.
  4.Landfills- Soil is used to bury rubbish.

| Unit | Chapter : **3. Soil for Human Beings** | Total lesson No: 8 / 97 |
|---|---|---|
| **Our Earth** | Topic : **3.1. Soils and Human Beings** | Textbook page: 29 - 30 |

**Lesson** 2 / 6

**Lesson Title**

# Soil Pollution

**Preparation**

- Pictures showing the cause of soil pollution

## Lesson Flow

**1 Introduction (10 min.)**

- Review the previous lesson:

Q:How do people use soil?

- Encourage students to think about soil pollution by asking:

Q:What do you do with your empty tins or water bottle when you are finished with?

Q:How will the grounds look like if the rubbish is thrown everywhere?

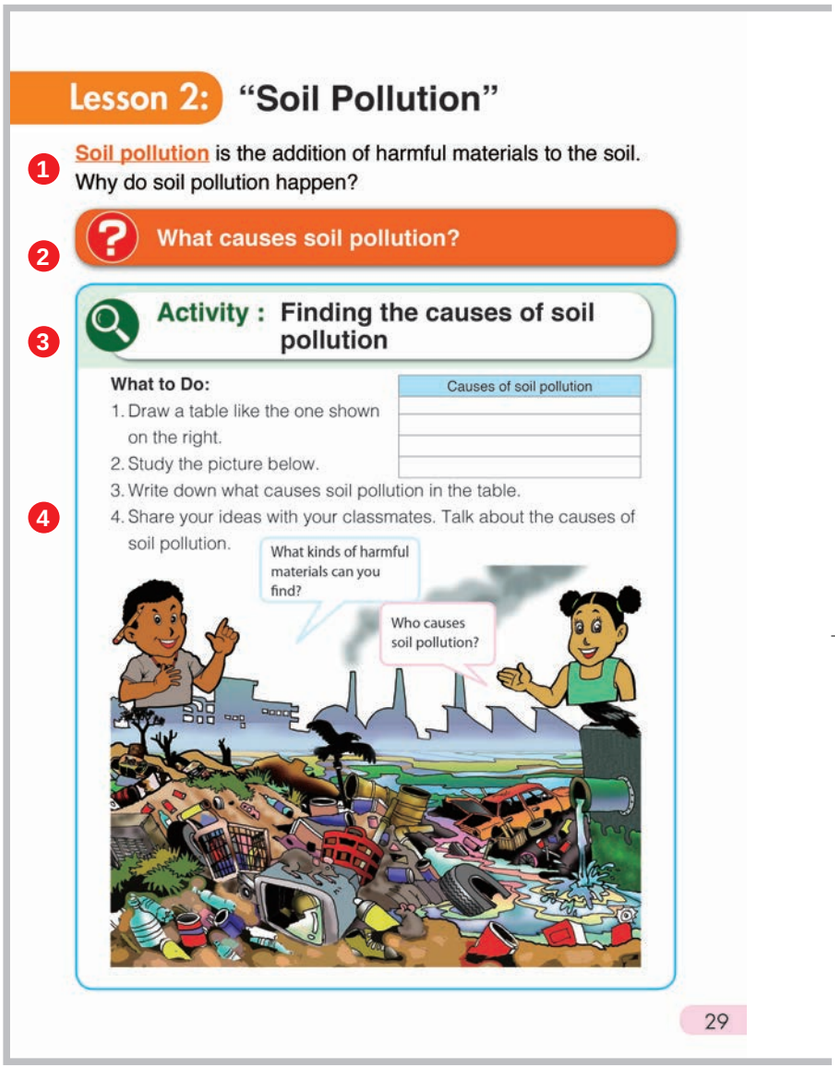
- Explain what soil pollution is.

**2 Introduce the key question**

What causes soil pollution?

**3 Activity (20 min.)**

- Organise students into pairs.
- Explain the steps of the activity.
- Ask students to refer to the pictures and characters' talking in the activity for their investigation.
- Take students to any nearby place where soil is polluted.
- Ask students to reflect on their daily experiences if they cannot come up with ideas.
- Give enough time to students to find new ideas through the activity by themselves.



Lesson 2: "Soil Pollution"

1 Soil pollution is the addition of harmful materials to the soil.
Why do soil pollution happen?

2 What causes soil pollution?

3 Activity : Finding the causes of soil pollution

What to Do:

1. Draw a table like the one shown on the right.
2. Study the picture below.
3. Write down what causes soil pollution in the table.
4. Share your ideas with your classmates. Talk about the causes of soil pollution.

| Causes of soil pollution |
|---|
| |
| |
| |
| |



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## Teacher's Notes

### Additional information about soil pollution

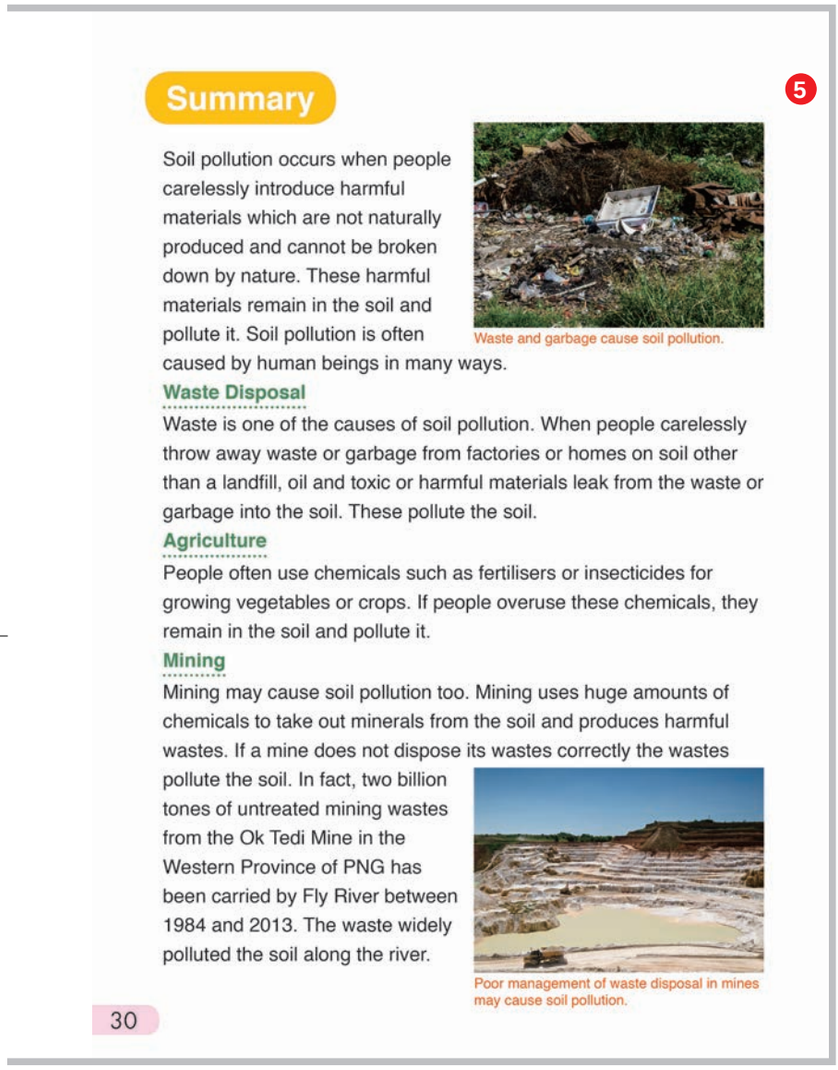
- Sometimes soil pollution occurs naturally when toxic minerals are highly contaminated in soil by eruptions of volcanos, landslides and earthquakes. However, it is basically caused by human, when they improperly introduce harmful or toxic chemicals (pollutants or contaminants) in soil with high enough concentrations to pose a risk to human health and/or the ecosystem. We need to prevent such improper and/or uncontrolled introduction of toxic chemicals. And thus, this chapter does not describe soil pollution occurring naturally.
- We need to carefully distinguish that proper and improper introduction of chemicals are totally different. If human use fertilisers and insecticides carefully, they don't cause soil pollutions. Likewise, waste disposals, landfilling and mining are not a problem if they are controlled and well managed.
- Teachers need to think carefully to avoid unfair discrimination for the person who is engaged in agriculture, waste disposal, landfilling and mining. These jobs are important for our lives, and we need them. We should even respect and appreciate them. People to be criticised are only those who perform these tasks improperly and/or irregularly.
- Ok Tedi mining pollution introduced in textbook caused soil as well as water pollutions. Hence it is influenced both agriculture and fisheries. Details are presented in various sources on new papers and internet (e.g. Wikipedia: Ok Tedi environmental disaster https://en.wikipedia.org/wiki/Ok_Tedi_environmental_disaster). Referring to these sources is recommended.

## Lesson Objectives

Students will be able to:
- Define soil pollution.
- Explain the causes of soil pollution.
- Identify different types of soil pollution.

## Assessment

Students are able to:
- Describe what a soil pollution is.
- Give some examples of the different types of soil pollution.
- List the causes of soil pollution.
- Investigate with eagerness.



Summary

Soil pollution occurs when people carelessly introduce harmful materials which are not naturally produced and cannot be broken down by nature. These harmful materials remain in the soil and pollute it. Soil pollution is often caused by human beings in many ways.

Waste and garbage cause soil pollution.

**Waste Disposal**

Waste is one of the causes of soil pollution. When people carelessly throw away waste or garbage from factories or homes on soil other than a landfill, oil and toxic or harmful materials leak from the waste or garbage into the soil. These pollute the soil.

**Agriculture**

People often use chemicals such as fertilisers or insecticides for growing vegetables or crops. If people overuse these chemicals, they remain in the soil and pollute it.

**Mining**

Mining may cause soil pollution too. Mining uses huge amounts of chemicals to take out minerals from the soil and produces harmful wastes. If a mine does not dispose its wastes correctly the wastes pollute the soil. In fact, two billion tones of untreated mining wastes from the Ok Tedi Mine in the Western Province of PNG has been carried by Fly River between 1984 and 2013. The waste widely polluted the soil along the river.

Poor management of waste disposal in mines may cause soil pollution.

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### 4 Discussion for findings (20 min.)

- Ask students to present their findings from their activity.
- Write down students' findings on the blackboard.
- Facilitate active students' discussion.
- Confirm the findings with students.
- **Based on their findings,** ask the following questions.

Q:What are the causes of soil pollution?
(Harmful materials or oil from factories or homes being buried in the soil, people using insecticide for growing crops, when people throw away waste or garbage to the ground, people mining natural resources, etc)

Q:What is the main causes of soil pollution?
(Humans)

- Conclude the discussion.
→Human activities cause the soil pollution.

### 5 Summary (5 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard (Refer to 'Blackboard Plan') .
- Ask these questions as assessment:
Q: What is soil pollution?
Q: Give examples of the causes of soil pollution.
Q: What is main causes of soil pollution?
- Ask students to copy the notes on the blackboard into their exercise books.

## Sample Blackboard Plan

Title:
"Soil Pollution?"

Key question
What causes soil pollution?

Activity
Finding the causes of soil pollution.

| Causes of soil pollution |
|---|
| Throwing away waste on the ground |
| Use of fertilizer and insecticides that remains in soil. |
| Pouring oil, etc. |

Discussion
Q: What are the causes of soil pollution?
Harmful materials or oil from factories or homes being buried in the soil, people using insecticide for growing crops, when people throw away waste or garbage to the ground, people mining natural resources, etc

Q: What is main causes of soil pollution?
Humans

Summary
1. What is soil pollution?
➤ Soil pollution is the addition of harmful materials to the soil.

2. Causes of Soil Pollution
➤ Soil pollution is caused by:
1. Waste disposal
2. Agriculture and
3. Mining, etc

| Unit | Chapter : **3. Soil for Human Beings** | Total lesson No: 9 / 97 |
|---|---|---|
| **Our Earth** | Topic : **3.1. Soils and Human Beings** | Textbook page: 31 - 32 |

**Lesson** 3 / 6

**Lesson Title**

# Effects of Soil Pollution

**Preparation**

- Pictures showing effects of soil pollution

## Lesson Flow

**1 Introduction (10 min.)**

- Revise the previous lesson:

Q:What is soil pollution?
Q:What are the causes of soil pollution?
Q:What is main causes of soil pollution?

- Encourage students to think about the effects of soil pollution by asking:

Q:How does soil pollution affect living things?

**2 Introduce the key question**

What are the effects of soil pollution on living things?

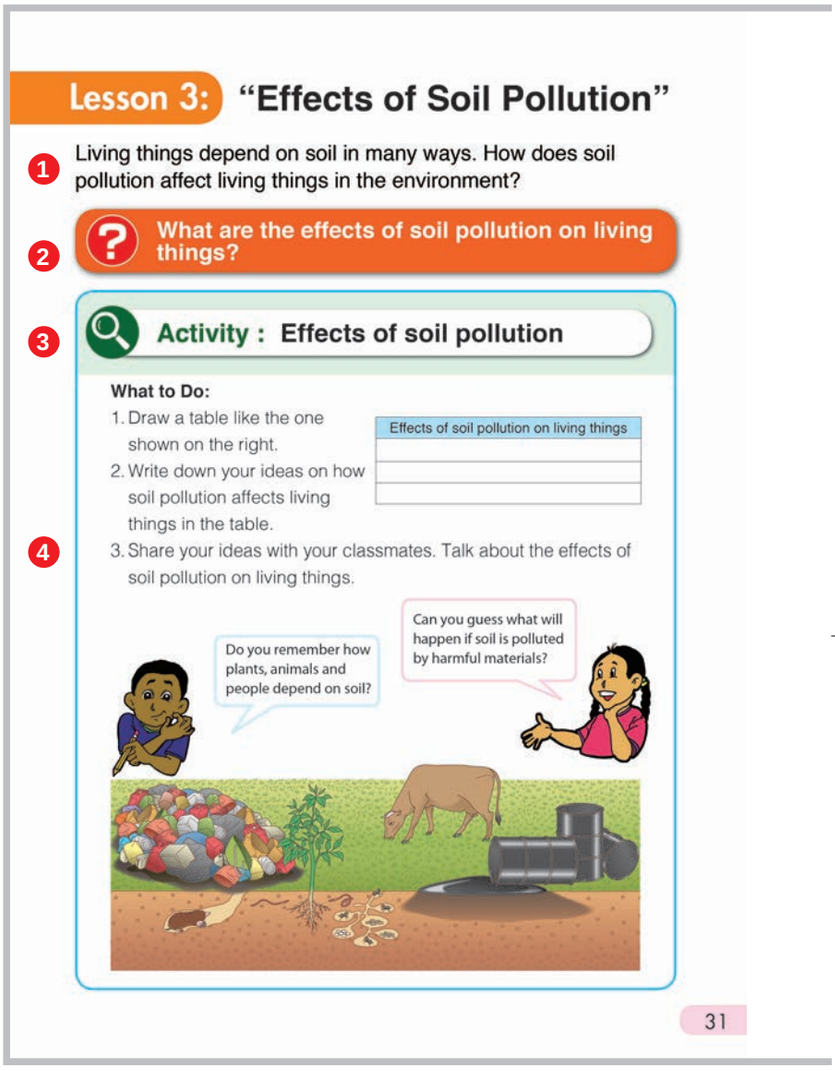
**3 Activity (20 min.)**

- Organise students into pairs.
- Explain the steps of the activity.
- Ask students to refer to the pictures and what the characters are saying in the activity for their investigation.
- Have students do the activity and ask them to record their findings in the table.
- Give enough time for students to complete the activity well.

**4 Discussion for findings (20 min.)**

- Ask students to present their findings from their activity.
- Write down students' findings on the blackboard.

**(Continue)**




## Teacher's Notes

### Addition Information for "Effects on Living Things"

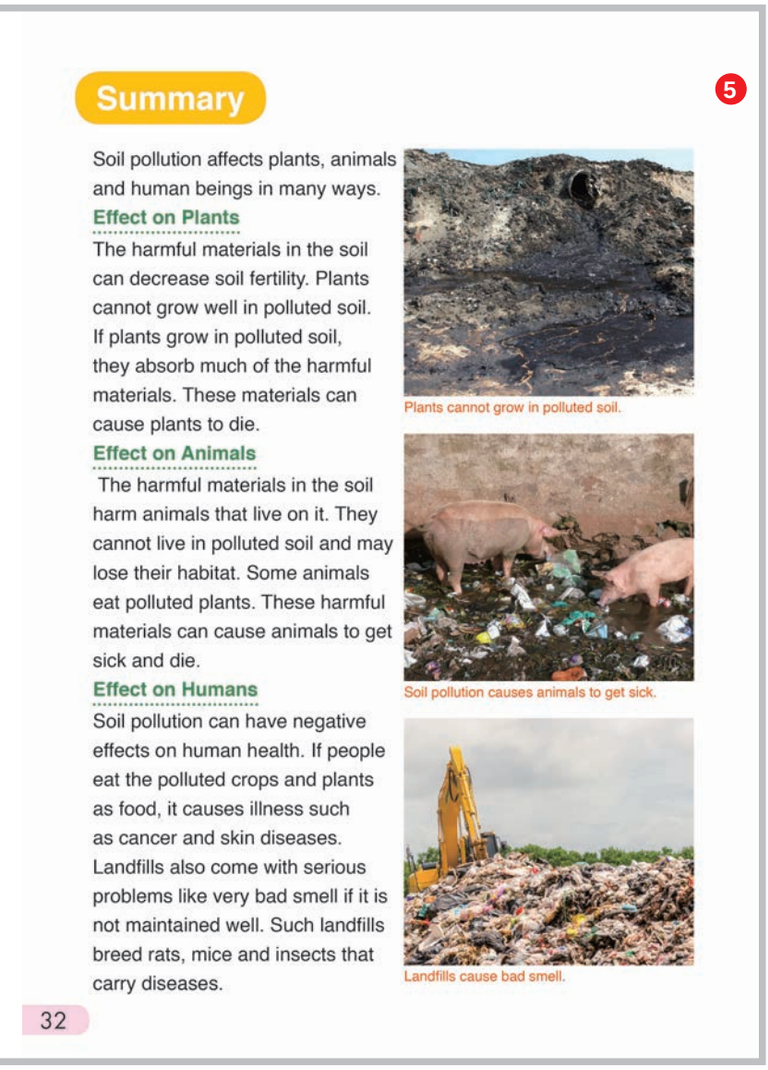
- Soil pollution consists two factors; pollutants and contaminants. When pollutants are contaminated in soil, the soil is polluted. Examples of the most common and problematic soil pollutants are lead (Pb), mercury (Hg), arsenic (As), copper (Cu), zinc (Zn), nickel (Ni) and manmade toxic chemicals (fertilizer, pesticides, insecticides). Chemicals produced when burning coal, oil, gasoline, trash, tobacco and wood are the pollutants, too. When human activities such as agricultural practices, urban or industrial wastes and radioactive emissions contaminate these pollutants, soil is polluted.
- Effect on Health of Humans: Crops and plants grown on polluted soil to absorb much of the pollution and then pass these on to us. This could explain the sudden surge in small and terminal illnesses.
- Effect on Growth of Plants: Soil pollution directly causes the illness by absorbing toxic chemicals. Soil pollution also leads to the loss of soil fertility as a result of loss of topsoil and nutrients, loss of organic matter and clay and the consequent loss of the soil's capacity to retain nutrients and water. Plants cannot move and are unable to adapt when the chemistry of the soil changes so radically in a short period of time. In this point of view, soil pollution is more critical for plants.

## Lesson Objectives

Students will be able to:
- Identify the effects of soil pollution on plants, animals and human.
- Relate the causes of soil pollution to the effects of soil pollution.

## Assessment

Students are able to:
- List the different effects of soil pollution on plants, animals and humans.
- Explain the effects of soil pollution in relation to the causes of soil pollution.



**Summary** 5

Soil pollution affects plants, animals and human beings in many ways.

**Effect on Plants**

The harmful materials in the soil can decrease soil fertility. Plants cannot grow well in polluted soil. If plants grow in polluted soil, they absorb much of the harmful materials. These materials can cause plants to die.

Plants cannot grow in polluted soil.

**Effect on Animals**

The harmful materials in the soil harm animals that live on it. They cannot live in polluted soil and may lose their habitat. Some animals eat polluted plants. These harmful materials can cause animals to get sick and die.

Soil pollution causes animals to get sick.

**Effect on Humans**

Soil pollution can have negative effects on human health. If people eat the polluted crops and plants as food, it causes illness such as cancer and skin diseases. Landfills also come with serious problems like very bad smell if it is not maintained well. Such landfills breed rats, mice and insects that carry diseases.

Landfills cause bad smell.

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- Facilitate active students' discussion.
- Confirm the findings with students.
- **Base on their findings,** ask students to classify their findings into three groups such as the effects of soil pollution on plants, animals and human.
- Ask the following questions:

Q:How does soil pollution affect plants?
(Harmful materials in the soil can decrease soil fertility and plants cannot grow well and die.)

Q:How does soil pollution affect animals?
(Animals lose their homes, get sick and die.)

Q:How are humans affected by soil pollution?
(Human gets illnesses and diseases.)

- Conclude the discussion.

**5 Summary (5 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard (Refer to 'Blackboard Plan').
- Ask these questions as assessment:
  Q: Give examples of how soil pollution affects plants, animals and human.
  Q: Explain why soil pollution causes animals to get sick or die.
- Ask students to copy the notes on the blackboard in their exercise books.

## Sample Blackboard Plan

Title:
"Effects of soil pollution"

Key question
Q: What are the effects of soil pollution on living things?

Activity: Effects of Soil Pollution

| Effects of Soil pollution |
|---|
| Plants cannot grow well. |
| Animals lose their homes |
| Causes illness to people |
| Causes bad smell |
| Breed animals that transmit diseases, etc |

Discussion

Q: How does the soil pollution affect plants?
Harmful materials in the soil can decrease soil fertility and plants cannot grow well and die.

Q: How does the soil pollution affects animals?
Animals lose their homes, get sick and die.

Q: How are humans affected by soil pollution?
Human gets illnesses and diseases.

Summary
- Soil pollution affects plants, animals and humans in many ways.
- When soil is polluted;
  1. Plants:
     cannot grow well.
  2. Animals:
     lose their homes, get sick or die.
  3. Humans:
     get illnesses such as cancer, skin problems and infectious diseases.

| Unit | Chapter : **3. Soil for Human Beings** | Total lesson No: 10 / 97 |
|---|---|---|
| **Our Earth** | Topic : **3.1. Soils and Human Beings** | Textbook page: 33 - 34 |

**Lesson** 4 / 6

**Lesson Title**

# Preventing Soil Pollution

**Preparation**

- Pictures of waste disposal, products with "Recycle symbol" and "Don't litter symbol"

## Lesson Flow

**1 Introduction (10 min.)**

- Review the previous lesson:

Q:What are the effects of soil pollution on plants, animals and humans?

- Encourage students to think about the effects of soil pollution by asking:

Q:How can we protect soil from pollution?

**2 Introduce the key question**

How can we help prevent soil pollution?

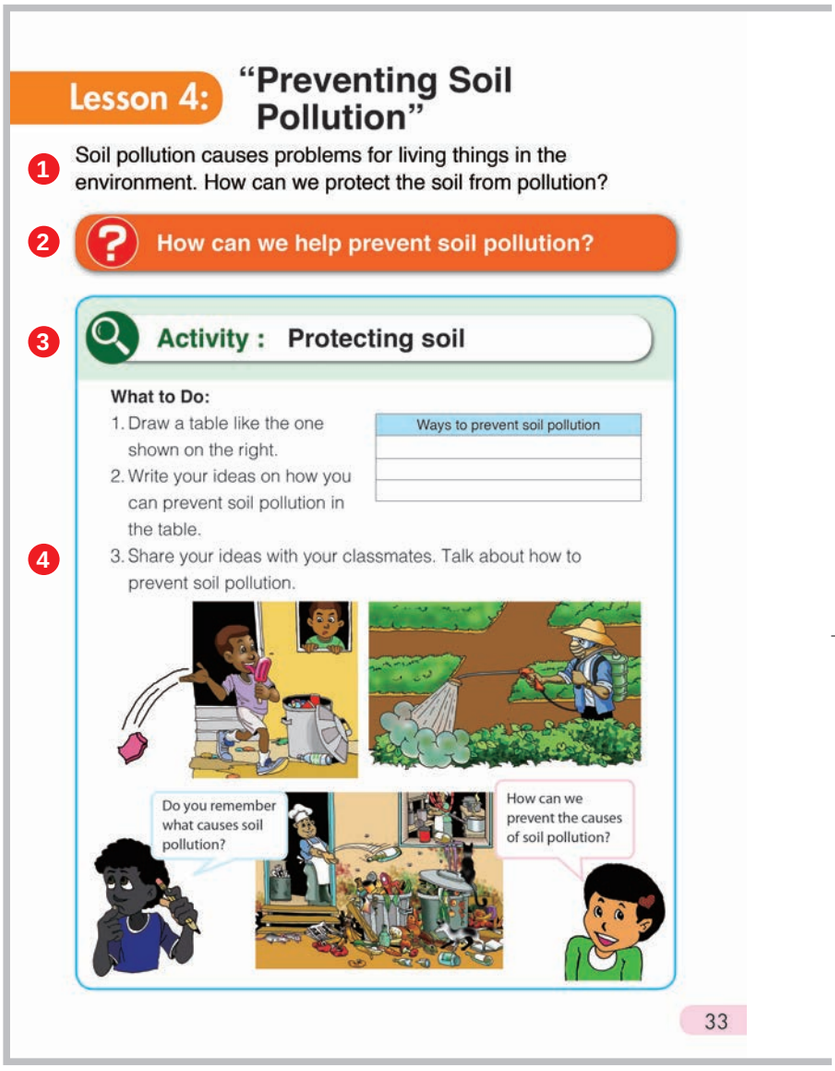
**3 Activity (20 min.)**

- Organise students in pairs.
- Explain the steps of the activity.
- Ask students to refer to the pictures and what the characters are saying in the activity for their investigation.
- Have students do the activity and ask them to record their findings in the table.
- Assist students to recall their experiences on how they manage waste at home and at school.

**4 Discussion for findings (20 min.)**

- Ask students to present their findings from their activity.
- Write down students' findings on the blackboard.

**(Continue)**



Lesson 4: "Preventing Soil Pollution"

1 Soil pollution causes problems for living things in the environment. How can we protect the soil from pollution?

2 How can we help prevent soil pollution?

3 Activity : Protecting soil

What to Do:

1. Draw a table like the one shown on the right.
2. Write your ideas on how you can prevent soil pollution in the table.
3. Share your ideas with your classmates. Talk about how to prevent soil pollution.

4

| Ways to prevent soil pollution |
|---|
| |
| |
| |



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## Teacher's Notes

### Prevention of Soil Pollution (Soil Conservation)

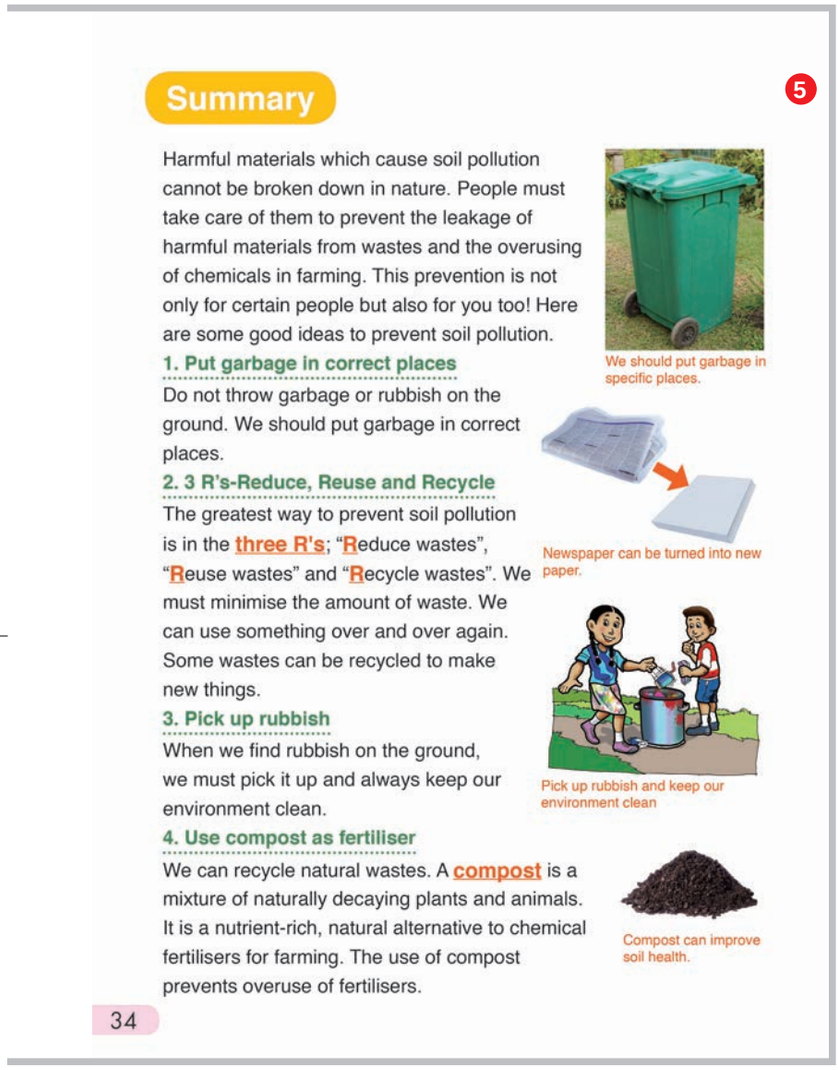
- Soil is an invaluable natural resource, on which the whole world is dependent. The ecological balance of any system gets affected due to the widespread contamination of pollutants in soil. The fertility slowly diminishes, making land unsuitable for agriculture and any local vegetation to survive. In addition, fungi and bacteria found in the soil that bind it together begin to decline, which creates an additional problem of soil erosion.
- Soil conservation is a process of preventing soil loss from erosion or reduced fertility caused by over usage of chemicals and contamination of pollutants. It includes efforts made not only to prevent soil pollution but also to maintain the quality of soil.
- To prevent soil pollution, we need to control soil pollutant and contamination. To reduce pollutants, 3R's (reduce, reuse and recycle) is a very good phrase that students can memorise easily. It is an obligation of citizens.
- To reduce contaminations of pollutants, professional need to improve the quality of their work. For instance, formers should reduce the use of chemical fertiliser and pesticides and replace them by organic fertilisers and pesticides. However, organic fertilisers are also 'extra' for soil. Overuse of these also destroy soil fertility. There are various techniques to maintain soil fertility without using fertilisers such as crop rotation.
- People engaged in waste disposal, landfilling and mining also need to study the way to control the pollutants and contaminations.

## Lesson Objectives

Students will be able to:
- Describe different ways of preventing soil pollution in their environment.
- Apply ways of prevent soil pollution in their daily life.

## Assessment

Students are able to:
- List different ways to prevent soil pollution.
- Explain the meaning of 3R's (Three R's).
- Make rules of preventing soil pollution with classmates.



## Summary

Harmful materials which cause soil pollution cannot be broken down in nature. People must take care of them to prevent the leakage of harmful materials from wastes and the overusing of chemicals in farming. This prevention is not only for certain people but also for you too! Here are some good ideas to prevent soil pollution.

**1. Put garbage in correct places**

Do not throw garbage or rubbish on the ground. We should put garbage in correct places.

We should put garbage in specific places.

**2. 3 R's-Reduce, Reuse and Recycle**

The greatest way to prevent soil pollution is in the three R's; "Reduce wastes", "Reuse wastes" and "Recycle wastes". We must minimise the amount of waste. We can use something over and over again. Some wastes can be recycled to make new things.

Newspaper can be turned into new paper.

**3. Pick up rubbish**

When we find rubbish on the ground, we must pick it up and always keep our environment clean.

Pick up rubbish and keep our environment clean

**4. Use compost as fertiliser**

We can recycle natural wastes. A compost is a mixture of naturally decaying plants and animals. It is a nutrient-rich, natural alternative to chemical fertilisers for farming. The use of compost prevents overuse of fertilisers.

Compost can improve soil health.

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- Confirm their findings with students.
- **Based on their findings,** explain the ways to prevent soil pollution: Putting garbage in correct places, 3R's, picking up rubbish, and using compost as fertiliser.
- Ask the following questions about 3R's:

Q:How can we reduce wastes? (refer to summary.)

Q:How can we reuse waste? (refer to summary.)

- Ask the following questions by showing 'Recycle symbol':

Q:What is the meaning of this symbol? (e.g. This symbol helps us to identify which things can be recycled.)

Q:On which things can we find it?" (e.g. can, plastic bottle, paper, plastic items, etc)

- Conclude the discussion.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on a blackboard (Refer to 'Blackboard Sample')
- Ask these questions as assessment:
  Q: What's the meaning of 'Three R's (3R's)'?
  Q: Give some examples of the ways to prevent soil pollution.
- Let students make classroom rules of preventing soil pollution.
- Confirm the rules with students and ask them to keep the rules.
- Ask students to copy the notes on the blackboard in their exercise books.

## Sample Blackboard Plan

Title:

"Preventing Soil pollution."

Key question

How can we help prevent soil pollution?

Activity

Protecting soil

| How to prevent soil pollution? |
|---|
| 1.Pick up rubbish |
| 2.Use compost as fertilizers |
| 3.Reuse, recycle and reduce rubbish. |
| 4.Dump rubbish at correct places. |

Discussion

Q: How can we reduce wastes? (Refer to summary.)

Q: How can we reuse wastes? (Refer to summary.)

Q: What is the meaning of this symbol? (e.g. This symbol help us to identify which things can be recycled.)

Q: On which things can we find it? (e.g. can, plastic bottle, paper, plastic items, etc)

Summary

- Soil pollution can be prevented in ways such as,
  1. Pick up rubbish
  2. Dump garbage in correct places.
  3. Practise using the three R's to reduce, recycle and reuse waste.
  4. Use compost as fertilisers

| Unit | Chapter : **3. Soil for Human Beings** | Total lesson No: 11 / 97 |
|---|---|---|
| **Our Earth** | Topic : **3.1. Soils and Human Beings** | Textbook page: 35 - 37 |

**Lesson** 5 / 6

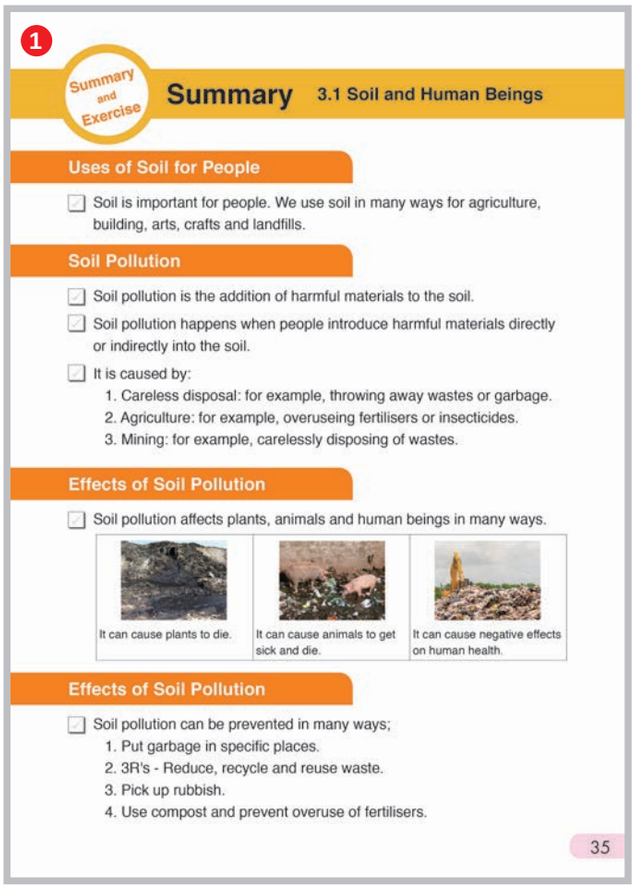
Lesson Title

# Summary and Exercise

## Tips of lesson

### 1 Summary (20 min.)

- Recap main learning contents in this topic.
- Ask some questions to students and verify their students understanding. Explain and correct learning contents again if they still have misconceptions.
- Provoke students to think about why soil is important for people for their daily life.
- Have students to realise that soil pollution happens when harmful materials are added to the soil.
- Explain the three causes of soil pollution.
- Guide students to understand that soil pollution is mainly caused by human and can be prevented using the 3R's.



1

Summary and Exercise

**Summary** 3.1 Soil and Human Beings

**Uses of Soil for People**

- Soil is important for people. We use soil in many ways for agriculture, building, arts, crafts and landfills.

**Soil Pollution**

- Soil pollution is the addition of harmful materials to the soil.
- Soil pollution happens when people introduce harmful materials directly or indirectly into the soil.
- It is caused by:
  1. Careless disposal: for example, throwing away wastes or garbage.
  2. Agriculture: for example, overuseing fertilisers or insecticides.
  3. Mining: for example, carelessly disposing of wastes.

**Effects of Soil Pollution**

- Soil pollution affects plants, animals and human beings in many ways.

| | | |
|---|---|---|
| It can cause plants to die. | It can cause animals to get sick and die. | It can cause negative effects on human health. |

**Effects of Soil Pollution**

- Soil pollution can be prevented in many ways;
  1. Put garbage in specific places.
  2. 3R's - Reduce, recycle and reuse waste.
  3. Pick up rubbish.
  4. Use compost and prevent overuse of fertilisers.

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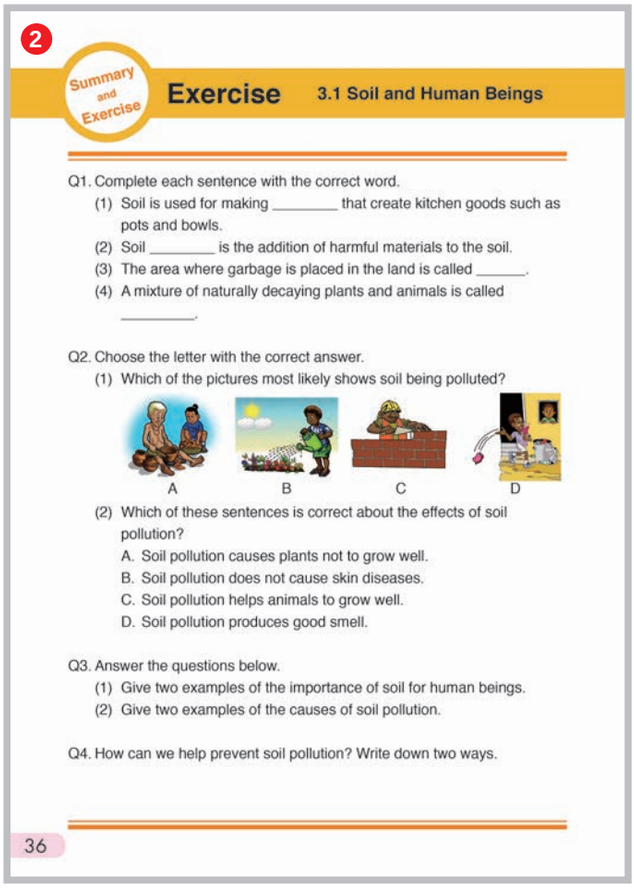
### 2 Exercise & Explanation (30 min.)

- Allow students enough time to answer questions individually.
- After the test, give them answers of the questions and explain how to solve them using student's answers and thoughts.
- Guide students to understand the main ideas or concepts in response to their answers.
- For question 4 students should come up with their answers based on their experiences on using the 3R's
- Remind students this is the test for the end of the topic on soils for our life. We will be moving into a new topic in our next science lesson.



2

Summary and Exercise

**Exercise** 3.1 Soil and Human Beings

Q1. Complete each sentence with the correct word.

(1) Soil is used for making _____ that create kitchen goods such as pots and bowls.

(2) Soil _____ is the addition of harmful materials to the soil.

(3) The area where garbage is placed in the land is called _____.

(4) A mixture of naturally decaying plants and animals is called _____.

Q2. Choose the letter with the correct answer.

(1) Which of the pictures most likely shows soil being polluted?

A B C D

(2) Which of these sentences is correct about the effects of soil pollution?

A. Soil pollution causes plants not to grow well.
B. Soil pollution does not cause skin diseases.
C. Soil pollution helps animals to grow well.
D. Soil pollution produces good smell.

Q3. Answer the questions below.

(1) Give two examples of the importance of soil for human beings.

(2) Give two examples of the causes of soil pollution.

Q4. How can we help prevent soil pollution? Write down two ways.

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## Exercise answers

Q1.
(1) **pottery**
(2) **pollution**
(2) **landfill**
(3) **compost**

Q2.
(1) **D**
Explain that humans grow plants to get food. They sometimes use fertiliser or insecticides for growing them well. Some harmful materials in the fertiliser or insecticides remain in the soil.
(2) **A**

Q3.
(1)
- **People use it for growing plants**
- **People build houses and buildings on it**
- **People make pottery and art work**
- **People use it to bury rubbish**

(2) **Example of the the answer**
- **Waste disposal on the soil**
- **To many uses of fertiliser or insecticides in agriculture**
- **Harmful materials left behind in soil after mining of natural resource.**

Q4. Example of the answer
**Soil pollution can be prevented by;**
1. **Picking up trash or rubbish**
2. **Put trash or rubbish in correct places**
3. **By using the 3R's (reduce, reuse and recycle)**
4. **Use compost instead of fertilisers, etc.**

**Explanation of Science Extras**

### 3 Science Extras (10 min.)

- Give opportunities to students to closely observe the nature and its phenomena in the world.
- Allow students to ask questions that demonstrate curiosity about the content in the science extras.


3

Chapter 3
•Science Extras•

How do we use sand to make our lives easier?

Sand is a type of soil. How do we use sand to make our live easier? If you heat sand long enough to melt, you can change it into glass. Glass is useful for us because it is used for many things such as glass cup, window of houses and eyeglasses. Glassmakers put sand and some minerals into hot oven to melt it. Then they can shape and mold it to make glass cup, windows and other useful things.

Sand change into glass when enough heat is added.

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**Lesson**
**6 / 6**

**Lesson Title**

# Chapter Test

**Answer of the Chapter Test**

*Chapter Test*

## 3. Soil for Human Beings

**Q1** Complete each sentence with the correct word.

(1) Soil pollution occurs when harmful materials remain in the soil.

(2) Soil pollution affects plants, animals and human beings in many ways.

(3) Compost is a mixture of naturally decaying plants and animals.

**Q2** Choose the letter with the correct answer.

(1) What cause of soil pollution produces large holes in the ground to remove natural resources?

A. Garbage
B. Landfills
C. Mining
D. Factories

(2) Which of the following is not a way to prevent soil pollution?

A. Prepare dust bins or rubbish boxes to collect garbage.
B. Use pesticides to kill harmful insects in crops.
C. Minimise the amount of waste.
D. Use compost as fertilisers.

(3) Which of the following is not included in the phrase 3 R's to protect soil?

A. Reuse
B. Recycle
C. Research
D. Reduce

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## Q3

For question (1), refer to the table below.

| Rubbish Collected |
|---|
| 1. sheets of paper |
| 2. plastic bottles |
| 3. old tyres |
| 4. tin cans |

Ms. Noel's class collected rubbish in school.
The table above shows the items they collected.

(1) Which of the following items can be recycled to help prevent soil pollution?

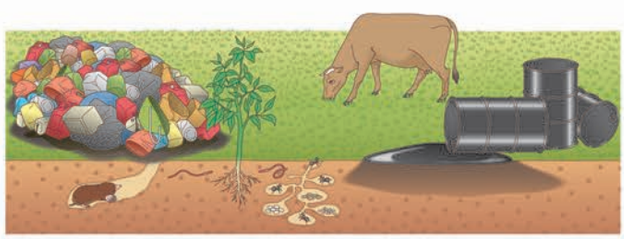
Sheets of papers and tin cans

(2) While driving, Mike throws an empty plastic bottle out the window of his car. Explain what wise decision he should make to help prevent soil pollution.

Mike should keep the empty plastic bottle and dispose it in correct places or rubbish bins.

## Q4

Refer to the picture below and answer the two questions.



(1) What happens to animals that live in polluted soil?

Harm materials cause animals to get and sick and die. They cannot live in polluted soil and lose their habitat.

(2) What happens to plants that grow in polluted soil?

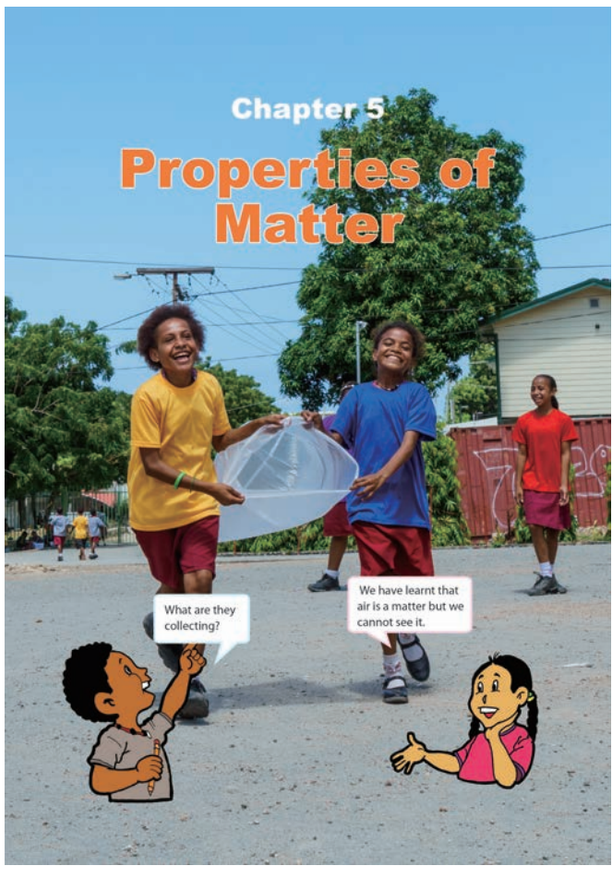
The harmful materials in the soil can decrease soil fertility and cause plants to die.

Strand : PHYSICAL SCIENCE
Unit : MATTER

# Chapter 5. Properties of Matter

## Chapter Objectives

Students will be able to understand properties of air that are corresponding to the volume, size and weight.




The picture at the chapter heading in the textbook shows the activity in which students collected air by using plastic bag.

## Topic Objectives

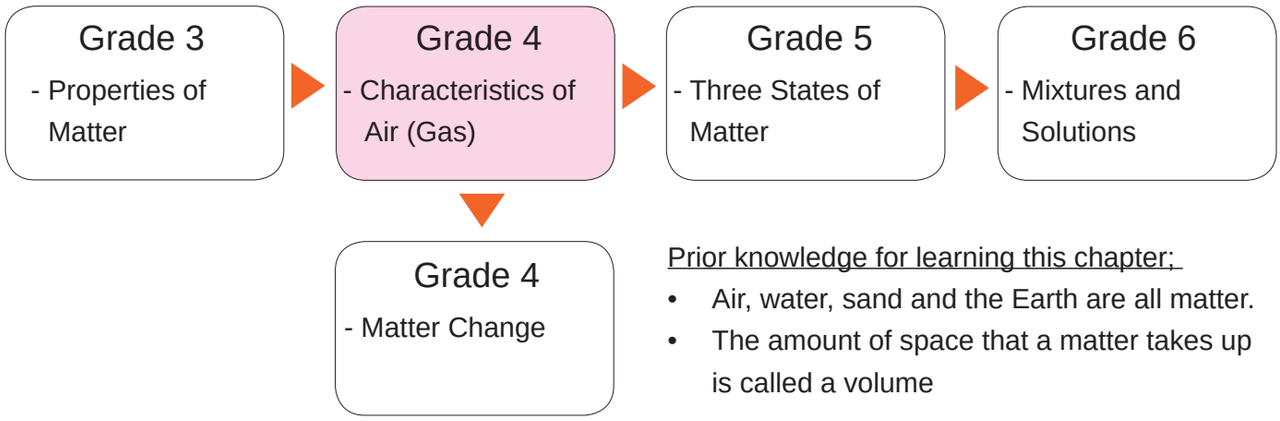
### 5.1 Characteristics of Air (Gas)

Students will be able to;

- Explain how air can be found.
- State that air takes up space.
- Identify how air can change its size when it is compressed.
- Realise that air has weight.

## Related Learning Contents

The learning contents in this chapter connect to the following chapters.




Prior knowledge for learning this chapter;

- Air, water, sand and the Earth are all matter.
- The amount of space that a matter takes up is called a volume

## Teaching Overview

This chapter consists of 6 lessons, each lesson is a double period.

| Topic | Lesson No. | Lesson Title and Key Question | Content standard in syllabus | Textbook page number |
|---|---|---|---|---|
| 5.1 Characteristics of Air (Gas) | 1 | **Air around Us**<br>How can we tell that air is around us? | 4.2.4 | 45 - 46 |
| | 2 | **Properties of Air 1**<br>Does air take up space? | | 47 - 48 |
| | 3 | **Properties of Air 2**<br>What happens if we press air? | | 49 - 50 |
| | 4 | **Properties of Air 3**<br>Does air have weight? | | 51 - 52 |
| | 5 | Summary and Exercise | | 53 - 55 |
| Chapter Test | 6 | Chapter Test | | 56 - 57 |

| Unit | Chapter : **5. Properties of Matter** | Total lesson No: 14 /97 |
|---|---|---|
| **Matter** | Topic : **5.1. Characteristics of Air (Gas)** | Textbook page: 45 - 46 |

**Lesson** 1 / 6

**Lesson Title**

# Air around us

**Preparation**

- Plastic bag, plastic bottle, bucket filled with water

## Lesson Flow

**1 Introduction (10 min.)**

- Show an empty plastic filled with air and ask the following questions:

Q:What is in the plastic bag? (Air)
Q:Can you see air with your eyes? (No)
Q:How do you know if air is in the plastic bag?

**2 Introduce the key question**

How can we tell that air is around us?

**3 Activity (30 min.)**

- Organise students into groups.

Activity 1

- Explain steps of activity 1.
- Have students do the activity.
- Ask students to record their findings in their exercise books.

Activity 2

- Explain steps of activity 2.
- Have students do the activity.
- Ask students to record their findings in their exercise books.
- If it is difficult to prepare enough water containers for each group, this activity can be demonstrated by the teacher.

**4 Discussion for findings (15 min.)**

- Ask students to present their findings of activity 1 and 2. **(Continue)**


## Teacher's Notes

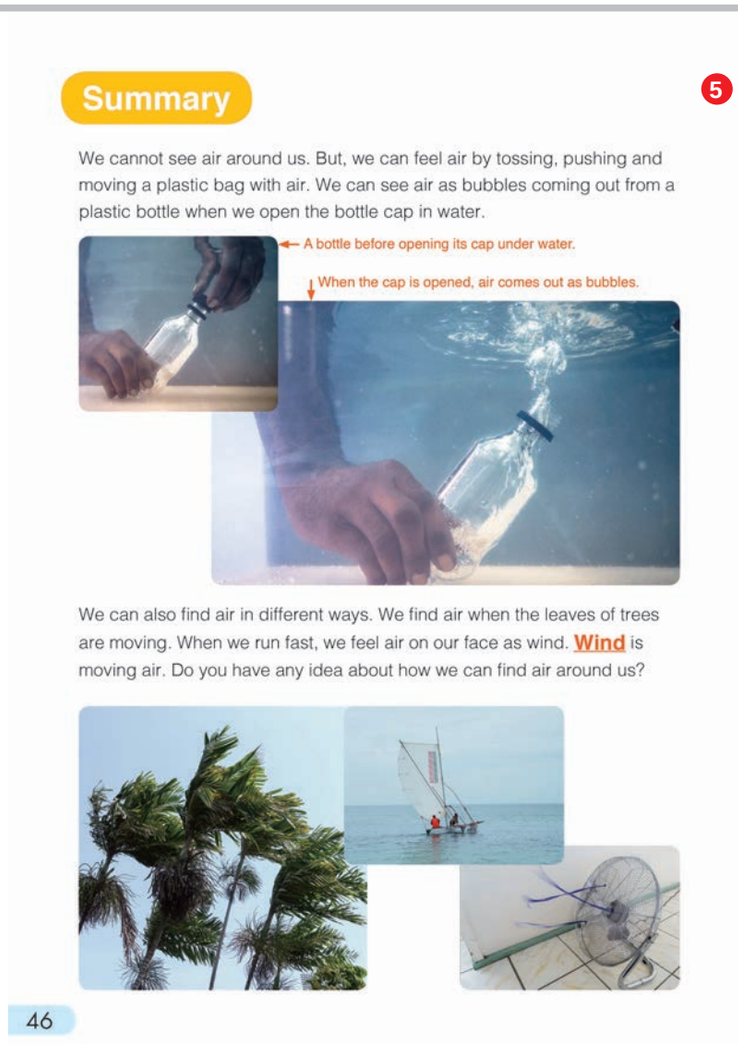
- Air is a mixture of gases that is surrounding the Earth. It consists of approximately 78% of nitrogen, 21% oxygen and trace amount of water vapor, argon carbon dioxide, hydrogen, helium, neon and other gases.
- Most of the planets in our solar system are surrounded by air (atmosphere). However, the composition of those air is far different from our air. For instance, the air of Venus is composed of 96.5% of carbon dioxide and 3.5% of nitrogen and traces of other gases. The air on Mars consists of 95% carbon dioxide, 3% nitrogen, 1.6% argon with traces of oxygen, water vapour and so on.
- Air on the Earth is breathable but air on other planet is not. Living things cannot live on other planets.
- The Moon does not have air, consequently, wind does not blow on the Moon. On the Earth, a flag is blown by the wind and it flutters. But a flag on Moon does not flutter. When astronauts went to the Moon on Apollo 11 in 1969, they set up the US flag with a rod running across the top. The flag on the Moon is being held out by the rod. The flag in the photo seems waving but it does not move at all. It just keeps the initial shape.

## Lesson Objectives

Students will be able to:
- Explain how air can be found.
- State what wind is.
- Relate wind to the existence of air.

## Assessment

Students are able to:
- Give some examples of how to find the air around us.
- Identify that bubbles in water are air.
- Explain what wind can do.



Summary

5

We cannot see air around us. But, we can feel air by tossing, pushing and moving a plastic bag with air. We can see air as bubbles coming out from a plastic bottle when we open the bottle cap in water.

A bottle before opening its cap under water.

When the cap is opened, air comes out as bubbles.

We can also find air in different ways. We find air when the leaves of trees are moving. When we run fast, we feel air on our face as wind. **Wind** is moving air. Do you have any idea about how we can find air around us?

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- Write down students' findings on the blackboard.
- **Based on their findings,** asks the following questions.

Q:Why do you feel bouncing or like a cushion when you toss, push, hit and move the plastic bag? (Air is inside the bag.)

Q:What do you think the bubbles are? (air)

Q:How can we find that air is around us? (By tossing and pushing the plastic bag, observing the bubbles in water.)

Q:Do you have any other ideas on how to find air around us? (e.g. when something is moved by wind, when wind is produced from the electric fan, the bus is moving very fast, when there is a strong wind, etc)

- Summarise the discussion and explain what wind is.

**5 Summary (5 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard. (Refer to 'Blackboard Plan')
- Ask these questions as assessment:
  Q: How can we find that air is around us?
  Q: What makes the leaves of a tree move?
  Q: What is wind?
- Ask students to copy the notes on blackboard in their exercise books.

## Sample Blackboard Plan

Title:
"Air around us"

Key question
How can we tell that air is around us?

Activity1: Feeling Air
- ➤ What did you feel when you toss, push, hit and moved the bag?
  e.g. I feel bouncing, feeling like a cushion,

Activity2: Finding Air
- ➤ What did you observe when you opened the cap?
  Bubbles coming out of the bottle

Discussion
Q: Why do you feel bouncing or like a cushion when you toss, push, hit and move the plastic bag? (Air is inside the bag.)
Q: What do you think the bubbles are? (air)
Q: How can we find that air is around us? (By tossing and pushing the plastic bag, observing the bubbles in water.)
Q: Do you have any ideas on how to find air around us? (e.g. when something is moving by wind, when wind is produced from the electric fan, the bus is moving very fast When there is a strong wind, etc)

Summary
- Air cannot be seen but is felt all around us through:
  - ➤ Tossing, pushing and moving a plastic bag with air.
  - ➤ Bubbles in water.
  - ➤ When something is moving by wind
  - ➤ When we feel wind from the electric fan, the bus moving very fast, when there is a strong wind
- Wind is moving air.

| Unit | Chapter : **5. Properties of Matter** | Total lesson No: 15 /97 |
|---|---|---|
| **Matter** | Topic : **5.1. Characteristics of Air (Gas)** | Textbook page: 47 - 48 |

**Lesson** 2 / 6

**Lesson Title**

# Properties of Air 1

**Preparation**

- A glass cup, large transparent container, tissue or paper and water,

## Lesson Flow

**1 Introduction (5 min.)**

- Review the previous lesson:

Q:How can we find air around us?

Q:What is wind?

**2 Introduce the key question**

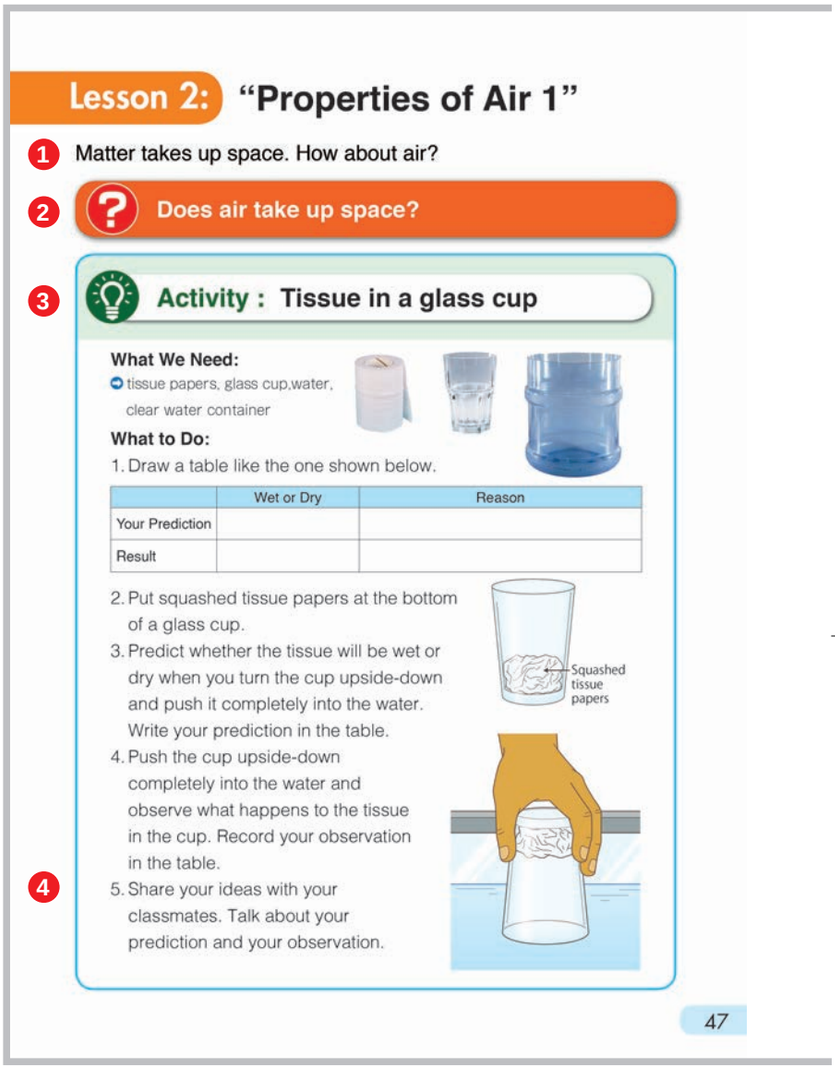
Does air take up space?

**3 Activity (25 min.)**

- Organise students into groups.
- Explain the steps of the activity.
- Make sure that students make a table in their exercise books.
- Provide the materials for all groups.
- Ask students to predict the results of the activity and write it in the table.
- Have each group present their predictions with reasons and record it on the blackboard.
- Allow students to do the activity and carefully observe and record their findings in the table.
- Facilitate each group doing the activity.
- Give enough time for the students to get their findings through the activity.
- If it is difficult to prepare enough materials for each group, this activity can be demonstrated by the teacher.

**4 Discussion for findings (20 min.)**

- Ask each group to present their results from activity. **(Continue)**



Lesson 2: "Properties of Air 1"

1 Matter takes up space. How about air?

2 Does air take up space?

3 Activity : Tissue in a glass cup

What We Need:

tissue papers, glass cup,water, clear water container

What to Do:

1. Draw a table like the one shown below.

| | Wet or Dry | Reason |
|---|---|---|
| Your Prediction | | |
| Result | | |

2. Put squashed tissue papers at the bottom of a glass cup.
3. Predict whether the tissue will be wet or dry when you turn the cup upside-down and push it completely into the water. Write your prediction in the table.
4. Push the cup upside-down completely into the water and observe what happens to the tissue in the cup. Record your observation in the table.
5. Share your ideas with your classmates. Talk about your prediction and your observation.

Squashed tissue papers

4

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## Teacher's Notes

### Additional Information for Activity

- Tissue must be thick. Makes sure the tissue is secure at the base of the cup.
- Teacher can improvise water container and plastic cups by using available materials. For example, cups made from plastic bottles, plastic container can be made by cuting big water bottle for water server.

### Space taken up by air saves life

- An air bag is an inflatable soft cushion to protect passengers in a vehicle from serious injury in the case of a collision. During a crash, the vehicle's crash sensors detect crucial information and send signals to the airbag controller. When the controller receives the signal, it examines if it is the serious incident or not. If it is serious, the controller immediately inflates the cushion. It uses chemical reaction to generate harmless nitrogen gas that fills the air bag rapidly. The inflation takes less than one-twentieth (1/20) of a second.

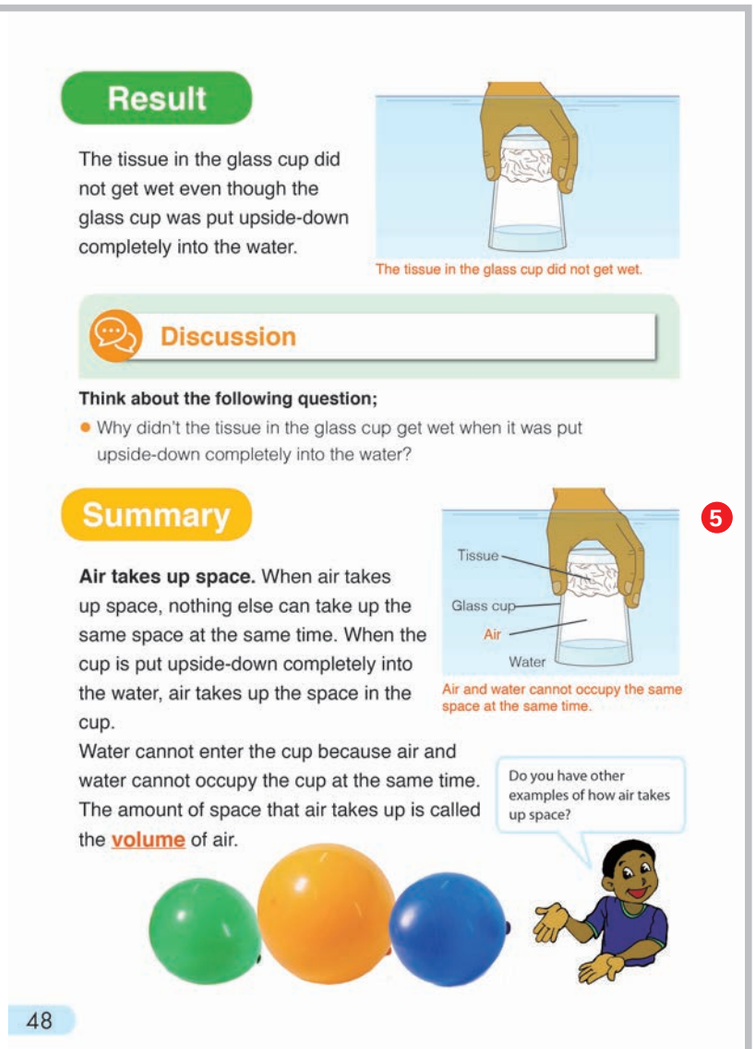
Airbag

## Lesson Objectives

Students will be able to:
- Define what volume is.
- Describe the property of air: 'air takes up space'.
- Conduct an experiment to show that air takes up space.

## Assessment

Students are able to:
- Infer that air takes up space based on the results of the activity.
- Explain the reason why the tissue in a glass does not get wet.
- Demonstrate the activity by correctly following the steps.



**Result**

The tissue in the glass cup did not get wet even though the glass cup was put upside-down completely into the water.

The tissue in the glass cup did not get wet.

**Discussion**

**Think about the following question;**

- Why didn't the tissue in the glass cup get wet when it was put upside-down completely into the water?

**Summary**

**Air takes up space.** When air takes up space, nothing else can take up the same space at the same time. When the cup is put upside-down completely into the water, air takes up the space in the cup.

Tissue
Glass cup
Air
Water

Air and water cannot occupy the same space at the same time.

Water cannot enter the cup because air and water cannot occupy the cup at the same time. The amount of space that air takes up is called the **volume** of air.

Do you have other examples of how air takes up space?

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- Write down their results on the blackboard.
- Confirm that the tissue didn't get wet.
- Ask students to compare their predictions with the results. Let them think about the reason if their predictions are different from the result.
- **Based on the results of the activity,** ask the following questions.

Q:Why didn't the tissue get wet?
(e.g. Because water cannot enter the glass, etc.)

Q:What do you know about the property of air from this result?
(e.g. Air takes up space in a glass, etc.)

- Explain the reason why the tissue didn't get wet.
- Summarise the discussion.

5 **Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard. (Refer to 'Blackboard Plan')
- Ask these questions as assessment:
  Q: Why didn't the tissue in the glass cup get wet?
  Q: What is the property of air?
  Q: What is the volume of air?
- Ask students to copy the notes on the blackboard in their exercise books.

## Sample Blackboard Plan

Title:
"Properties of Air 1"

Key question
Does air take up space?

Activity: Tissue in a glass cup

| | Wet or dry | Reason |
|---|---|---|
| Prediction | Wet | Because ..... |
| | Dry | Because ..... |
| Result | It stays dry | Because water cannot enter the glass, air is still in a glass, etc. |

Discussion
Q. Why didn't the tissue get wet?
Because water cannot enter the glass, air is still in a glass, etc

Q: What do you know about the property of air from this result?
Air takes up space in a glass, etc.

Summary
1. Property of Air
➤Air takes up space.
Air and water cannot occupy the same space at the same time.
2. Volume of Air
➤The amount of space that air takes up is called the volume of air.
Q: Can you give some examples of where you have noticed the presence of air taking space?
Bubbles, Submarines, Floating balloons, Floaters, Tyres, etc.

| Unit | Chapter : **5. Properties of Matter** | Total lesson No: 16 / 97 |
|---|---|---|
| **Matter** | Topic : **5.1. Characteristics of Air (Gas)** | Textbook page: 49 - 50 |

**Lesson** 3 / 6

**Lesson Title**

# Properties of Air 2

**Preparation**

- Empty clear plastic bottle with caps on, water

## Lesson Flow

**1 Introduction (10 min.)**

- Review the previous lesson:

Q:What property does air have?

Q:What is the volume of air?

**2 Introduce the key question**

What happens if we press air?

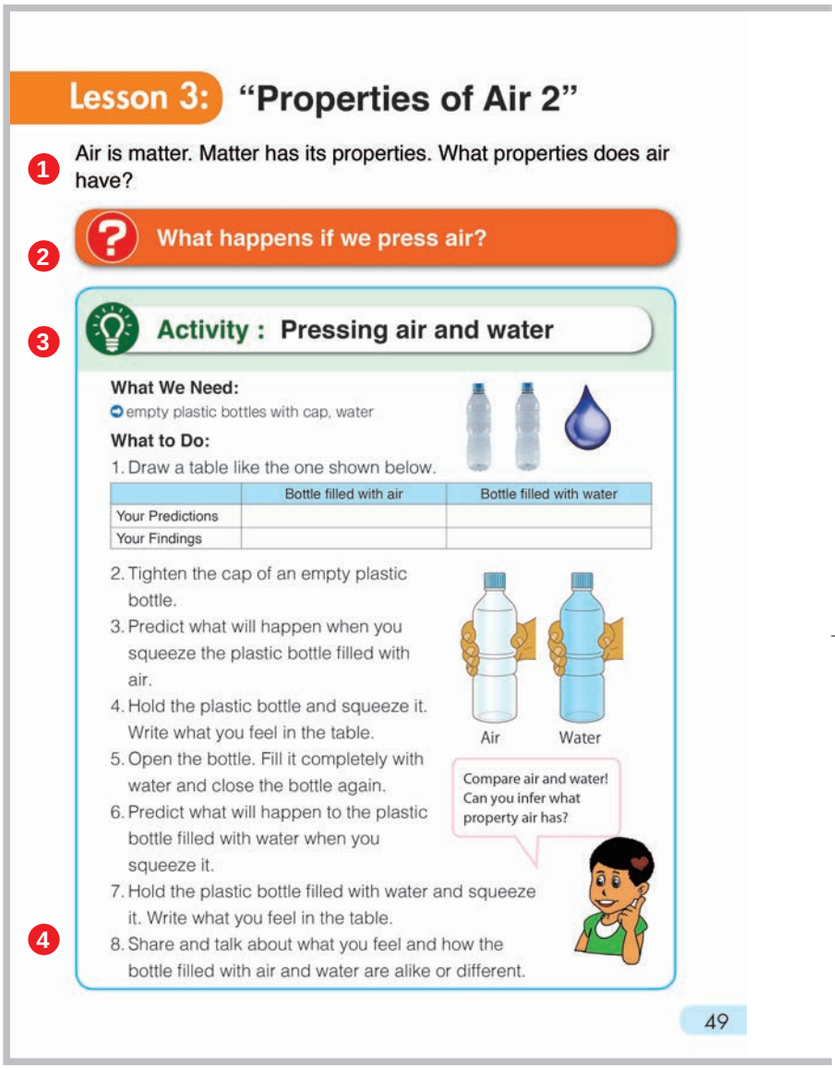
**3 Activity (20 min.)**

- Organise students into groups.
- Explain the steps of the activity.
- Ask students to make a table in their exercise books.
- Have each group predict what will happen to the plastic bottle filled with air and water if they squeeze it and record their predictions in the table.
- Have each group present their predictions with reasons and record it on the blackboard.
- Allow students to do the activity and ask them to record their findings in the table.
- Facilitate each group doing the activity. Encourage students to record their findings in the table.

**4 Discussion for findings (20 min.)**

- Ask each group to present their results from their activity.
- Write down their results on the blackboard.

**(Continue)**



Lesson 3: "Properties of Air 2"

1 Air is matter. Matter has its properties. What properties does air have?

2 What happens if we press air?

3 Activity : Pressing air and water

What We Need:
empty plastic bottles with cap, water

What to Do:

1. Draw a table like the one shown below.

| | Bottle filled with air | Bottle filled with water |
|---|---|---|
| Your Predictions | | |
| Your Findings | | |

2. Tighten the cap of an empty plastic bottle.
3. Predict what will happen when you squeeze the plastic bottle filled with air.
4. Hold the plastic bottle and squeeze it. Write what you feel in the table.
5. Open the bottle. Fill it completely with water and close the bottle again.
6. Predict what will happen to the plastic bottle filled with water when you squeeze it.
7. Hold the plastic bottle filled with water and squeeze it. Write what you feel in the table.
8. Share and talk about what you feel and how the bottle filled with air and water are alike or different.

Air Water

Compare air and water! Can you infer what property air has?

4

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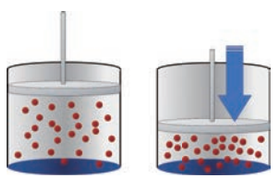
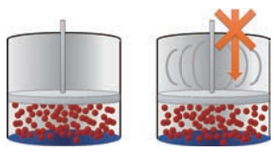
## Teacher's Notes

### Additional information about compression of gas and liquid

- The volume of substances can be reduced by the application of pressure. In gas, molecules are widely spaced and there are a lot of empty spaces. Hence, gases are highly compressive. In liquid, molecules are closely spaced and there are fewer empty spaces. Liquids are not easily compressive.
- However, it does not mean, liquids cannot be compressed. Liquids have very small potential for compression. Water decreases 0.1% in volume at room temperature (25 °C) when pressure of 2100000 Pa ($N/m^2$) is applied. This small compression is not felt in our daily life. Therefore you can say for primary school students that water cannot be compressed.
- Air can be compressed. It means that more air can be squeezed into the small space. Such squeezed air blows out when the container of the air is opened. This air movement is often used in workshops and factories for driving drills, inflating tyres, spraying paint and blowing dusts. The device which compresses and pushes air into a container is called "air compressor".



Gas



Liquid

## Lesson Objectives

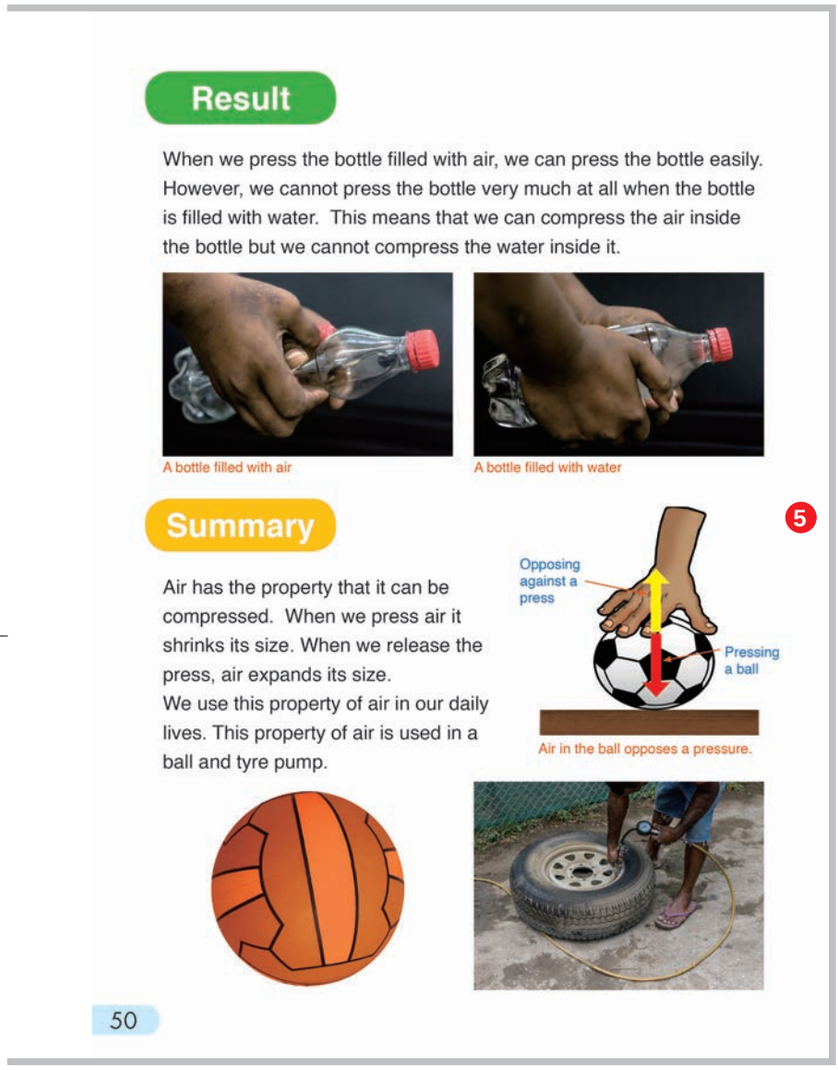
Students will be able to:

- Realise that air and water have different properties according to the change in their sizes.
- Identify the properties of air - air can change its size.

## Assessment

Students are able to:

- State that air has a property that it can shrink when pressed and expand when pressure is released.
- Compare the property of air with that of water according to the changes in size.



**Result**

When we press the bottle filled with air, we can press the bottle easily. However, we cannot press the bottle very much at all when the bottle is filled with water. This means that we can compress the air inside the bottle but we cannot compress the water inside it.

A bottle filled with air

A bottle filled with water

**Summary**

Air has the property that it can be compressed. When we press air it shrinks its size. When we release the press, air expands its size.
We use this property of air in our daily lives. This property of air is used in a ball and tyre pump.



Air in the ball opposes a pressure.

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- Confirm the results with students.
- Ask students to compare their predictions with the results. Let them think about the reason if their predictions are different from the result.
- **Based on their result,** ask questions as discussion point;

Q:What happened to air in the bottle when you pressed and released it? (It shrunk in size when we pressed it. It returned to its original size when we released it.)

Q:What happened to water in the bottle when you pressed and released it? (It didn't change.)

Q:What do you know about the property of air and water from the result? (Air can shrink and expand. Water cannot change its size.)

- Conclude the discussion.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard. (Refer to 'Blackboard Plan')
- Ask these questions as assessment:
  Q: What property does air have?
  Q: What property does water have?
  Q: Do you have any ideas on how to use the property of air in our daily life?
- Ask students to copy the notes on the blackboard in their exercise books.

## Sample Blackboard Plan

Title:

"Properties of Air 2"

Key question

Q: What happens if we press air?

Activity

Press air and water

| Bottle filled with air | Bottle filled with water |
|---|---|
| Prediction:<br>It depends. | Prediction:<br>It depends. |
| It was squeezed easily | It was not able to be squeezed easily. |

Discussion

Q: What happened to air in the bottle when you pressed and released it?

It shrunk in size when we pressed it. It returned to its original size when we released it.

Q: What happened to water in the bottle when you pressed and released it?

It didn't change.

Q: What do you know about the property of air and water from the result?

Air can shrink and expand. Water cannot change its size.

Summary

1. Property of Air
   - ➤ Air can be compressed.
     When air is pressed it can shrink its size. When it is released, it returns to its original size.
   - ➤ This property of air is used in our daily life.

Q: Do you have any ideas on how to use the property of air in our daily life?

A bicycle pump, balloon, tyre, ball

| Unit | Chapter : **5. Properties of Matter** | Total lesson No: 17 /97 |
|---|---|---|
| **Matter** | Topic : **5.1. Characteristics of Air (Gas)** | Textbook page p. 51 - 52 |

**Lesson** 4 / 6

**Lesson Title**

# Properties of Air 3

**Preparation**

- Long pole (PVC pipe), three big binder clips, two small binder clips, two balloons

## Lesson Flow

**1 Introduction (10 min.)**

- Review the previous lesson:

Q:What property does air have?

- Show two flat balloons. Let students examine the weight by hands and ask;

Q:Do they have the same weight?

- Blow one balloon. Let students examine the weight by hands and ask;

Q:Which balloon is heavier?

**2 Introduce the key question**

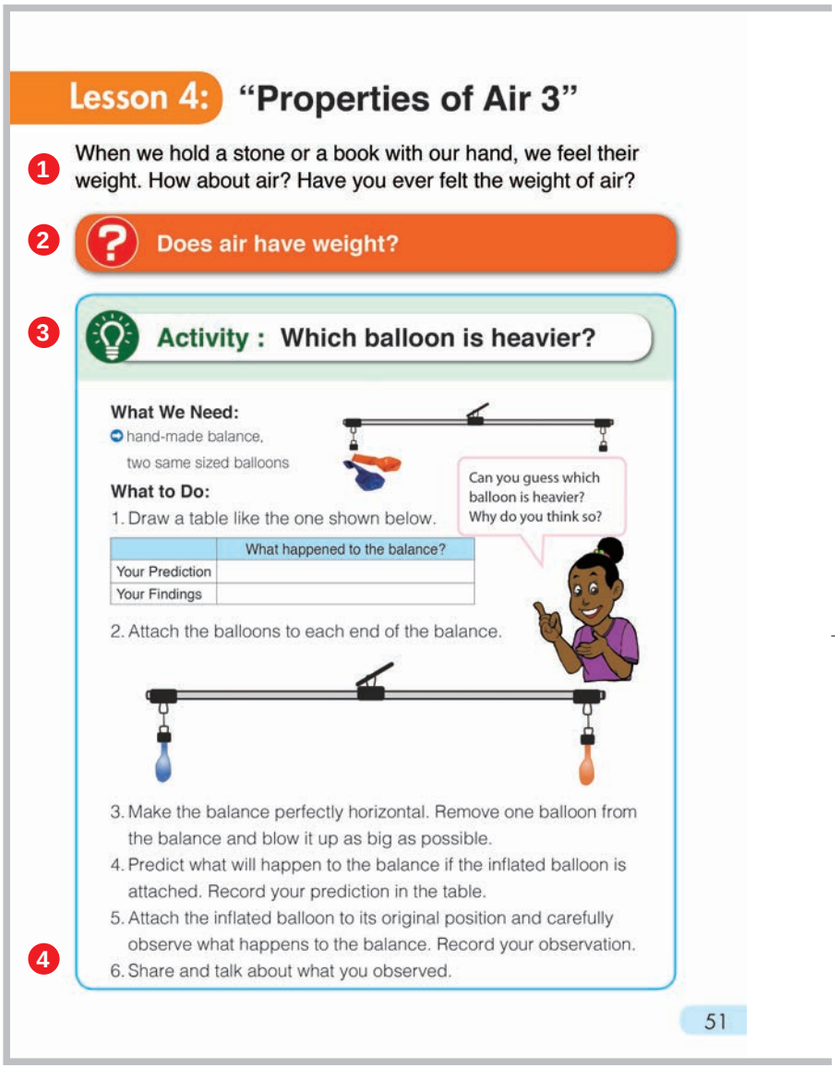
Does air have weight?

**3 Activity (20 min.)**

- Organise students into groups.
- Explain the activity step by step.
- Assist the students to make and set up a balance.
  →The balance must be perfectly horizontal by adjusting position of the large bulldog clip after attaching each of the flat balloons to each end of the balance.
- Ask students to predict which is heavier, the deflated balloon or the inflated balloon and record their predictions.
- Allow students to do the activity and ask them to record their findings.
- Give enough time for them to complete the activity.

**4 Discussion for findings (20 min.)**

- Ask students to present their findings from their activity. **(Continue)**



Lesson 4: "Properties of Air 3"

1 When we hold a stone or a book with our hand, we feel their weight. How about air? Have you ever felt the weight of air?

2 Does air have weight?

3 Activity : Which balloon is heavier?

What We Need:
hand-made balance,
two same sized balloons

What to Do:
1. Draw a table like the one shown below.

| | What happened to the balance? |
|---|---|
| Your Prediction | |
| Your Findings | |

2. Attach the balloons to each end of the balance.
3. Make the balance perfectly horizontal. Remove one balloon from the balance and blow it up as big as possible.
4. Predict what will happen to the balance if the inflated balloon is attached. Record your prediction in the table.
5. Attach the inflated balloon to its original position and carefully observe what happens to the balance. Record your observation.
6. Share and talk about what you observed.

Can you guess which balloon is heavier? Why do you think so?

4

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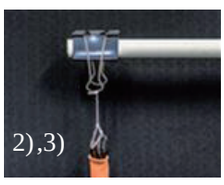
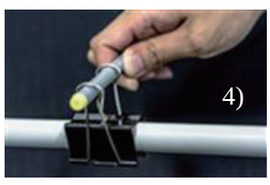
## Teacher's Notes

How to make a balance

**1)** Prepare long pole (PVC pipe, bamboo, pitpit), three big bulldog clips,two small bulldog clips, string, pen
2) Bind a pole by the large bulldog clips at both ends of the pole
3) Tie one end of the string to a small clip and another end to the large clip.
4) Bind the pole by a large bulldog clip in the centre.

**Note:**
**Children around the world enjoy this experiment and many of their videos are found on internet sites such as Youtube. But most of them cheat the result. When they remove the air from the balloon, they break (explode) it. Then, the debris of the balloon scatters and the balloon itself loses its weight. This weight loss causes the unbalance, not because of the loss of air weight.**



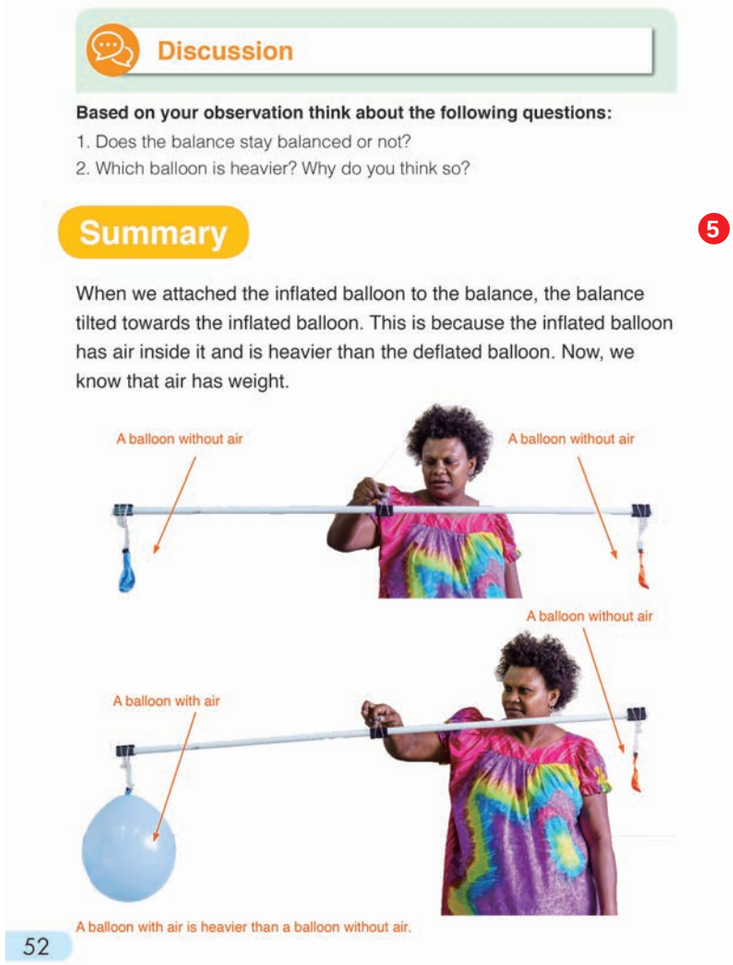

Tips:
1. The length of pole should be 1m long or longer.
2. Find the centre of the pole and check if it balances.
3. Put bulldog clips at both ends of the pole then check that it is balanced.
4. Balloons must be blown up as big as possible.

## Lesson Objectives

Students will be able to:
- Understand that air has weight.
- Relate the tilt of a balance to the property of air.
- Demonstrate in the activity that air has weight.

## Assessment

Students are able to:
- Explain that air has weight.
- Identify which balloon is heavier with their reasons.
- Respect others' opinions.



Discussion

**Based on your observation think about the following questions:**

1. Does the balance stay balanced or not?
2. Which balloon is heavier? Why do you think so?

Summary

5

When we attached the inflated balloon to the balance, the balance tilted towards the inflated balloon. This is because the inflated balloon has air inside it and is heavier than the deflated balloon. Now, we know that air has weight.



A balloon with air is heavier than a balloon without air.

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- Write down students' findings on the blackboard.
- Verify their findings and confirm if any new ideas or misconceptions came up.
- **Based on their findings,** ask the questions as discussion point;

Q:Does the balance stay balanced? (It is not balanced. It tilted.)

Q:Why does the balance tilt? (Because the weight of each balloon is different.)

Q:Which side does the balance tilt towards? (Side with the blown balloon)

Q:What is inside the blown balloon? (Air)

Q:Which balloon is heavier? (The blown balloon)

Q:Why is the blown balloon heavier than the flat balloon? (Because it has air in it and air has weight.)

- Conclude the discussion

**5 Summary (5 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard. (Refer to 'Blackboard Plan')
- Ask these questions as assessment:
  Q: What property does air have?
  Q: Explain how we can prove that air has weight.
- Ask students to copy the notes on the blackboard in their exercise books.

## Sample Blackboard Plan

Title:

"Properties of air 3"

Key question

Does air have weight?

Activity

Which balloon is heavier?

| | What happened to the balance? |
|---|---|
| Your Prediction | It depends. |
| Your findings | The balance tilted, the balance is not balanced. |

Discussion

Q: Does the balance stay balanced?
It is not balanced. It tilted.

Q: Why does the balance tilt?
Because the weight of each balloon is different.

Q: Which side does the balance tilt towards?
Side with the blown balloon

Q: What is inside the blown balloon?
Air

Q: Which balloon is heavier?
The blown balloon

Q: Why is the blown balloon heavier than the flat balloon?
Because it has air in it and air has weight.

Summary

➤A balance tilts towards a heavier object

➤A balance tilts towards the inflated balloon because it has air in it.
Air has weight!

Properties of air:

1. Air takes up space.
2. Air can be compressed.
3. Air has weight.

| Unit | Chapter : **5. Properties of Matter** | Total lesson No: 18 / 97 |
|---|---|---|
| **Matter** | Topic : **5.1. Characteristics of Air (Gas)** | Textbook page p. 53 - 55 |

**Lesson** 5 / 6

**Lesson Title**

# Summary and Exercise

## Tips of lesson

### 1 Summary (15 min.)

- Recap the main learning contents of the topic ' Characteristics of Air (Gas).
- Lead students to the summary page in the student textbook and explain main learning contents.
- Based on the main learning contents, ask students some questions and verify their understanding against the summary points.
- Ask the following questions.

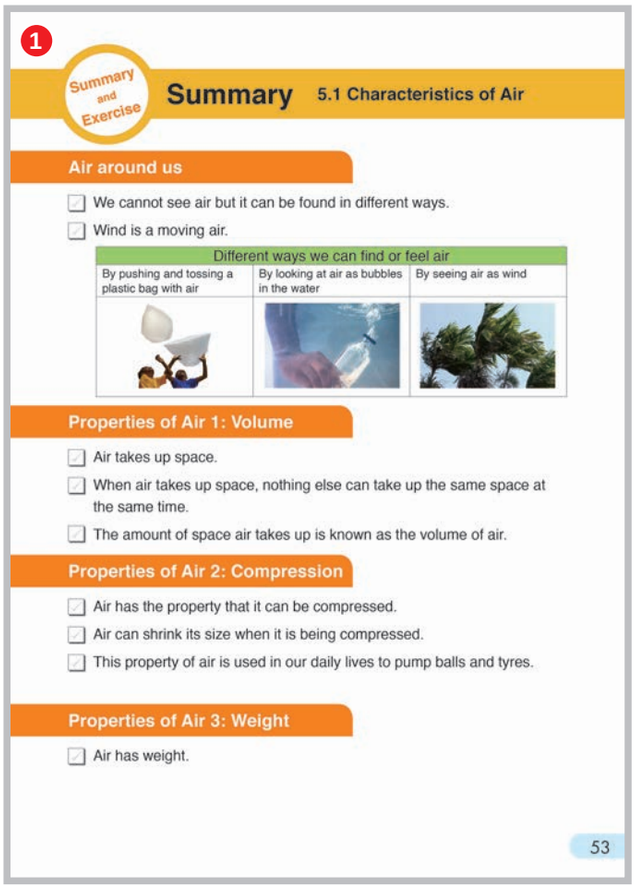
Q:What are some ways that air can be seen?
Through the moving leaves of trees, a canoe sailing or even pushing or tossing an object. (e.g.: balloon, shopping plastic bags)

Q:What will happen if there are two balloons weighing on a balance and one balloon is prick with a needle? The balance will tilt towards the inflated one. (One that is not prick) Explain why? Because the balloon has air inside it and is heavier than the other pricked balloon.

- Explain and correct learning contents again if they still have misconception

### 2 Exercise & Explanation (30 min.)

- Go through with the students the instructions of the exercise.
  Question 1: Filling in Blanks
  Question 2: Multiple Choices
  Question 3: Short Answer items
  Question 4: Comprehension items
- Allow students enough time to answer the questions individually according to their understanding.
- After the test, provide the answers of the questions to the students and explain how to solve using their scientific knowledge.



1

Summary and Exercise

**Summary** 5.1 Characteristics of Air

**Air around us**

- We cannot see air but it can be found in different ways.
- Wind is a moving air.

Different ways we can find or feel air

| By pushing and tossing a plastic bag with air | By looking at air as bubbles in the water | By seeing air as wind |
|---|---|---|

**Properties of Air 1: Volume**

- Air takes up space.
- When air takes up space, nothing else can take up the same space at the same time.
- The amount of space air takes up is known as the volume of air.

**Properties of Air 2: Compression**

- Air has the property that it can be compressed.
- Air can shrink its size when it is being compressed.
- This property of air is used in our daily lives to pump balls and tyres.

**Properties of Air 3: Weight**

- Air has weight.

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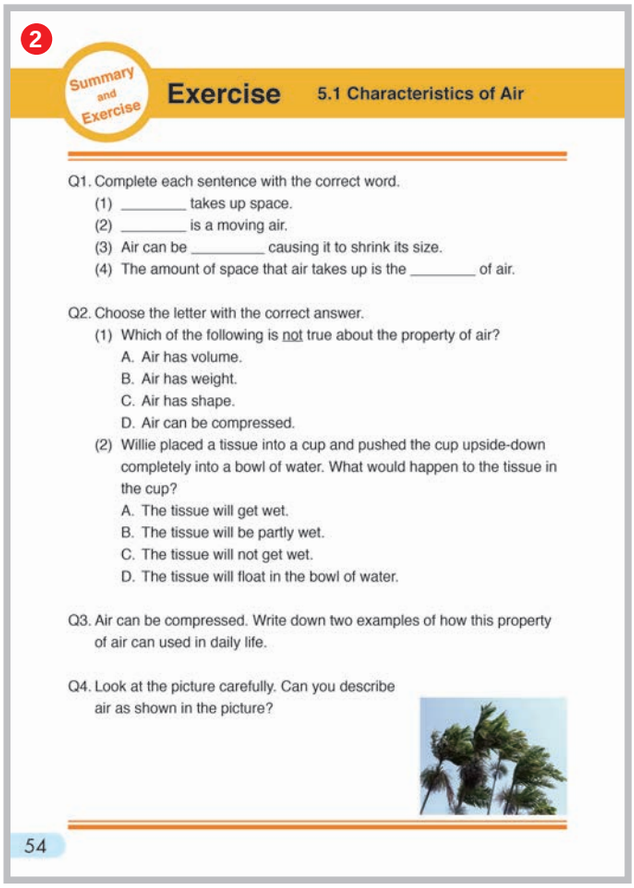

2

Summary and Exercise

**Exercise** 5.1 Characteristics of Air

Q1. Complete each sentence with the correct word.
(1) _____ takes up space.
(2) _____ is a moving air.
(3) Air can be _____ causing it to shrink its size.
(4) The amount of space that air takes up is the _____ of air.

Q2. Choose the letter with the correct answer.
(1) Which of the following is not true about the property of air?
A. Air has volume.
B. Air has weight.
C. Air has shape.
D. Air can be compressed.
(2) Willie placed a tissue into a cup and pushed the cup upside-down completely into a bowl of water. What would happen to the tissue in the cup?
A. The tissue will get wet.
B. The tissue will be partly wet.
C. The tissue will not get wet.
D. The tissue will float in the bowl of water.

Q3. Air can be compressed. Write down two examples of how this property of air can used in daily life.

Q4. Look at the picture carefully. Can you describe air as shown in the picture?

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## Exercise answers

Q1.
(1) **Air**
(2) **Wind**
(3) **compressed**
(4) **volume**
The property of air which can be compressed is often used in our daily lives for examples; bicycle pump, balloon, tyre and a ball.

Q2.
(1) **C**
Air takes up space. Air can be compressed. Air has weight. But air has no fixed shape.
(2) **C**
When a cup is put upside down completely into the bowl of water, air takes up space in the cup. Water cannot go into the cup because air and water cannot occupy the same space at the same time. Therefore the piece of tissue was dry.

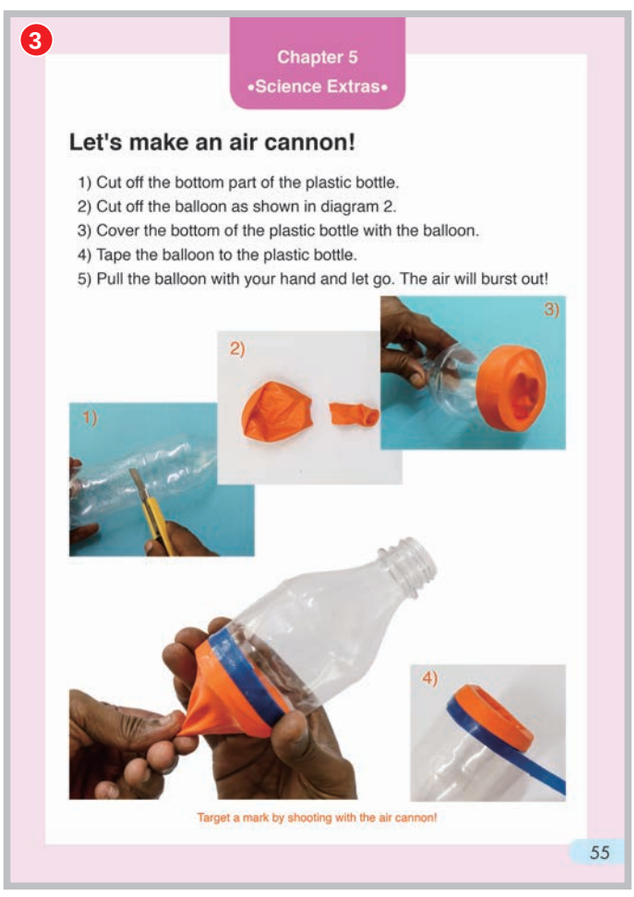
Q3. **Pump for a tyre, balloon and ball**

Q4. **(Example of answer)**
**Air can be seen through the moving leaves of the palm tree.**

**Explanation of Science Extras**

### 3 Science Extras (15 min.)

- Give opportunities to students to closely observe the nature and its phenomena in the world.
- Allow students to ask questions that demonstrate curiosity about the content in the science extras.
- Give enough time to students to make an air cannon and play with it.

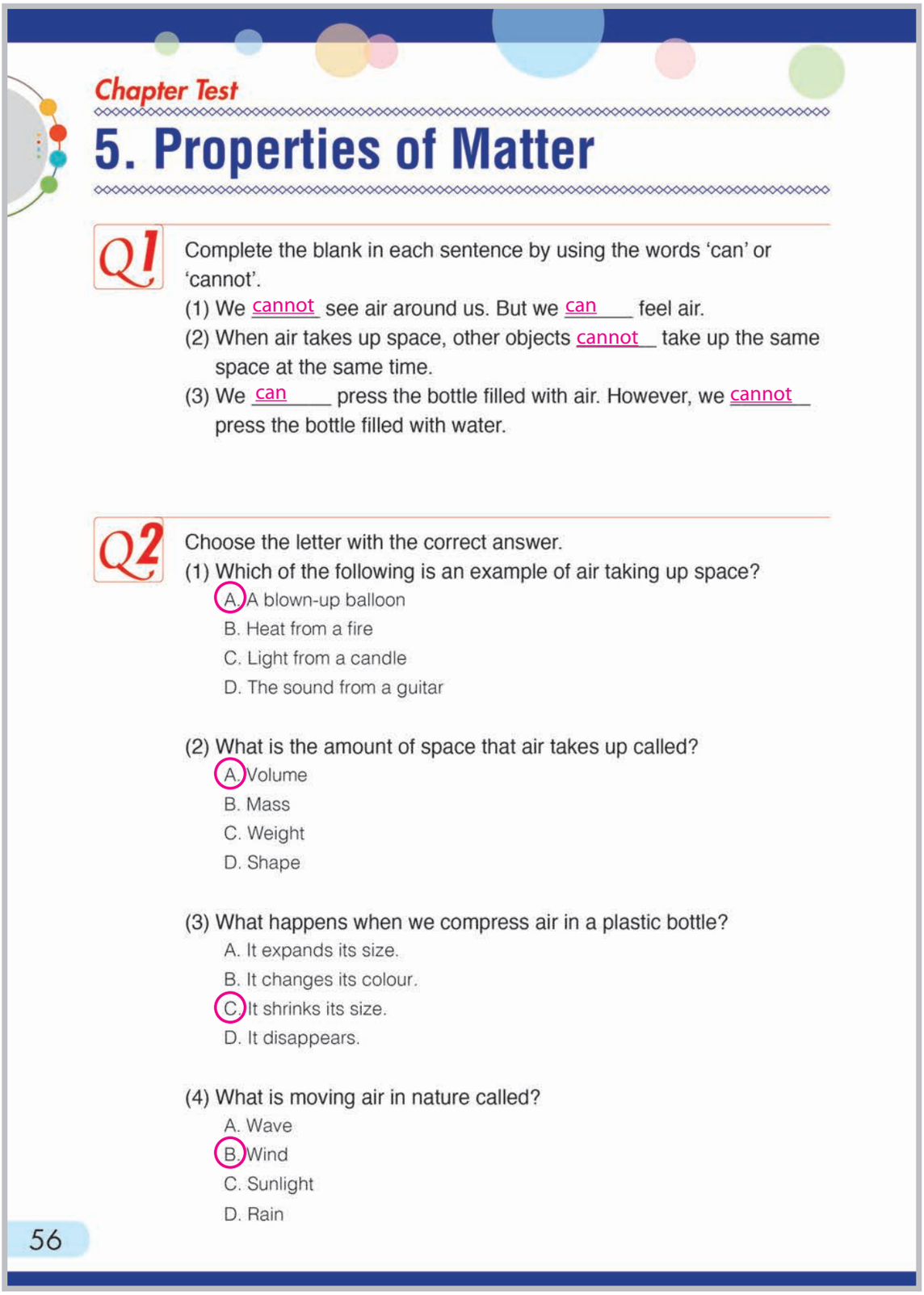


**Lesson**
**6 / 6**

**Lesson Title**

# Chapter Test

**Answer of the Chapter Test**



*Chapter Test*

## 5. Properties of Matter

**Q1** Complete the blank in each sentence by using the words 'can' or 'cannot'.

(1) We cannot see air around us. But we can feel air.
(2) When air takes up space, other objects cannot take up the same space at the same time.
(3) We can press the bottle filled with air. However, we cannot press the bottle filled with water.

**Q2** Choose the letter with the correct answer.

(1) Which of the following is an example of air taking up space?
A. A blown-up balloon
B. Heat from a fire
C. Light from a candle
D. The sound from a guitar

(2) What is the amount of space that air takes up called?
A. Volume
B. Mass
C. Weight
D. Shape

(3) What happens when we compress air in a plastic bottle?
A. It expands its size.
B. It changes its colour.
C. It shrinks its size.
D. It disappears.

(4) What is moving air in nature called?
A. Wave
B. Wind
C. Sunlight
D. Rain

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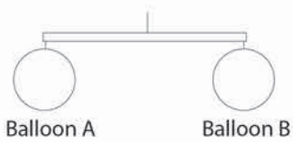
**Q3** Steven hung two balloons of similar sizes on each end of a balance as shown in the diagram.




(1) What would happen to the balance if balloon B is pricked with a pin?

The balance will tilt downwards, towards the side that balloon A is hanging.

(2)Explain the reason for the above answer.

Because the air contained in the balloons has weight. Once balloon B is pricked, it would burst and the air would escape. This makes balloon B lighter than balloon A.

**Q4** How can we find air around us?

(1) Suggest ways of how to feel air.

We can feel air by tossing, pushing and moving a plastic bag with air. We can also feel air on our face as a wind when we go outside, run fast or use a fan.

(2) Suggest ways of how to find air.

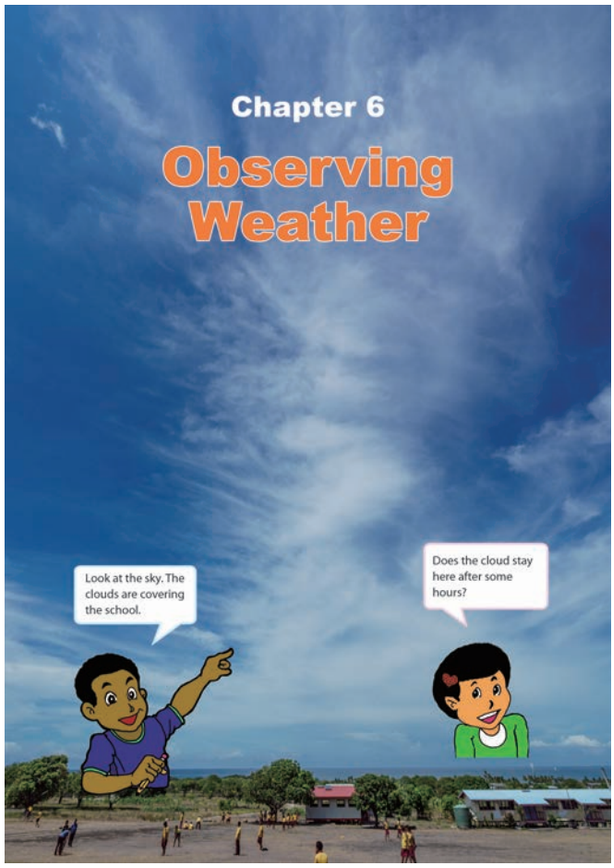
We can see air in water as bubbles when the cap of plastic bottle filled with air is unscrewed. Air escapes to the surface of the water as bubbles.

Strand : EARTH AND SPACE
Unit : WEATHER and CLIMATE

# Chapter 6. Observing Weather

## Chapter Objectives

Students will be able to understand the weather descriptions and changes in the sky through observation.




The picture at the chapter heading in the textbook shows a kind of cloud often seen in the sky (cirrus cloud).

## Topic Objectives

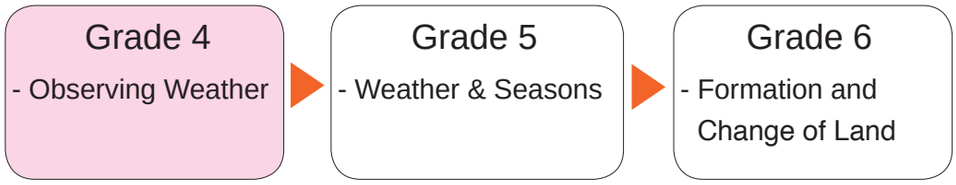
### 6.1 Weather Descriptions and Changes

Students will be able to;

- State what weather is.
- Explain how weather can be measured.
- Idenfify how weather affects people.

## Related Learning Contents

The learning contents in this chapter connect to the following chapters.




## Teaching Overview

This chapter consists of 5 lessons, each lesson is a double period.

| Topic | Lesson No. | Lesson Title and Key Question | Content standard in syllabus | Textbook page number |
|---|---|---|---|---|
| 6.1 Weather Descriptions and Changes | 1 | **Change in the Sky**<br>How does the sky change from day to day? | 4.3.2 | 59 - 60 |
| | 2 | **Measuring Weather**<br>How can we measure weather? | | 61 - 62 |
| | 3 | **Weather and People**<br>How do people change with weather in their daily lives? | | 63 - 64 |
| | 4 | Summary and Exercise | | 65 - 67 |
| Chapter Test | 5 | Chapter Test | | 68 - 69 |

| Unit | Chapter : **6. Observing Weather** | Total lesson No: 20 / 97 |
|---|---|---|
| **Weather and Climate** | Topic : **6.1. Weather Descriptions and Changes** | Textbook page: 59 - 60 |

**Lesson** 1 / 5

**Lesson Title**

# Change in the Sky

**Preparation**

• Observation chart
(See sample in Teacher's note)

## Lesson Flow

**1 Introduction (10 min.)**

- Ask students to look at the sky and ask following questions;

Q:What do you see in the sky?

Q:Does the sky always look the same every day?

**2 Introduce the key question**

How does the sky change from day to day?

**3 Activity (20 min.)**

- Prior to this lesson, students have already observed and recorded the sky conditions for the past four days.(Note: If students did not observe the sky conditions, ask them to recall and record the sky conditions for the past four days in the table.)
- Organise students into groups.
- Explain the steps of the activity.
- Before students go outside, remind them not to look directly at the sun.
- Allow students to go outside, observe the sky and record the sky condition.
- Provide enough time for them to complete their activity.

**4 Discussion for findings (20 min.)**

- Ask students to present their findings about the sky conditions observed for five days. **(Continue)**


## Teacher's Notes

1. Observations of the sky conditions must be done four days prior to this lesson.
2. Teacher should prepare a chart to keep record of the observations done for the past four days to confirm against students observation result.
3. If possible, give an opportunity to students to observe the sky conditions throughout a day.

Example of an Observation Table:

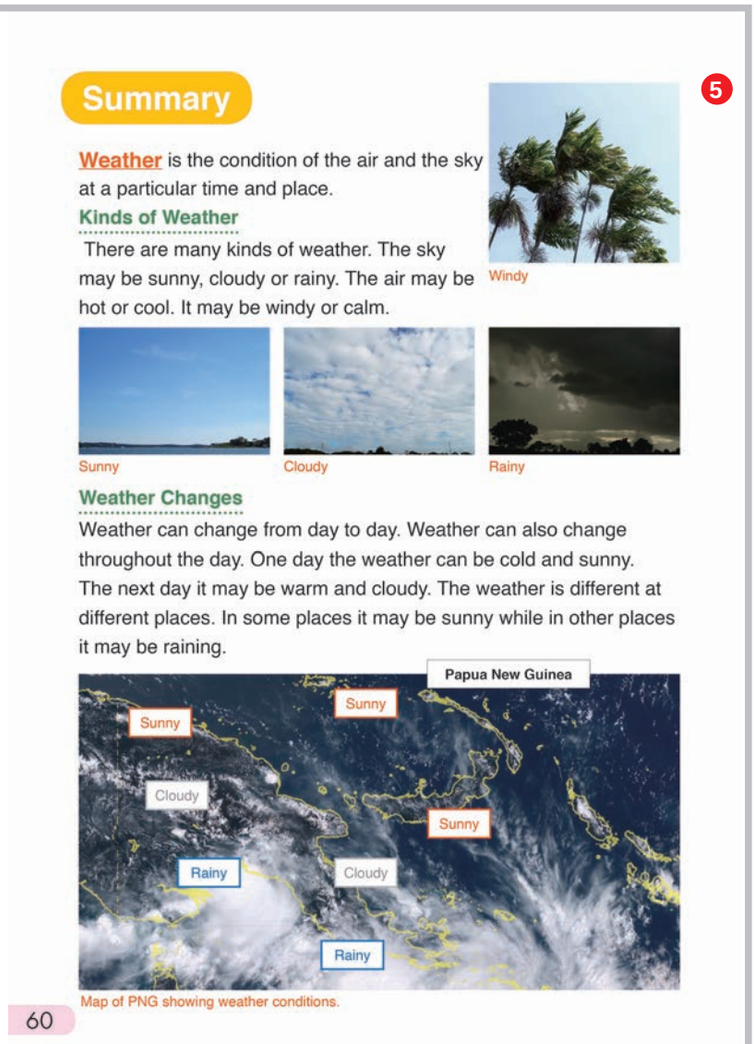
| Date & Time | April 20 at 9:30 | April 21 at11:00 | April 22 at13:45 | April 23 at14:35 | April 24 at 10:30 (Today) |
|---|---|---|---|---|---|
| Sky condition | Sunny, no cloud in the sky | There are some clouds. Cloud moves faster. | All sky is covered with cloud | All sky is covered with cloud and it rains | Sunny, No cloud in the sky |

## Lesson Objectives

Students will be able to:
- Define of weather.
- Describe the different kinds of weather.
- Observe the changes in the sky conditions.

## Assessment

Students are able to:
- Explain that weather is the condition of the air and the sky.
- State the different types of weather conditions such as sunny, cloudy, windy or rainy.
- Compare the changes in the sky conditions in the table.
- Develop curiosity when observing the sky conditions.



Summary

**Weather** is the condition of the air and the sky at a particular time and place.

**Kinds of Weather**

There are many kinds of weather. The sky may be sunny, cloudy or rainy. The air may be hot or cool. It may be windy or calm.

Windy

Sunny Cloudy Rainy

**Weather Changes**

Weather can change from day to day. Weather can also change throughout the day. One day the weather can be cold and sunny. The next day it may be warm and cloudy. The weather is different at different places. In some places it may be sunny while in other places it may be raining.



Map of PNG showing weather conditions.

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- Write down students' findings on a blackboard.
- **Based on their findings,** asks the following questions:

Q:What do you find from your results?
(e.g. Sky conditions change every day. The amount of cloud is different while at some days. Cloud moves faster, etc)

Q:What types of the sky conditions can you find? (Sunny, cloudy, rainy, windy)

Q:Do you think the sky conditions change during the day? Why do you think so? (e.g. "Yes", because it can be sunny in the morning and rainy in the afternoon. "No", because it is fine all day today.)

- Summarise the discussion.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard. (Refer to 'Blackboard Plan')
- Ask these questions as assessment:
  Q: What is the weather?
  Q: What kinds of weather can be observed?
  Q: How does weather change?
- Ask students to copy the notes on the blackboard into their exercise books.

## Sample Blackboard Plan

Title:
"Change in the Sky"

Key question
How does the sky change from day to day?

Activity: Observing the sky conditions

| Date & Time | | | | | Today |
|---|---|---|---|---|---|
| Sky conditions | | | | | |

→ Refer to "Example of an Observation Table" in the page 72.

Discussion
Q: What do you find from your results? (e.g. Sky conditions change every day. The amount of cloud is different while at some days. Cloud moves faster, etc)
Q: What kind of the sky conditions can you find? (sunny, cloudy, rainy, windy)
Q: Do you think the sky conditions change during the day? Why do you think so? (e.g. "Yes", because it can be sunny in the morning and rainy in the afternoon. "No", because it is fine all day today.)

Summary
Weather: The conditions of the air and the sky at a particular time and place.
1. Types of Weather
- Weather can be sunny, cloudy, or rainy.
- Weather also can be described hot, cold, windy or calm.

2. Weather Changes
- Weather can change:
  ✓ From day to day
  ✓ Throughout a day
- Weather is different in different places at different times.

| Unit | Chapter / Topic | |
|---|---|---|
| **Weather and Climate** | Chapter : **6. Observing Weather**<br>Topic : **6.1. Weather Descriptions and Changes** | Total lesson No: 21 / 97<br>Textbook page: 61 - 62 |

**Lesson** 2 / 5

**Lesson Title**

# Measuring Weather

**Preparation**

- Thermometer, measuring cup, ruler

## Lesson Flow

**1 Introduction (10 min.)**

- Recap the previous lesson.

Q:What types of weather are there?
Q: How does weather change?

**2 Introduce the key question**

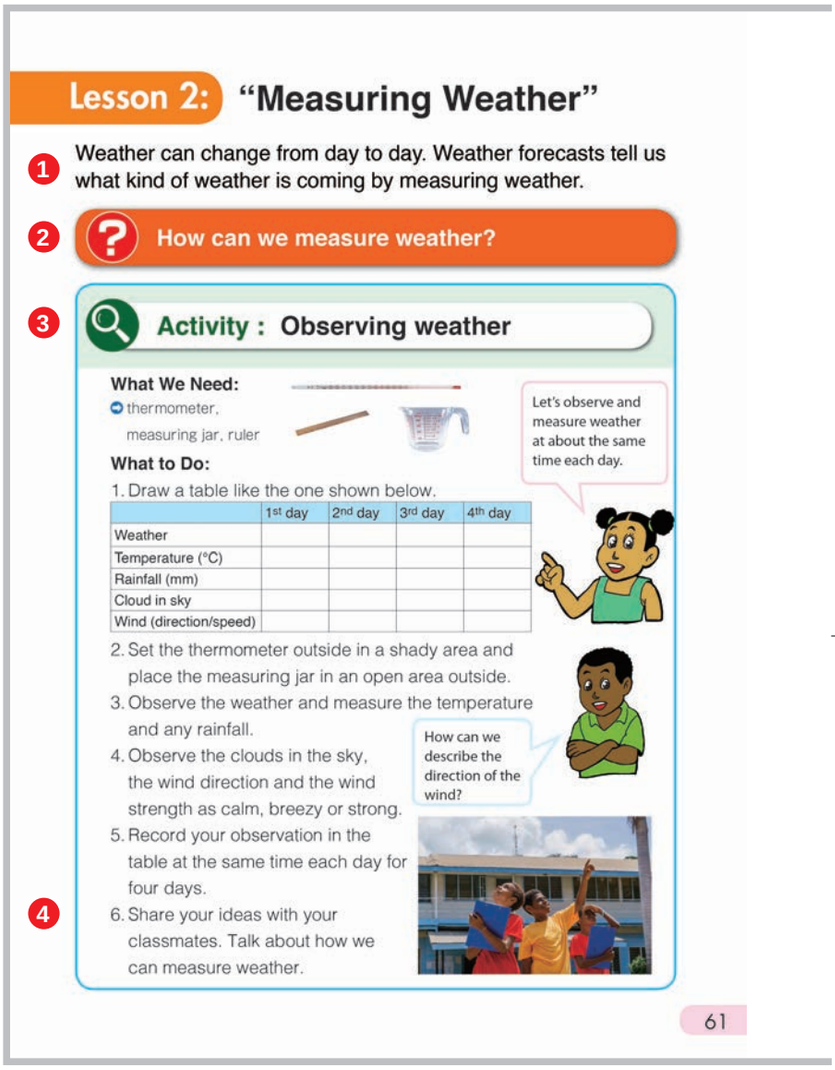
How can we measure weather?

**3 Activity (20 min.)**

- Explain the steps of the activity.
- Show students the measuring instruments (thermometer and measuring cup), and explain how to use this. (Refer to 'Teacher's Notes' on this page.)
- The way to observe clouds in the sky is "How much % of the sky is covered by clouds".
- Ask students to observe the weather and cloud, measure the temperature, rainfall and wind at a particular time (e.g. 10:00AM) each day for four days, and record their findings in the table.
- STOP THE LESSON HERE! Deliver 'Lesson 3: Weather and People' first and continue with this lesson after the last observation.

**4 Discussion for findings (20 min.)**

- Ask students to present their results of the observation about the weather conditions measured for four days. **(Continue)**



Lesson 2: "Measuring Weather"

1 Weather can change from day to day. Weather forecasts tell us what kind of weather is coming by measuring weather.

2 How can we measure weather?

3 Activity : Observing weather

What We Need:
thermometer,
measuring jar, ruler

Let's observe and measure weather at about the same time each day.

What to Do:

1. Draw a table like the one shown below.

| | 1st day | 2nd day | 3rd day | 4th day |
|---|---|---|---|---|
| Weather | | | | |
| Temperature (°C) | | | | |
| Rainfall (mm) | | | | |
| Cloud in sky | | | | |
| Wind (direction/speed) | | | | |

2. Set the thermometer outside in a shady area and place the measuring jar in an open area outside.
3. Observe the weather and measure the temperature and any rainfall.
4. Observe the clouds in the sky, the wind direction and the wind strength as calm, breezy or strong.
5. Record your observation in the table at the same time each day for four days.
6. Share your ideas with your classmates. Talk about how we can measure weather.

How can we describe the direction of the wind?

4

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## Teacher's Notes

- Before conducting the activity, review "How to Use the Thermometer". (Refer to page 237 in the textbook)
- The followings are some tips for measuring rainfall and making a wind vane.

**How to Measure Rainfall**

1. Use a container that has a flat surface.
2. Put the container in an open area outside where it can collect water 1 hour before measuring rainfall.
3. When rain collects in the container, put a ruler and measure the height of rainfall in the container
4. After measuring rainfall, pour away water in the container. Measure the rainfall again on the next day.

**How to Make Wind Vane**

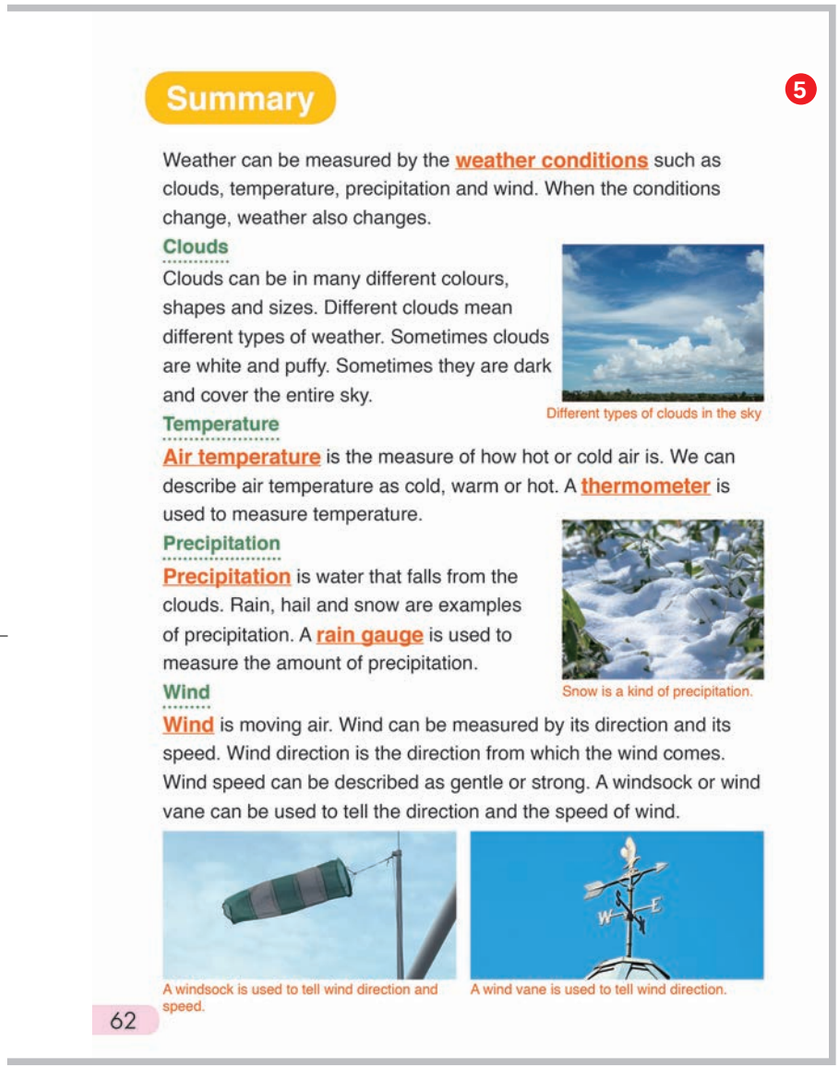
1. Cut a slit in each end of a drinking straw.
2. Cut thick paper into a triangle and a square. Stick the triangle and square into the slots on the straw.
3. Stick a pencil through the bottom of a paper cup.
4. Push the pin through the centre of the straw and attach it to the top of the pencil eraser.
5. Take your wind vane outside and find "North" direction with a compass.
6. If the triangle is pointing west, the wind is blowing from west to east.

## Lesson Objectives

Students will be able to:
- Explain how weather can be measured.
- Measure the weather conditions using appropriate measuring instruments.
- Understand the relationship between changes in weather and change in the weather conditions.

## Assessment

Students are able to:
- State the types of weather conditions.
- Explain how to measure temperature, precipitation and wind.
- Record the observation of weather conditions in the table.
- Relate the change in weather to the change in weather conditions based on the results of the activity.



Summary

Weather can be measured by the **weather conditions** such as clouds, temperature, precipitation and wind. When the conditions change, weather also changes.

**Clouds**

Clouds can be in many different colours, shapes and sizes. Different clouds mean different types of weather. Sometimes clouds are white and puffy. Sometimes they are dark and cover the entire sky.

Different types of clouds in the sky

**Temperature**

**Air temperature** is the measure of how hot or cold air is. We can describe air temperature as cold, warm or hot. A **thermometer** is used to measure temperature.

**Precipitation**

**Precipitation** is water that falls from the clouds. Rain, hail and snow are examples of precipitation. A **rain gauge** is used to measure the amount of precipitation.

Snow is a kind of precipitation.

**Wind**

**Wind** is moving air. Wind can be measured by its direction and its speed. Wind direction is the direction from which the wind comes. Wind speed can be described as gentle or strong. A windsock or wind vane can be used to tell the direction and the speed of wind.

A windsock is used to tell wind direction and speed.

A wind vane is used to tell wind direction.

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- Confirm their results of observation if the results vary.
- **Based on their findings,** asks the following questions.

Q:How has weather changed for the past four days? (Answers will depend on results.)

Q:How have temperature, rainfall, cloud and wind changed for four days? (Answer will depends on results.)

Q:What relationship did you find between weather and temperature, rainfall, cloud cover and wind? (When weather changes, temperature, rainfall, cloud cover and wind also change.)

Q:How can we measure weather? (By measuring temperature, rainfall, cloud cover and wind)

- Summarise the discussion.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard. (Refer to 'Blackboard Plan')
- Ask these questions as assessment:
  Q: How can we measure weather?
  Q: What kinds of weather conditions are there?
  Q: How can we measure temperature, precipitation, and wind?
  Q: What happens to the weather when the conditions change?
- Ask students to copy the notes on the blackboard into their exercise books.

## Sample Blackboard Plan

Title:

"Measuring Weather"

Key question

How can we measure weather?

Activity: Observing Weather

| Day | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Weather | Sunny | Cloud | ... | ... |
| Temperature (°C) | 28°C | 22°C | ... | ... |
| Rainfall (mm) | 0 | 0 | ... | ... |
| Cloud in Sky (%) | 10% | 80% | ... | ... |
| Wind (direction / speed) | East / strong | North / calm | ... | ... |

Discussion

Q: How has weather changed for four days? (Answer will depends on results.)

Q: How have temperature, rainfall, cloud and wind changed for four days? (Answer will depends on results.)

Q: What relationship did you find between weather and temperature, rainfall, cloud and wind? When weather changes, temperature, rainfall, cloud and wind also change.

Q: How can we measure weather? By measuring temperature, rainfall, cloud and wind

Summary

- Weather can be measured by weather conditions
- Weather conditions are clouds, temperature, precipitation, and wind.

How to measure weather conditions

- Temperature: Thermometer
- Rainfall: Rain gage
- Wind: Windsock or Wind vane

When the weather conditions change, weather also changes.

| Unit | Chapter / Topic | |
|---|---|---|
| **Weather and Climate** | Chapter : **6. Observing Weather**<br>Topic : **6.1. Weather Descriptions and Changes** | Total lesson No: 22 /97<br>Textbook page: 63 - 64 |

**Lesson** 3 / 5

**Lesson Title**

# Weather and People

**Preparation**

- Nil

## Lesson Flow

**1 Introduction (10 min.)**

- Revise the previous lesson;

Q:What instruments are used for measuring weather?

Q:What happens to the weather if its conditions change?

Q:How can we describe weather?

**2 Introduce the key question**

How do people change with weather in their daily lives?

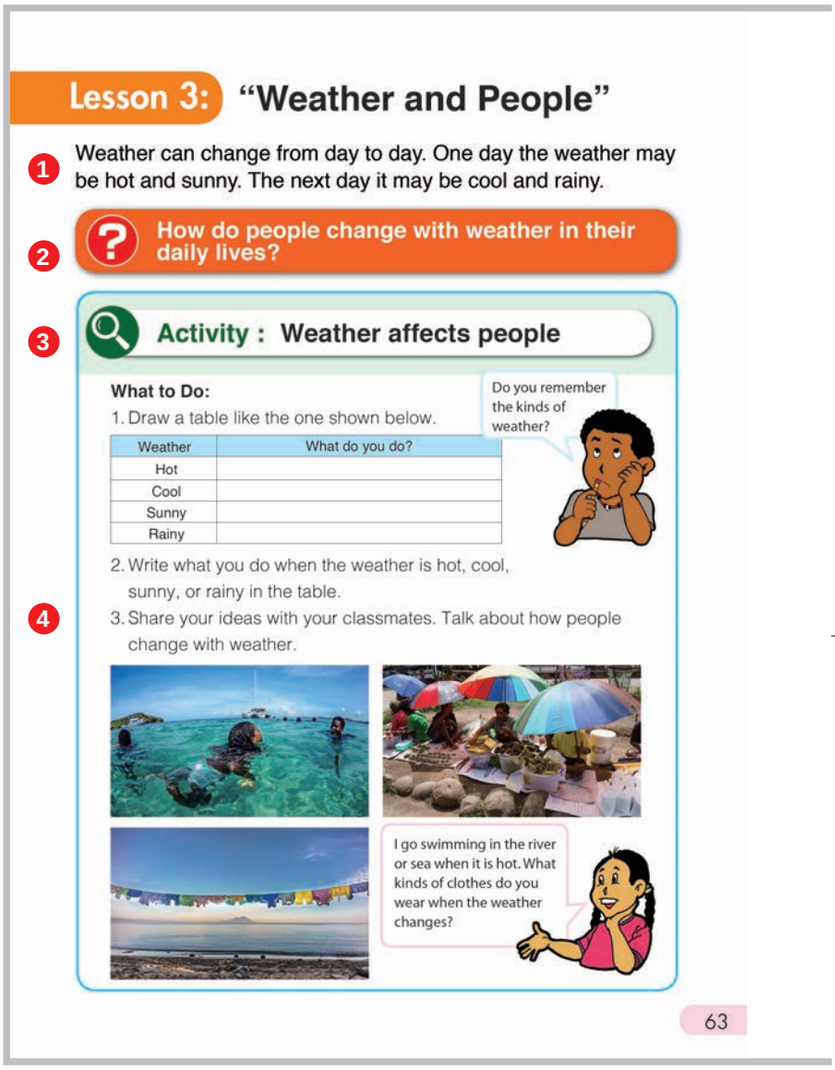
**3 Activity (20 min.)**

- Organise students to work in groups.
- Explain the steps of the activity.
- Make sure that students make a table in their exercise book and write their ideas in the table.
- Ask students to do the activity.
- Advise students to refer to the pictures and characters' talking in the activity for their investigation.
- Facilitate students writing their ideas as many as possible based on their experiences.
- Give enough time for students to do their findings through the activity

**4 Discussion for findings (20 min.)**

- Ask students to present their findings from their activity.
- Write down students' findings on the blackboard.

**(Continue)**




## Teacher's Notes

Weather and Seasons

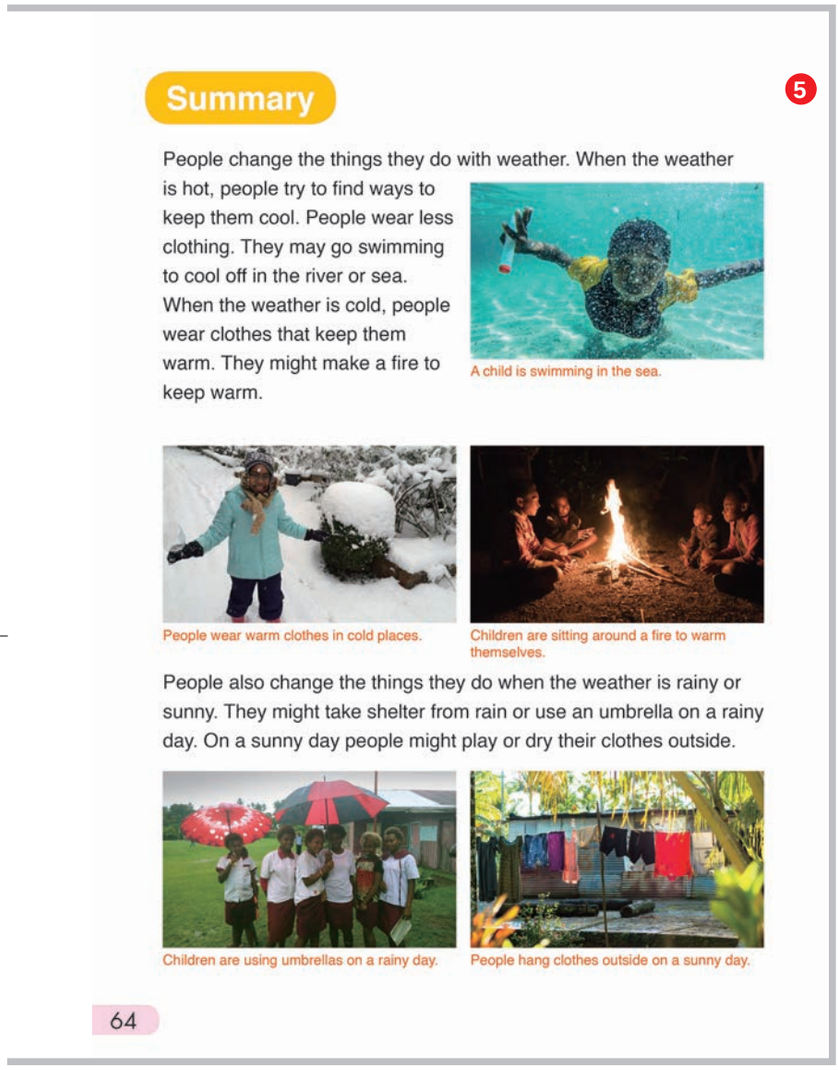
- **Weather** is the daily state of the atmosphere, or air, in any given place. **Seasons** are the periods of the year characterised by the particular weather patterns.
- In Papua New Guinea, basically there are two seasons such as dry and wet seasons. In other parts of the world they experience different seasons such as spring, summer, autumn and winter.
- Seasons also affect human's activities in many ways.
  1. Spring: People replant crops, and change the types of clothes, etc.
  2. Summer: People go swimming, wear less clothes and go outside to leisure activities.
  3. Autumn: People harvest crops and fruits, wear more clothes, etc.
  4. Winter: People wear more clothes to keep them warm, use more heat energy to warm them, etc.
- **Students will study about "Seasons" in Grade 5. This lesson should focus only on 'Weather'.**

## Lesson Objectives

Students will be able to:
- Identify how weather affects people.
- Explain the relationship between weather events and people's activities.

## Assessment

Students are able to:
- List some examples of how people change their activities or things in their daily lives with changes in different weather conditions.
- Explain how weather affects people's activities.
- Listen to opinion of others with respect.



Summary

People change the things they do with weather. When the weather is hot, people try to find ways to keep them cool. People wear less clothing. They may go swimming to cool off in the river or sea. When the weather is cold, people wear clothes that keep them warm. They might make a fire to keep warm.

A child is swimming in the sea.

People wear warm clothes in cold places.

Children are sitting around a fire to warm themselves.

People also change the things they do when the weather is rainy or sunny. They might take shelter from rain or use an umbrella on a rainy day. On a sunny day people might play or dry their clothes outside.

Children are using umbrellas on a rainy day.

People hang clothes outside on a sunny day.

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- **Based on their findings,** ask the following questions.

Q:What do you do when the weather is hot or cold? (Hot: Change the type of clothes, go swimming in a river or oceans, etc. Cold: Change the type of clothes, make a fire to get warm, etc.)

Q:What do you do when the weather is sunny or rainy? (Sunny: Play outside, dry our clothes outside, etc. Rainy: Use an umbrella, shelter from rain, etc.)

Q: Do you have any ideas on what to do when the weather is windy? (Sail a boat, etc.)

Q:How does weather affect people? (Weather makes people change their activities.)

- Summarise the discussion.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard. (Refer to 'Blackboard Plan')
- Ask these questions as assessment:
  Q: Give some examples of what people do when weather is hot, cold, sunny and rainy
  Q: How does weather affect people?
- Ask students to copy the notes on the blackboard into their exercise books.

## Sample Blackboard Plan

Title:

"Weather and People"

Key question

How do people change with weather in their daily lives?

Activity Wheather affects people

| Weather | What do you do? |
|---|---|
| Hot | Wear less clothes, swimming etc |
| Cold | Wear more clothes, making fire to keep warm, etc |
| Sunny | Dry our clothes outside, etc. |
| Rainy | Use an umbrella, etc |

Discussion

Q: What do you do when the weather is hot or cold? E.g. Hot: Change the type of clothes, go swimming in a river, etc. Cold: Change the type of clothes, make a fire to get warm, etc.

Q: What do you do when the weather is sunny or rainy? E.g. Sunny: Play outside, dry our clothes outside, etc. Rainy: Use an umbrella, shelter from rain, etc.

Q: Do you have any ideas on what to do when the weather is windy? E.g. sail a boat, etc.)

Q: How does weather affect people? (Weather makes people change their activities.

Summary

- People change the things that they do with weather in many ways.

Example:

➤Hot day- go swimming, less clothes

➤Cold day- make fire to keep warm

➤Sunny day- dry our clothes outside,

➤Rainy day- Use an umbrella,

Weather affects people's activities in many ways.

Unit
**Weather and Climate**

Chapter : **6. Observing Weather**
Topic : **6.1. Weather Descriptions and Changes**

Total lesson No: 23 / 97
Textbook page: 65 - 67

**Lesson**
**4 / 5**

**Lesson Title**

# Summary and Exercise

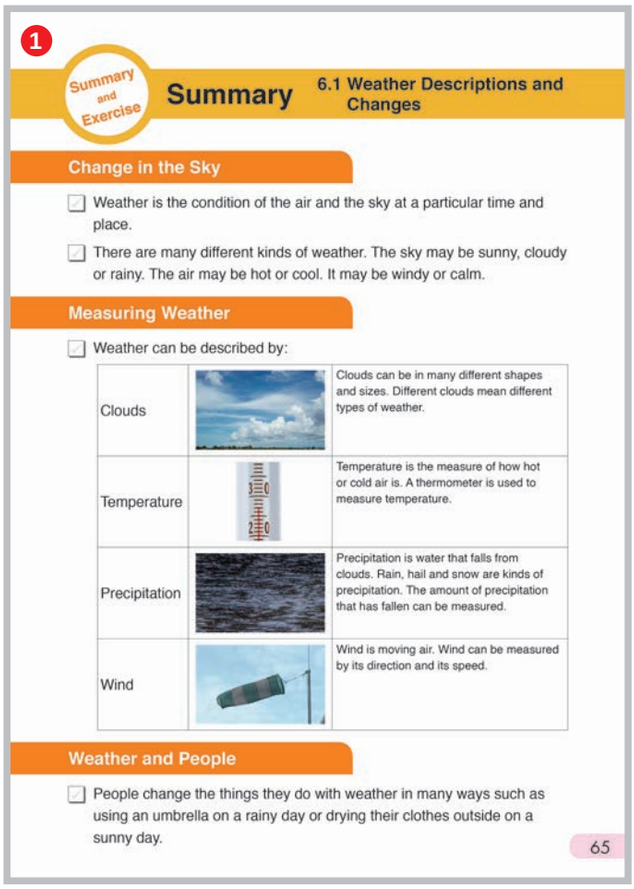
**Tips of lesson**

## 1 Summary (20 min.)

- Recap main learning contents in this topic.
- Ask some focus questions to students and verify student understanding.

Q:What is weather?
Q:What kinds are weather are experienced from day to day?
Q:How can we describe weather?

- Explain and correct learning contents again if they still have misconceptions.
- Provoke student to give some example of equipment that are used to measure weather.
- Ask students to give examples of some things people do during different weather conditions.



1

Summary and Exercise

**Summary** 6.1 Weather Descriptions and Changes

**Change in the Sky**

- Weather is the condition of the air and the sky at a particular time and place.
- There are many different kinds of weather. The sky may be sunny, cloudy or rainy. The air may be hot or cool. It may be windy or calm.

**Measuring Weather**

- Weather can be described by:

| | | |
|---|---|---|
| Clouds |  | Clouds can be in many different shapes and sizes. Different clouds mean different types of weather. |
| Temperature |  | Temperature is the measure of how hot or cold air is. A thermometer is used to measure temperature. |
| Precipitation |  | Precipitation is water that falls from clouds. Rain, hail and snow are kinds of precipitation. The amount of precipitation that has fallen can be measured. |
| Wind |  | Wind is moving air. Wind can be measured by its direction and its speed. |

**Weather and People**

- People change the things they do with weather in many ways such as using an umbrella on a rainy day or drying their clothes outside on a sunny day.

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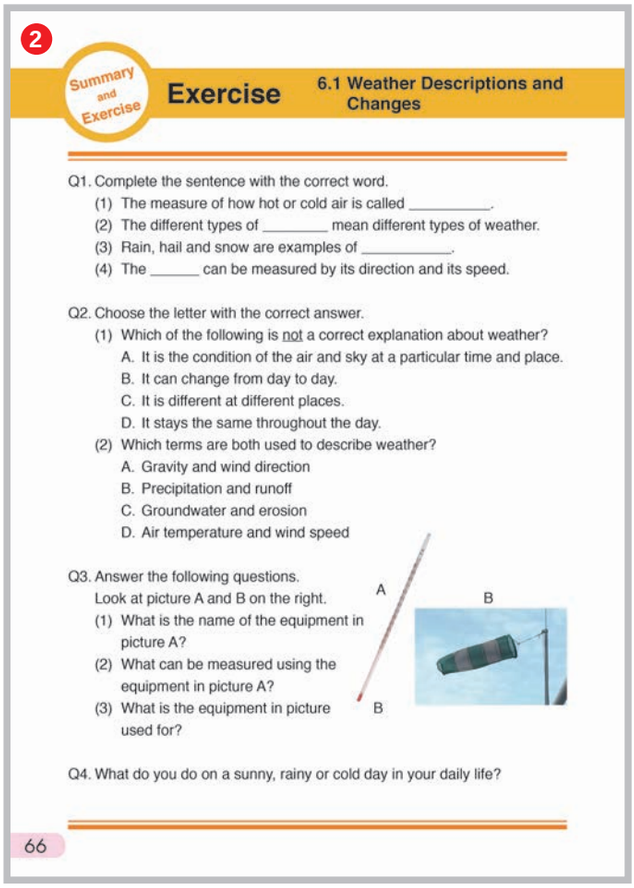
## 2 Exercise & Explanation (30 min.)

- Explain to students that they will have to answer all the parts of four (4) questions in the exercise even if they are not completely sure of the answer(s).
- Tell students;
  - that if they come across a difficult question, they should skip it and move on to the next question.
  - not to spend too much time on the difficult question(s).
  - that if there some time at the end of the exercise, they can come back and try to answer the difficult question(s).
- Allow student to enough time to answer the questions individually according to understanding.
- After the test, use student's answers to answer the questions.
- Explain how to solve the answer using the students' thoughts.



2

Summary and Exercise

**Exercise** 6.1 Weather Descriptions and Changes

Q1. Complete the sentence with the correct word.
(1) The measure of how hot or cold air is called _____.
(2) The different types of _____ mean different types of weather.
(3) Rain, hail and snow are examples of _____.
(4) The _____ can be measured by its direction and its speed.

Q2. Choose the letter with the correct answer.
(1) Which of the following is not a correct explanation about weather?
A. It is the condition of the air and sky at a particular time and place.
B. It can change from day to day.
C. It is different at different places.
D. It stays the same throughout the day.
(2) Which terms are both used to describe weather?
A. Gravity and wind direction
B. Precipitation and runoff
C. Groundwater and erosion
D. Air temperature and wind speed

Q3. Answer the following questions.
Look at picture A and B on the right.
(1) What is the name of the equipment in picture A?
(2) What can be measured using the equipment in picture A?
(3) What is the equipment in picture used for?

A B



Q4. What do you do on a sunny, rainy or cold day in your daily life?

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## Exercise answers

Q1.
(1) **Temperature**
(2) **Clouds**
(3) **Precipitation**
(4) **Wind**
(1) Air temperature can be described as cold, warm or hot.
(2) Different clouds mean different types of weather. Sometimes clouds are white and puffy and sometimes they can be dark and cover the entire sky.
(3) Precipitation is falls from clouds. Rain, hail and snow are kinds of precipitation.
(4) Wind is moving air. Wind can be measured by its direction (North/South/East/West) and its speed (calm or strong).

Q2.
(1) **D**
(2) **D**
(1) Weather doesn't stay the same throughout the day; weather can change throughout the day.
(2) Air temperature and wind speed are both used to describe the weather.

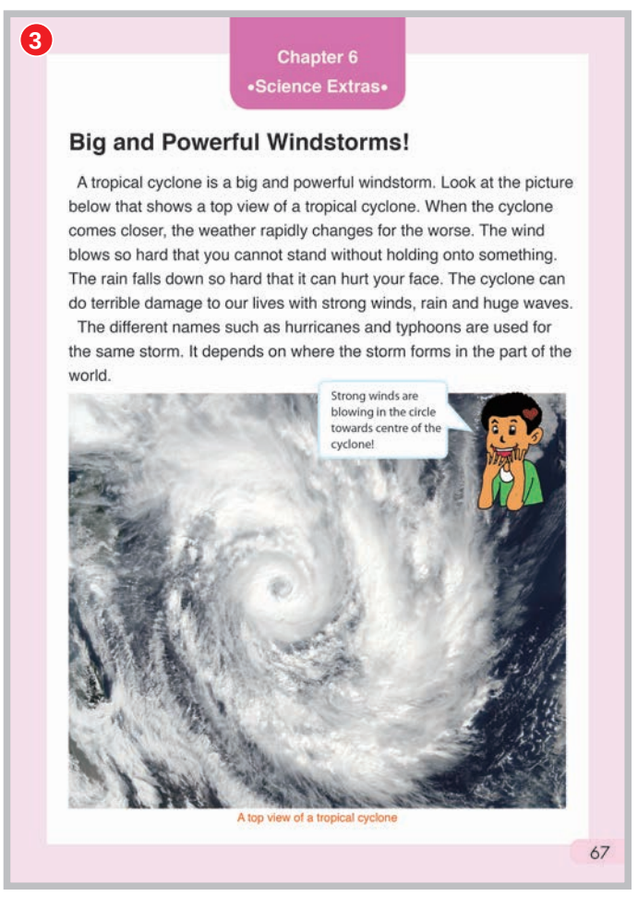
Q3.
(1) **Thermometer**
(2) **temperature**
(3) **It is used to measure strength and direction of wind**
(2) Picture B is called windsock.

Q4.
**Example of the answer:**
**People change the things that they do with weather in many ways.**
- **On a sunny day people can go swimming, go to the market or garden, and play outdoor sports.**
- **On a rainy day people use umbrella to cover themselves from getting wet, stay indoors.**
- **On a cold day people wear warm clothes and sit by a fire place to keep warm.**

**Explanation of Science Extras**

### 3 Science Extras (10 min.)

- Give opportunities to students to closely observe the nature and its phenomena in the world.
- Allow students to ask questions that demonstrate curiosity about the content in the science extra.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Chapter 6
•Science Extras•

**Big and Powerful Windstorms!**

A tropical cyclone is a big and powerful windstorm. Look at the picture below that shows a top view of a tropical cyclone. When the cyclone comes closer, the weather rapidly changes for the worse. The wind blows so hard that you cannot stand without holding onto something. The rain falls down so hard that it can hurt your face. The cyclone can do terrible damage to our lives with strong winds, rain and huge waves.

The different names such as hurricanes and typhoons are used for the same storm. It depends on where the storm forms in the part of the world.



A top view of a tropical cyclone

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**Lesson**
**5 / 5**

**Lesson Title**

# Chapter Test

**Answer of the Chapter Test**

*Chapter Test*

## 6. Observing Weather

**Q1** Complete each sentence with the correct word.

(1) Weather is the condition of the _____air_____ and the _____sky_____ at a particular time and place.

(2) Weather conditions can be described by clouds, _____temperature_____, precipitation and wind.

(3) When the weather is _____hot_____, people wear less clothes.
When the weather is _____cold_____, people wear more clothes.

**Q2** Choose the letter with the correct answer.

(1) What equipment is used to measure air temperature?

A. A rain gauge
B. A thermometer
C. A windsock
D. A wind vane

(2) What equipment is used to measure the amount of precipitation that has fallen?

A. A rain gauge
B. A thermometer
C. A windsock
D. A wind vane

(3) Which of the following is not an example of precipitation?

A. Clouds
B. Rain
C. Hail
D. Snow

(4) During which kind of weather will you most likely use an umbrella?

A. On windy day
B. On rainy day
C. On cloudy day
D. On cold day

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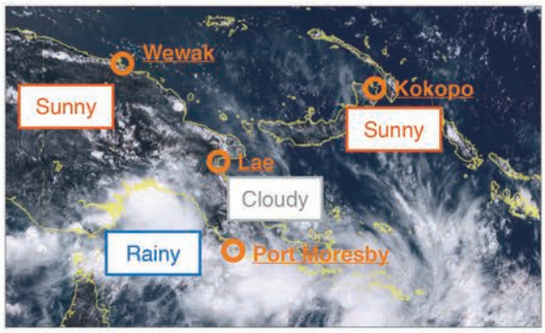
**Q3** Ahmed observed the clouds one day and saw that the clouds were puffy and white but after a few hours it turned grey. He predicted that the weather would become sunny later. Do you agree with Ahmed's prediction? What is your prediction?

Disagree. It might rain in a few minutes/ hours' time, because the clouds was getting darker as we normally have rain.

**Q4** The picture below shows the satellite map of PNG on a certain day. Answer the following questions.




(1) Which town or city is most likely sunny? Choose the town or city from the map.

Wewak and Kokopo

(2) In which city or town would people most likely need an umbrella? Choose the city or town from the map.

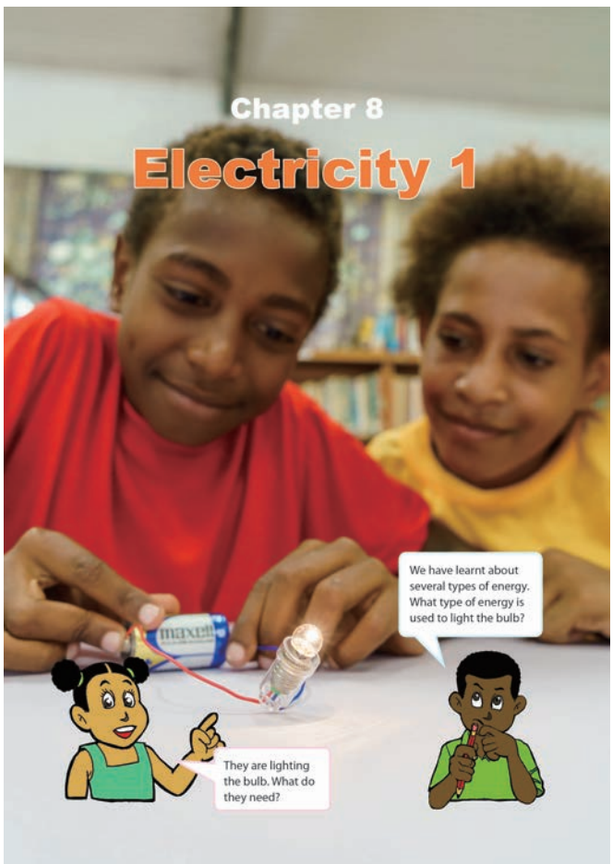
Port Moresby

Strand : PHYSICAL SCIENCE
Unit : ENERGY

# Chapter 8. Electricity 1

## Chapter Objectives

Students will be able to understand how electricity works in our lives and the functions of electricity through experiments to light a bulb using wires, a battery and a switch.




The picture at the chapter heading in the textbook shows an activity in which students light a bulb by using a dry cell.

## Topic Objectives

### 8.1 Electricity in Our Life

Students will be able to;

- Identify how electricity works and where it can be found.
- Describe the different kinds of sources of electricity.

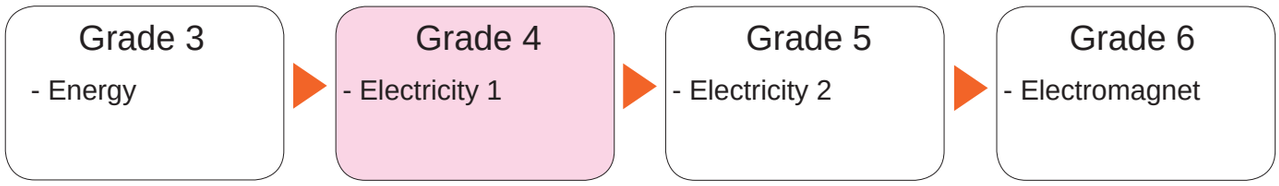
### 8.2 Function of Electricity

Students will be able to;

- Identify the correct way to light a bulb with a dry cell and wires.
- Explain that electric current flows through the closed circuit.
- Identify the characteristics of conductors and insulators.
- Describe the uses of a conductor and an insulator in daily life.

## Related Learning Contents

The learning contents in this chapter connect to the following chapters.




Prior knowledge for learning this chapter;

- Electricity is a form of energy.

## Teaching Overview

This chapter consists of 9 lessons, each lesson is a double period.

| Topic | Lesson No. | Lesson Title and Key Question | Content standard in syllabus | Textbook page number |
|---|---|---|---|---|
| 8.1 Electricity in Our Life | 1 | **Electricity around Us**<br>What is electricity? | 4.2.2 | 75 - 76 |
| | 2 | **Getting Electricity**<br>Where does electricity come from? | | 77 - 78 |
| | 3 | Summary and Exercise | | 79 - 80 |
| 8.2 Function of Electricity | 4 | **Lighting a Bulb**<br>How can we light a bulb with a dry cell? | | 81 - 82 |
| | 5 | **Flow of Electricity**<br>How does electricity flow through an electric circuit? | | 83 - 84 |
| | 6 | **Conductors and Insulators**<br>Which materials can electricity flow through? | | 85 - 86 |
| | 7 | **Uses of Conductors and Insulators**<br>How do we use conductors and insulators in daily life? | | 87 - 88 |
| | 8 | Summary and Exercise | | 89 - 91 |
| Chapter Test | 9 | Chapter Test | | 92 - 93 |

| Unit | Chapter : **8. Electricity 1** | Total lesson No: 26 / 97 |
|---|---|---|
| **Energy** | Topic : **8.1. Electricity in Our Life** | Textbook page: 75 - 76 |

**Lesson** 1 / 9

**Lesson Title**

# Electricity around us

**Preparation**

- Nil

## Lesson Flow

**1 Introduction (10 min.)**

- Encourage students to think about electricity by showing a mobile phone.

Q:What makes this mobile phone work?
Q:What if we do not have electricity?

**2 Introduce the key question**

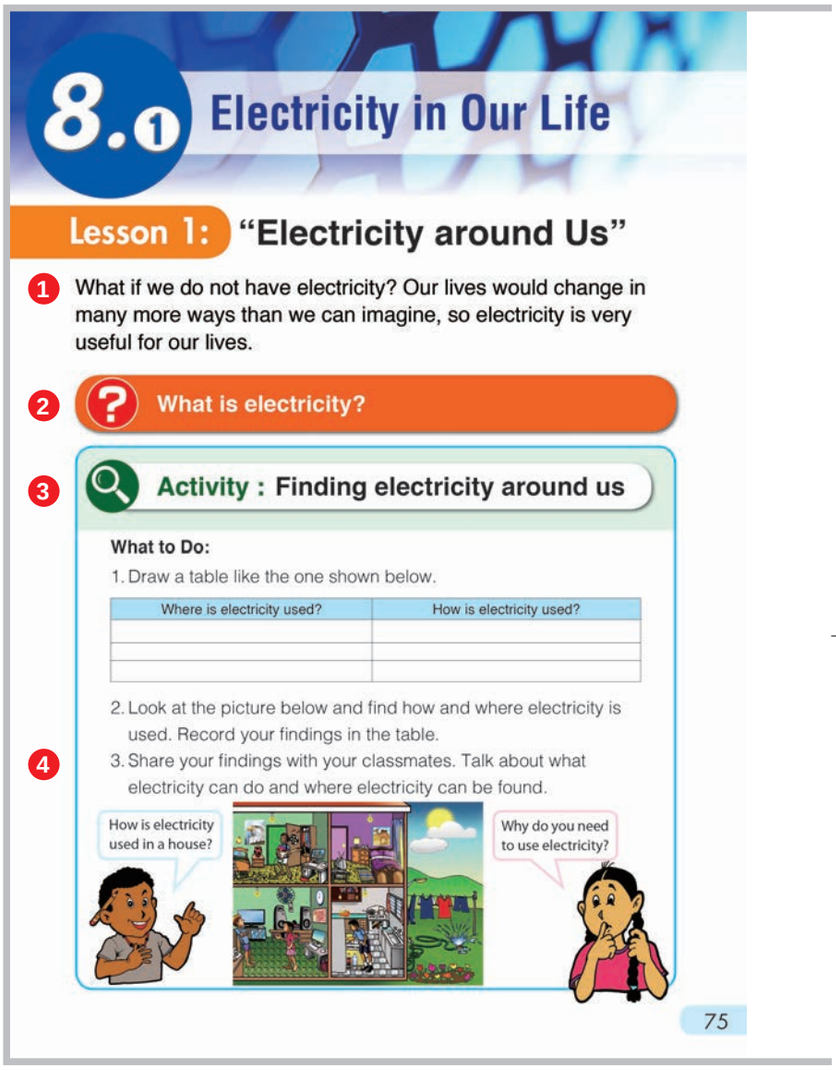
What is electricity?

**3 Activity (20 min.)**

- Arrange students into pairs to do this activity.
- Explain the steps of the activity.
- Refer students to the picture and characters' talking in the activity for their investigation.
- Ask students to draw a table in their exercise books.
- Have students do the activity and ask them to record their findings in the table.
- Allow enough time for the students to find new ideas through the activity by themselves.

**4 Discussion for findings (20 min.)**

- Ask students to present their findings from their activity.
- Write down students' findings on the blackboard. **(Continue)**


8.1 Electricity in Our Life

Lesson 1: "Electricity around Us"

1 What if we do not have electricity? Our lives would change in many more ways than we can imagine, so electricity is very useful for our lives.

2 What is electricity?

3 Activity : Finding electricity around us

What to Do:

1. Draw a table like the one shown below.

| Where is electricity used? | How is electricity used? |
|---|---|
| | |
| | |
| | |

2. Look at the picture below and find how and where electricity is used. Record your findings in the table.
3. Share your findings with your classmates. Talk about what electricity can do and where electricity can be found.

4



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## Teacher's Notes

### Additional information

### How did Benjamin Franklin discover electricity?

Benjamin **Franklin** first shocked himself in 1746, while conducting experiments on 'Electricity' with found objects from around his house. Six years later and exactly 261 years ago today, the founding father flew a kite attached to a key and a silk ribbon in a thunderstorm and effectively trapped lightning in a jar.

### How did Thomas Edison invent the Light Bulb?

In October 1879 **Edison** successfully tested a filament that burned for 13.5 hours. Continuing to improve his design, by November 1879, he filed for a U.S. patent for an electric lamp using "a carbon filament or strip coiled and connected … to platina contact wires".

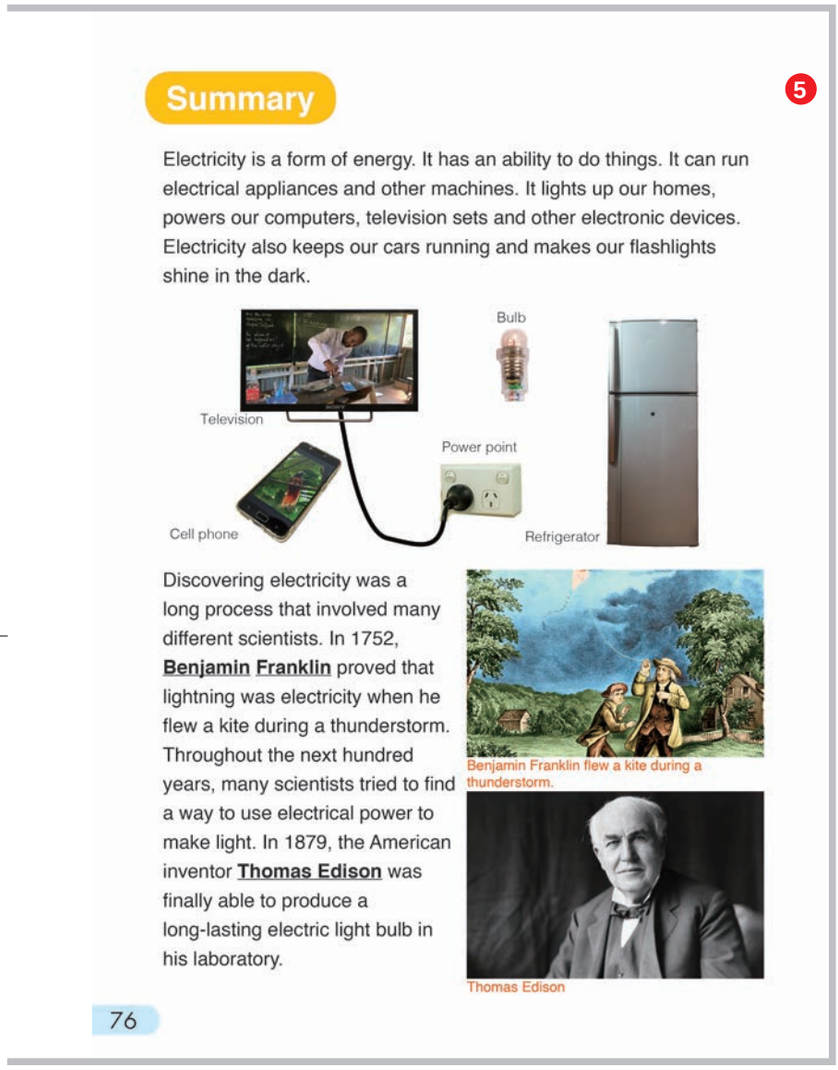
Perhaps one of the most **important** inventions of all time is the electric **light bulb**. We could get by with candles or lanterns in our homes, but imagine trying to shop at the mall, work in a large office complex, or travel at night by car or plane without electric lighting!

## Lesson Objectives

Students will be able to:
- Explain what electricity is.
- Identify how electricity works and where it can be found.
- Recognise the science history of electricity.

## Assessment

Students are able to:
- State that electricity is a kind of energy.
- Describe how electricity helps us in our life.
- List the places where electricity is found.
- Appreciate how electricity was discovered by scientists.



Summary

Electricity is a form of energy. It has an ability to do things. It can run electrical appliances and other machines. It lights up our homes, powers our computers, television sets and other electronic devices. Electricity also keeps our cars running and makes our flashlights shine in the dark.



Discovering electricity was a long process that involved many different scientists. In 1752, **Benjamin Franklin** proved that lightning was electricity when he flew a kite during a thunderstorm. Throughout the next hundred years, many scientists tried to find a way to use electrical power to make light. In 1879, the American inventor **Thomas Edison** was finally able to produce a long-lasting electric light bulb in his laboratory.

Benjamin Franklin flew a kite during a thunderstorm.

Thomas Edison

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- Confirm their findings with students.
- **Based on their findings,** ask the following questions.

Q:What things use electricity to work? (Television, radio, phones, car, mobile phone, etc)

Q:What can electricity do? (It can run electric appliances and machines, light up room, cool down food, heat rooms, moves fans, etc.)

Q:Can you find electricity in nature? (Yes, lightning)

- Conclude the findings.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Ask the following question:

Q:Do you know any historical scientists who investigated electricity? (Answer may vary.)

- Explain the history of electricity.
- Summarise today's lesson on the blackboard
- Ask these questionss as assessment:
  - Q: What can electricity do?
  - Q: What things use electricity to work?
  - Q: Where can we find electricity?
  - Q: Name some scientists who investigated electricity.
- Ask students to copy the notes on the blackboard into their exercise books.

## Sample Blackboard Plan

Title:
"Electricity around us"

Key question
What is electricity?

Activity
Finding electricity around us

| Where did you find electricity? How is electricity used? |
|---|
| Kitchen: to use electric cooker<br>Bedroom: to turn on light<br>Living room: to watch television<br>etc. |

Discussion

Q: What things use electricity to work?
Television, radio, phones, car, mobile phone, etc.

Q: What can electricity do?
It can run electric appliances and machines, light up rooms, cool down food, heat rooms, move fans, etc.

Q: Can you find electricity in nature?
Yes, lightning

Summary
- Electricity can:
  - ➲ Run electrical appliances and other machines
  - ➲ Light up rooms
  - ➲ Move things
  - ➲ Heat rooms
- Electricity can do many things.
- Electricity is a form of energy
- The historical scientists who investigated electricity:
  - ➲ Benjamin Franklin
  - ➲ Thomas Edison

| Unit | Chapter : **8. Electricity 1** | Total lesson No: 27 / 97 |
|---|---|---|
| **Energy** | Topic : **8.1. Electricity in Our Life** | Textbook page: 77 - 78 |

**Lesson** 2 / 9

**Lesson Title**

# Getting Electricity

**Preparation**

- Flashlight

## Lesson Flow

**1 Introduction (10 min.)**

- Review the previous lesson;

Q:Where do you find electricity?

Q:What things use electricity to work?

- Get students attention by turning on a flashlight and ask:

Q:What can this flashlight do?

Q:Do you think a flashlight uses electricity to light?

**2 Introduce the key question**

Where does electricity come from?

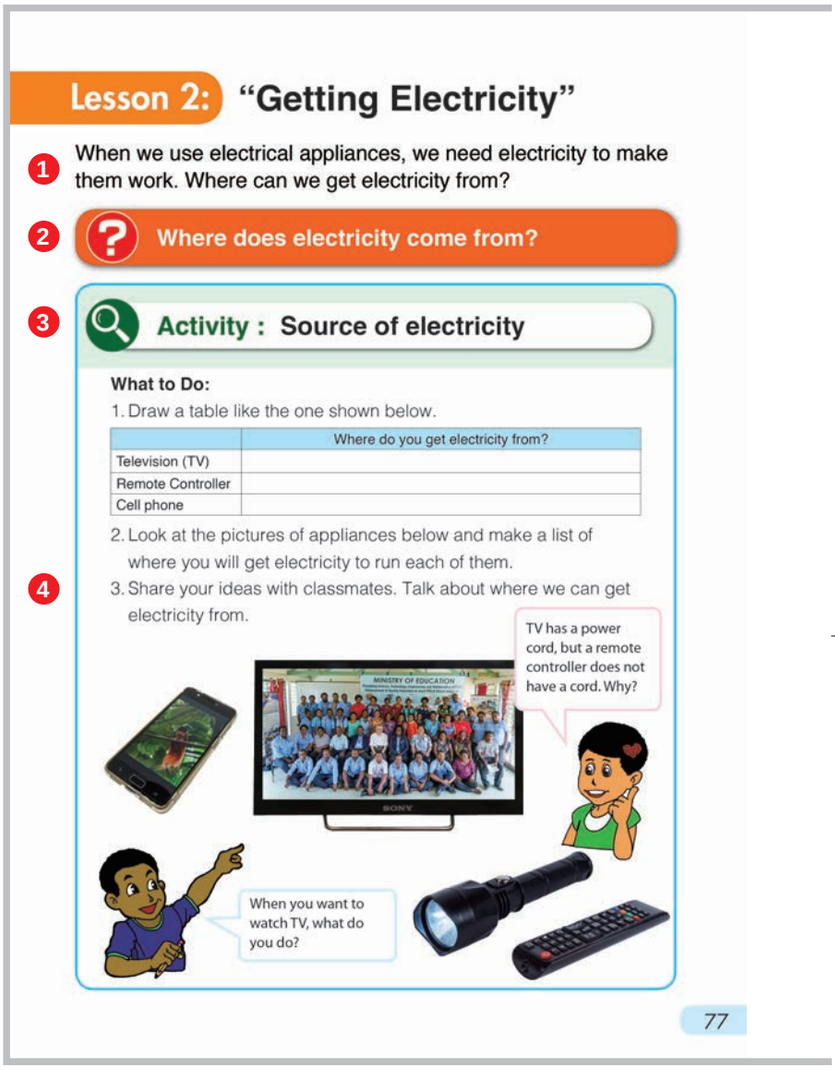
**3 Activity (20 min.)**

- Arrange students into pairs to do this activity.
- Explain the steps of the activity.
- Refer students to the pictures and what the characters are saying in the activity for their investigation.
- Have students do the activity and ask them to record their findings in the table.
- Allow enough time for students to find new ideas through the activity by themselves

**4 Discussion for findings (20 min.)**

- Ask students to present their findings from their activity.
- Write down students' findings on the blackboard.

**(Continue)**



Lesson 2: "Getting Electricity"

1 When we use electrical appliances, we need electricity to make them work. Where can we get electricity from?

2 Where does electricity come from?

3 Activity : Source of electricity

What to Do:

1. Draw a table like the one shown below.

| | Where do you get electricity from? |
|---|---|
| Television (TV) | |
| Remote Controller | |
| Cell phone | |

2. Look at the pictures of appliances below and make a list of where you will get electricity to run each of them.

4 3. Share your ideas with classmates. Talk about where we can get electricity from.



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## Teacher's Notes

### Dry cell batteries

Dry cells are widely used in toys, flashlights, portable radios, cameras, hearing aids, and other devices in common use. A battery consists of an outer case made of zinc (the negative electrode), a carbon rod in the center of the cell (the positive electrode), and the space between them is filled with an electrolyte paste. In operation the electrolyte, consisting of ground carbon, manganese dioxide, sal ammoniac, and zinc chloride, causes the electrons to flow and produce electricity.

### Wet cell batteries

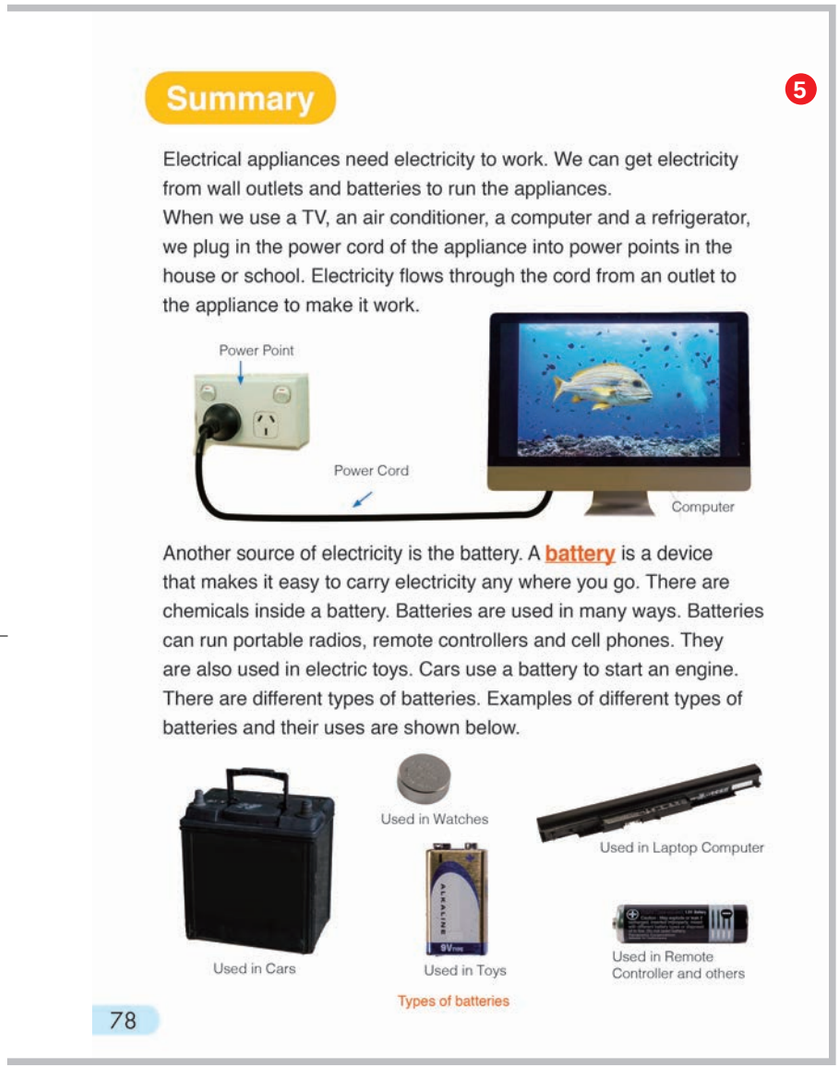
A wet-cell battery is the original type of rechargeable battery. The battery is widly used as a car battery. The battery contains a liquid electrolyte such as sulfuric acid, a dangerous corrosive liquid that damages what it comes into contact with.

## Lesson Objectives

Students will be able to:
- Identify the sources of electricity.
- Describe the different kinds of sources of electricity.

## Assessment

Students are able to:
- List the different kinds of sources of electricity.
- State the different sources of electricity such as batteries and power points.
- Investigate the source of electricity with interest.



Summary

5

Electrical appliances need electricity to work. We can get electricity from wall outlets and batteries to run the appliances.
When we use a TV, an air conditioner, a computer and a refrigerator, we plug in the power cord of the appliance into power points in the house or school. Electricity flows through the cord from an outlet to the appliance to make it work.



Another source of electricity is the battery. A **battery** is a device that makes it easy to carry electricity any where you go. There are chemicals inside a battery. Batteries are used in many ways. Batteries can run portable radios, remote controllers and cell phones. They are also used in electric toys. Cars use a battery to start an engine. There are different types of batteries. Examples of different types of batteries and their uses are shown below.



Types of batteries

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- Confirm their findings with other students.
- **Based on their findings,** ask questions as discussion point.

Q:How is a TV and a remote controller similar and different? (Both need electricity to work. TV has a power cord, but a remote controller does not.)

Q:Where do electrical appliances with power cords get electricity from? (Power point)

Q:Where do electrical appliances without power cords get electricity from? (Battery)

Q:What kinds of the sources of electricity are there? (Power point and battery)

- Conclude the findings.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: What are the sources of electricity?
  Q: What kinds of batteries are there?
  Q: What are some appliances that get electricity from power point?
  Q: What are some appliances that get electricity from batteries?
- Ask students to copy the notes on the blackboard into their exercise books.

## Sample Blackboard Plan

Title:
"Getting Electricity"

Key question
Where does electricity come from?

Activity
Source of electricity

| | Where does electricity come from |
|---|---|
| Television | Power point |
| Remote controller | Dry cell (battery) |
| Cell phone | battery charged from power points |

Discussion

Q: How is a TV and a remote controller similar and different?
Both need electricity to work. TV has a power cord, but a remote controller does not.

Q: Where do electric appliances with power cords get electricity from? Power point

Q: Where do electrical appliances without power cords get electricity from? Battery

Q: What kinds of the sources of electricity are there? Power point and battery

Summary

- Electric appliances use electricity to work.
- There are two types of the sources of electricity: Power point and Battery
- Electric appliances with a power cord get electricity from power point.
- Electric appliances without a power cord get electricity from battery.
  - There are many types of batteries.
  - Batteries are used in watches, laptop computer, toys, cars, etc.

| Unit | Chapter : **8. Electricity 1** | Total lesson No: 28 / 97 |
|---|---|---|
| **Energy** | Topic : **8.1. Electricity in Our Life** | Textbook page p. 79 - 80 |

**Lesson** 3 / 9

**Lesson Title**

# Summary and Exercise

**Tips of lesson**

## 1 Summary (20 min.)

- Recap main learning contents in this topic.
- Ask some focus questions to students and verify students' understanding.

Q:How does the electricity work on electrical appliances and machines?

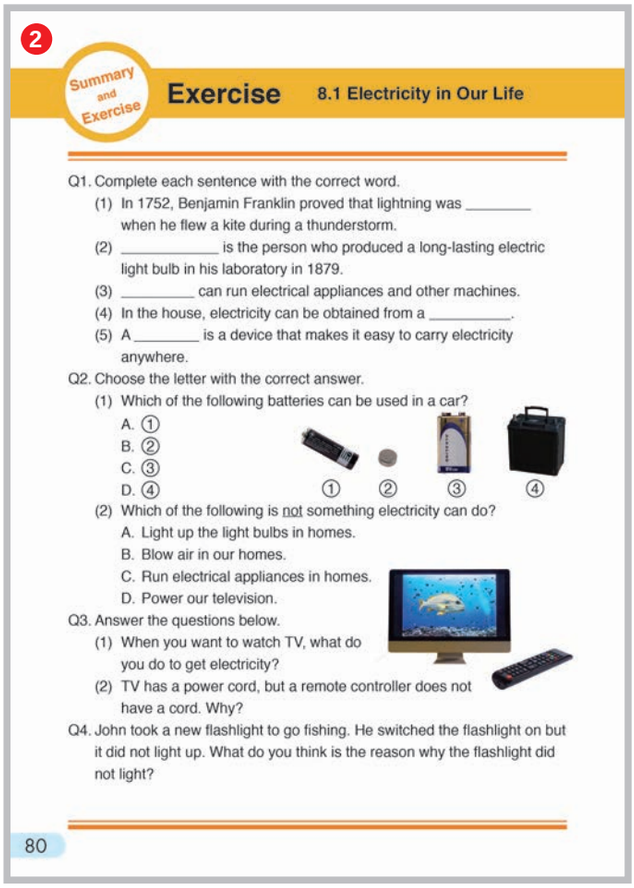
Q:How is electricity obtained in the house?

Q:How do electrical appliances and machines that are move get their electricity?

- Explain and correct learning contents again if they still have misconceptions.
- Provoke students to give some example of types of batteries and to describe the differences uses of the types of batteries.
- Ask students what kinds of appliances and machines use electricity.


## 2 Exercise & Explanation (30 min.)

- Explain to students that they will have to answer all the parts of four (4) questions in the exercise even if they are not completely sure of the answer(s).
- Tell students;
- Allow students enough time to answer questions individually according to their understanding.
- After the test, use student's answers and to answer the question.
- Explain how to solve the answer using the students' thoughts.



## Exercise answers

Q1.

(1) **electricity**
(2) **Thomas Edison**
(3) **electricity**
(4) **power point**
(5) **battery**

(1) Benjamin Franklin proved that lightning was electricity when he flew a kite during a thunderstorm.
(2) Thomas Edison was finally able to produce a long-lasting electric light bulb in his laboratory.
(4) In order to use electricity in the house, the appliance has to be connected to a power point.
(5) A lot of electrical appliances are portable and they need batteries which produce electricity.

Q2.

(1) **D**
(2) **B**

(1) A lot of smaller flashlights use 'AA' sized batteries as source of electricity.
(2) The electricity can spin the fan to produce cold air but it does not directly blow air.

Q3.

(1) **The cord of the TV is connected to the power point**
(2) **Because it uses dry cells/ battery as a power source.**

(1) A television gets electricity straight from the power points in order for it to work so the TV cord is connected to the power points to get electricity.
(2) A remote controller uses a dry cell/ battery as a power source to get electricity.

Q4.

**(Example of the answer)**
- **No dry cells/ battery inside**
- **Flat dry cells/ battery**

| Unit | Chapter : **8. Electricity 1** | Total lesson No: 29 / 97 |
|---|---|---|
| **Energy** | Topic : **8.2. Function of Electricity** | Textbook page: 81 - 82 |

**Lesson** 4 / 9

**Lesson Title**

# Lighting a Bulb

**Preparation**

- Bulb, bulb socket with wires or just wires, a dry cell,

## Lesson Flow

**1 Introduction (5 min.)**

- Review the previous lesson by showing a flashlight;

Q:What source of electricity does this flashlight use?

- Encourage students to think about lighting a bulb by asking:

Q:Can you guess what will happen to a flashlight without a battery?

Q:How can a bulb of a flashlight with a battery (or a dry cell)?

**2 Introduce the key question**

How can we light a bulb with a dry cell?

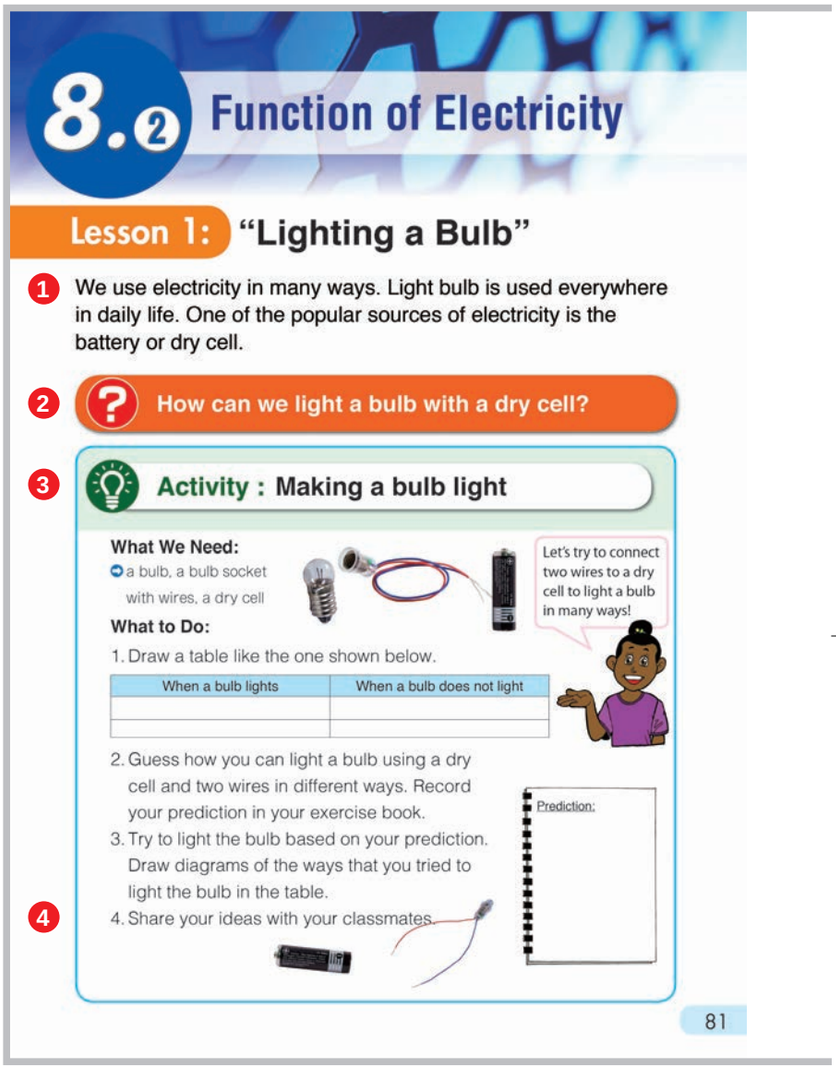
**3 Activity (30 min.)**

- Arrange students into groups.
- Explain the steps of the activity.
- Caution the students to be careful using the wire as it can pierce their skin.
- Let students guess how they can light a bulb using a dry cell and two wires.
- Have students to try to light a bulb based on their prediction and record their results in the table.
- Encourage students as much as possible to try to light the bulb in different ways.

**4 Discussion for findings (20 min.)**

- Ask students to present their results in the activity.

**(Continue)**




## Teacher's Notes

- Prepare adequate bulbs ranging from 1.5-3.0V to work with. Some bulbs require less power but others need higher voltage to light.
- Dry cells labelled D, AA, AAA size have same voltage but different usage time around 1.5V. Size D dry cell is recommended for this lesson.
- Wires used must be soft and should be prepared before the lesson. Cut and remove a piece of insulation from both ends of the wire.
- An example of a diagram of a circuit related to the real material should be drawn for the students to follow.

What are positive and negative terminals of a battery?
A **battery** has two ends -- a **positive terminal** (cathode) and a **negative terminal** (anode). If you connect the two **terminals** with wires, a circuit is formed. Electrons will flow through the wires and electrical current is produced.

Safety tips:

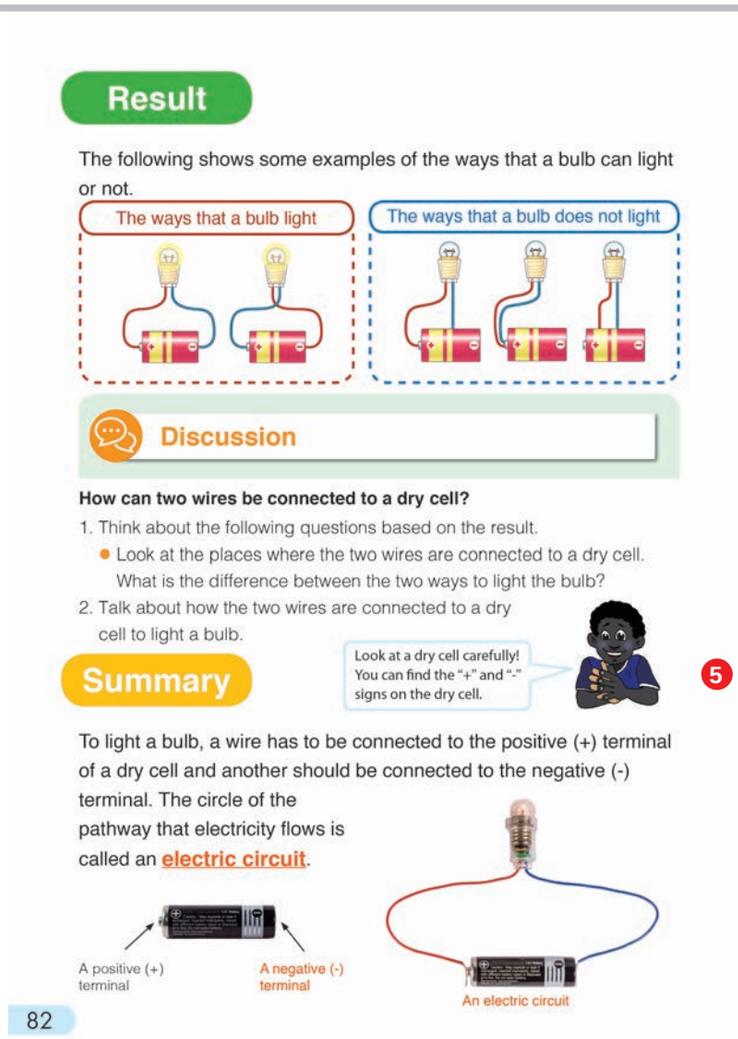
- Handle the wires careful as it can prick the skin.
- Do not hold the wire for too long on the terminals of the battery as it will heat up and cause burn your fingers.
- Remember to wash the hands after lessons as batteries contain harmful chemicals.
- Store carefully away in a safe place.
  - always roll up wire neatly
  - always pack dry cell in a box or a plastic bag

## Lesson Objectives

Students will be able to:
- Define electric circuit.
- Identify the correct way to light a bulb.

## Assessment

Students are able to:
- Explain the meaning of an electric circuit.
- Demonstrate how to connect wires correctly to a dry cell to light a bulb.
- Investigate the different way to light a bulb with excitement.



Result

The following shows some examples of the ways that a bulb can light or not.

The ways that a bulb light

The ways that a bulb does not light

Discussion

**How can two wires be connected to a dry cell?**

1. Think about the following questions based on the result.
   - Look at the places where the two wires are connected to a dry cell. What is the difference between the two ways to light the bulb?
2. Talk about how the two wires are connected to a dry cell to light a bulb.

Summary

Look at a dry cell carefully! You can find the "+" and "-" signs on the dry cell.

To light a bulb, a wire has to be connected to the positive (+) terminal of a dry cell and another should be connected to the negative (-) terminal. The circle of the pathway that electricity flows is called an **electric circuit**.

A positive (+) terminal

A negative (-) terminal

An electric circuit

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- Write down students' results on the blackboard.
- Confirm their findings with students.
- Let the students compare their prediction to the result and confirm.
- **Based on their findings,** ask the question as discussion point.

Q:When you compare the ways that a bulb lights, what is the difference between the two ways? (The way to connect wires is different, each of two wires are connected to the different ends of a dry cell when a bulb lights, etc)

Q:How should two wires be connected to a dry cell to light a bulb? (Wires must be placed at both ends of the dry cell.)

Q:What signs do you see on both ends of the dry cell? (Plus(+) and Minus(-))

- Conclude the findings.

**5 Summary (5 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on a blackboard.
- Ask these questions as assessment:
  Q: What is an electric circuit?
  Q: What kinds of terminal does a dry cell have?
  Q: How should two wires be connected to a dry cell to light a bulb?
- Ask students to copy the notes on the blackboard into their exercise books.

## Sample Blackboard Plan

Title:
"Lighting a Bulb"

Key question
How can we light a bulb with a dry cell?

Activity
Making a bulb light

Prediction:
Draw how you can light a bulb using a dry cell and two wires

Results:

| The ways that a bulb light | The ways that a bulb doesn't light |
|---|---|

Discussion
Q: When you compare the ways that a bulb lights, what is the difference between the two ways? The way to connect wires is different, each of two wires are connected to the different ends of a dry cell when a bulb lights, etc

Q: How should two wires be connected to a dry cell to light a bulb? Wires must be place at both ends of the dry cell.

Q: What signs do you see on both ends of the dry cell? Plus (+) and minus (-)

Summary
- The circle of a pathway that electricity flows is called an electric circuit.
- A dry cell has a positive (+) terminal and a negative (-) terminal.
- A wire has to be connected to the positive terminal and another should be connected to the negative terminal of a dry cell.

| Unit | Chapter : **8. Electricity 1** | Total lesson No: 30 / 97 |
|---|---|---|
| **Energy** | Topic : **8.2. Function of Electricity** | Textbook page: 83 - 84 |

**Lesson** 5 / 9

**Lesson Title**

# Flow of Electricity

**Preparation**

- A bulb, a bulb socket with wires, a dry cell, drycell holder and a switch.

## Lesson Flow

**1 Introduction (5 min.)**

- Review the previous lesson;

Q:What is an electric circuit?

Q:How should two wires be connected to a dry cell to light a bulb?

- Encourage students to think about the flow of electricity by asking;

Q:How does electricity flow in a circuit when a bulb lights?

**2 Introduce the key question**

How does electricity flow through a circuit?

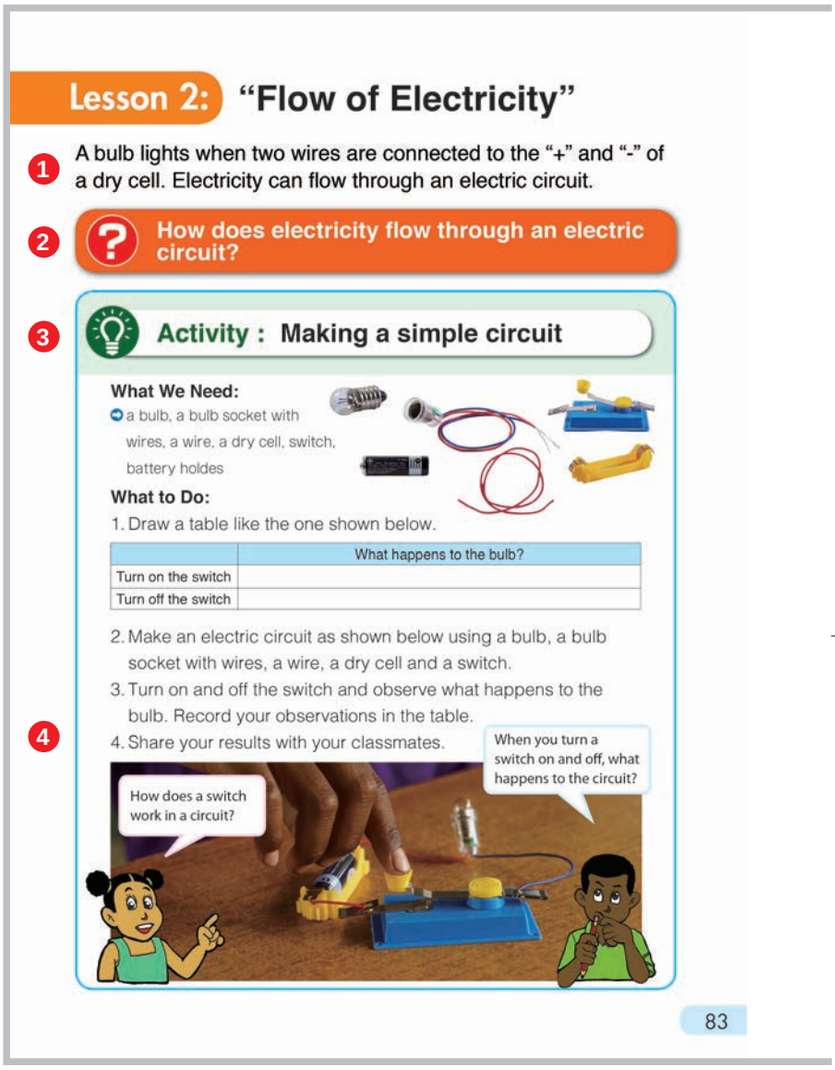
**3 Activity (30 min.)**

- Arrange students into groups.
- Explain the steps of the activity.
- Let students make an electric circuit using a bulb, wires, a dry cell and a switch.
- Ask students to predict what will happen to a bulb when you turn the switch on or off .
- Have students do the activity and ask them to record their results in the table.
- Allow enough time for the students to find new ideas through the activity by themselves.

**4 Discussion for findings (15 min.)**

- Ask students to present their results in the activity.

**(Continue)**



Lesson 2: "Flow of Electricity"

1 A bulb lights when two wires are connected to the "+" and "-" of a dry cell. Electricity can flow through an electric circuit.

2 How does electricity flow through an electric circuit?

3 Activity : Making a simple circuit

What We Need:

a bulb, a bulb socket with wires, a wire, a dry cell, switch, battery holdes

What to Do:

1. Draw a table like the one shown below.

| | What happens to the bulb? |
|---|---|
| Turn on the switch | |
| Turn off the switch | |

2. Make an electric circuit as shown below using a bulb, a bulb socket with wires, a wire, a dry cell and a switch.
3. Turn on and off the switch and observe what happens to the bulb. Record your observations in the table.
4. Share your results with your classmates.

4



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## Teacher's Notes

The battery pushes the **electricity** along the wires from the positive terminal, through the bulb and back to the negative terminal. This creates a **circuit**. The bulb glows because **electricity** flows through the filament. To turn out the light, the **circuit** needs to be broken by adding a **switch**.

Open circuit

A broken wire or an "**open**" (off) switch both create gaps in the circuit preventing electrons from traveling from one side of the power source to the other. Thus, electrons will not flow.

Closed circuit

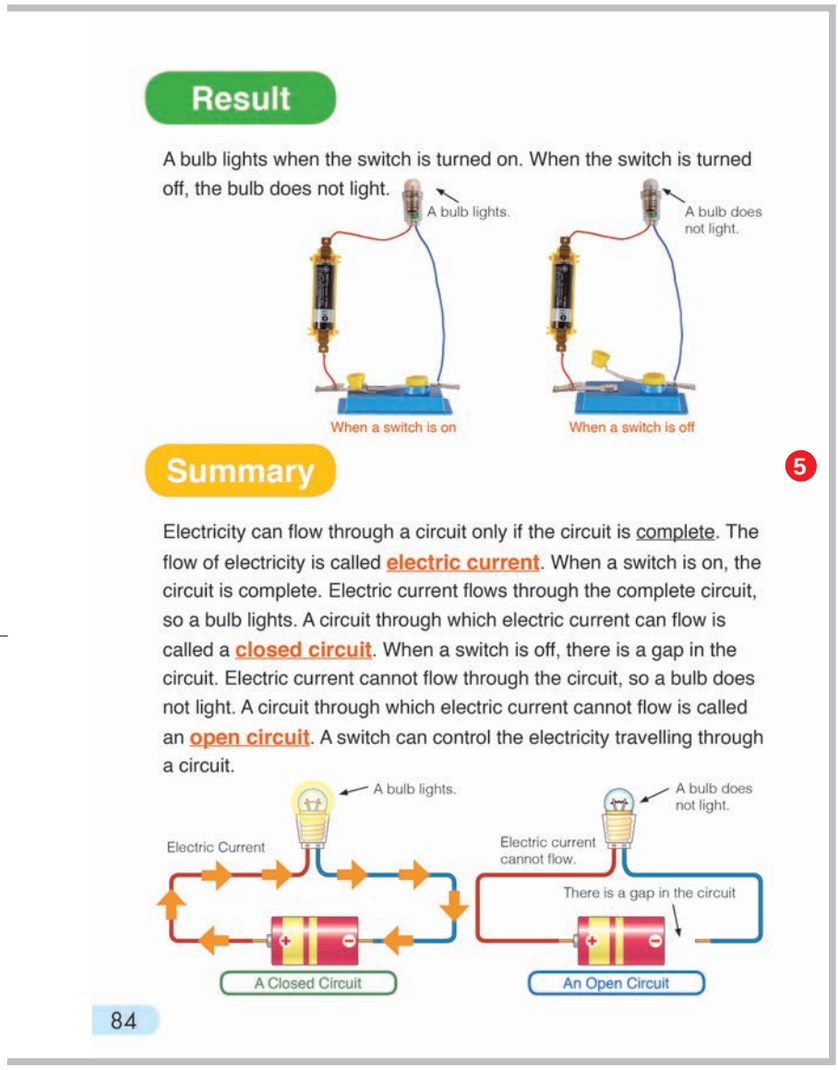
A **closed** (on) switch means that the **circuit** through the switch is connected. **Closed circuit** is also a complete electrical connection around which current flows or circulates. When you have a series of electrical wires connecting to each other and completing a **circuit** so that current travels from one end of the circuit to the other.

## Lesson Objectives

Students will be able to:
- Define an electric current.
- Identify a closed and open circuit.
- Describe the function of a switch in an electric circuit.

## Assessment

Students are able to:
- State what an electric current is.
- Describe how a closed and open circuit are different.
- Make a simple electric circuit with a bulb, wires, a dry cell and a switch.
- Explain how a switch work in a simple circuit.
- Investigate eagerly with classmates.



**Result**

A bulb lights when the switch is turned on. When the switch is turned off, the bulb does not light.



**Summary**

Electricity can flow through a circuit only if the circuit is complete. The flow of electricity is called **electric current**. When a switch is on, the circuit is complete. Electric current flows through the complete circuit, so a bulb lights. A circuit through which electric current can flow is called a **closed circuit**. When a switch is off, there is a gap in the circuit. Electric current cannot flow through the circuit, so a bulb does not light. A circuit through which electric current cannot flow is called an **open circuit**. A switch can control the electricity travelling through a circuit.



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- Write down students' results on the blackboard.
- Confirm their findings with other students.
- Let the students compare their prediction to the result and confirm.
- **Based on their findings,** asks questions as discussion point.

Q:How is the circuit different when a switch is on or off? (When a switch is on, all parts of the electric circuit are connected. When a switch is off, there is a break or gap in the circuit.)

Q:What happened to electricity when a switch is on or off? (When a switch is on, electricity can flow in the circuit. When a switch is off, electricity cannot flow in the circuit.)

Q: How does a switch in a circuit work? (It can control the flow of electricity.)

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: What is an electric circuit?
  Q: How are a closed and open circuit different?
  Q: Which circuit can electric current flow through: closed or open circuit?
- Ask students to copy the notes on the blackboard in their exercise books.

## Sample Blackboard Plan

Title:
"Flow of Electricity"

Key question
How does electricity flow through an electric circuit?

Activity
Making a simple circuit

| | What happens to a bulb? |
|---|---|
| Turn on a switch | A bulb lights |
| Turn off a switch | A bulb doesn't light |

Discussion

Q: How is the circuit different when a switch is on or off?
When a switch is on, all parts of the electric circuit are connected. When a switch is off, there is a break or gap in the circuit.

Q: What happened to electricity when a switch is on or off?
When a switch is on, electricity can flow in the circuit. When a switch is off, electricity cannot flow in the circuit.

Q: How does a switch in a circuit work? It can control the flow of electricity.

Summary
- Electricity can flow through a circuit only if the circuit is complete.
- The flow of electricity is called electric current.
- There are two types of circuit:
  - A closed circuit and an open circuit
- A closed circuit is a circuit through which electric current can flow.
- An open circuit is a circuit through which electric current cannot flow.
- The switch controls the flow of electricity in a circuit.

| Unit | Chapter : **8. Electricity 1** | Total lesson No: 31 / 97 |
|---|---|---|
| **Energy** | Topic : **8.2. Function of Electricity** | Textbook page: 85 - 86 |

**Lesson** 6 / 9

**Lesson Title**

# Conductors and Insulators

**Preparation**

- Bulb, bulb socket, wires, dry cell, paper clips, paper, aluminium can, glass, nail, plastic bottle, wood, any others

## Lesson Flow

**1 Introduction (10 min.)**

- Review the previous lesson:

Q:What is an electric circuit?

Q:How should we connect two wires to a dry cell to light a bulb?

- Encourage students to think about conductor and insulator by asking;

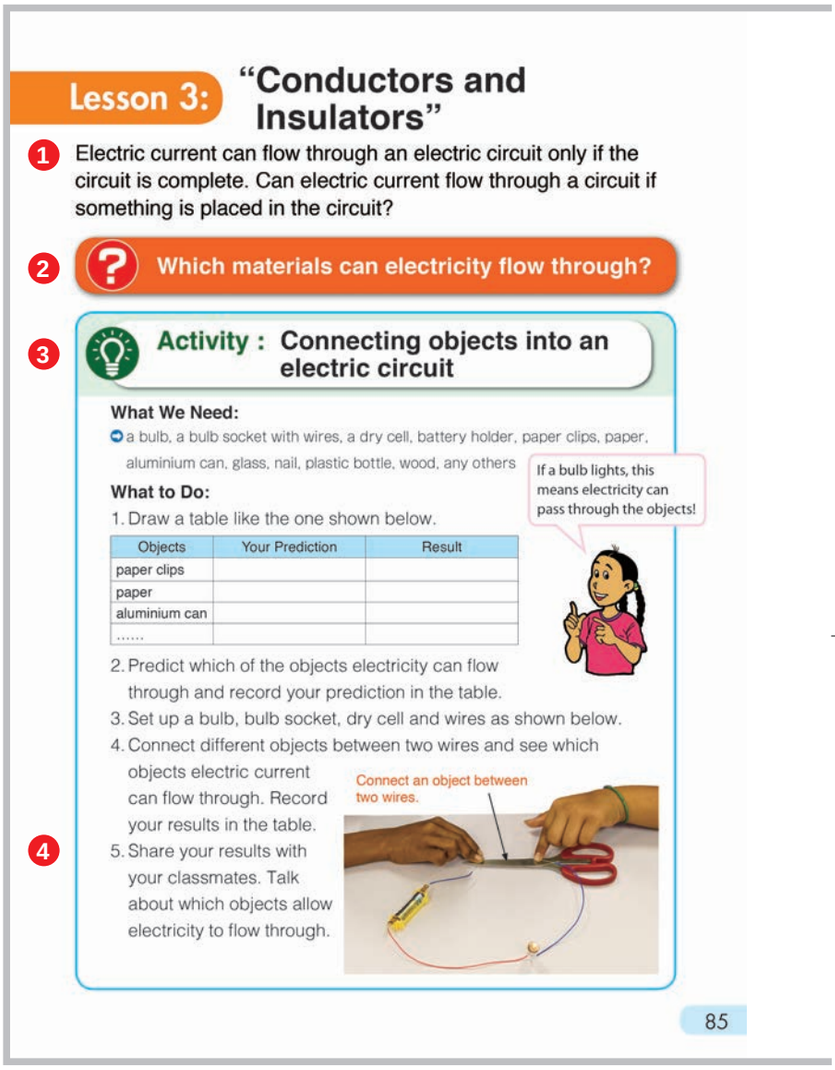
Q:What happens to electric current if an object is placed in an electric circuit?

**2 Introduce the key question**

Which materials can electricity flow through?

**3 Activity (20 min.)**

- Arrange students into groups.
- Explain the steps of the activity.
- Confirm that electric current can flow through objects if a bulb lights.
- Let students make an electric circuit as shown in the diagram in this activity.
- Ask students to predict which objects electricity can flow through and record their predictions in the table.
- Have students do the activity and ask them to record their results in the table.
- Ask students to discuss their results in their group.



Lesson 3: "Conductors and Insulators"

1 Electric current can flow through an electric circuit only if the circuit is complete. Can electric current flow through a circuit if something is placed in the circuit?

2 Which materials can electricity flow through?

3 Activity : Connecting objects into an electric circuit

What We Need:

a bulb, a bulb socket with wires, a dry cell, battery holder, paper clips, paper, aluminium can, glass, nail, plastic bottle, wood, any others

What to Do:

1. Draw a table like the one shown below.

| Objects | Your Prediction | Result |
|---|---|---|
| paper clips | | |
| paper | | |
| aluminium can | | |
| ..... | | |

If a bulb lights, this means electricity can pass through the objects!

2. Predict which of the objects electricity can flow through and record your prediction in the table.
3. Set up a bulb, bulb socket, dry cell and wires as shown below.
4. Connect different objects between two wires and see which objects electric current can flow through. Record your results in the table.
5. Share your results with your classmates. Talk about which objects allow electricity to flow through.

4

Connect an object between two wires.

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## Teacher's Notes

Tip for activity:

The available materials that are in the classroom can also be tested. If there are objects that are coated such as a can then, you should remove the coating by scratching the coated surface before connecting. The coating generaly does not allow the flow of electricity.

Background information:

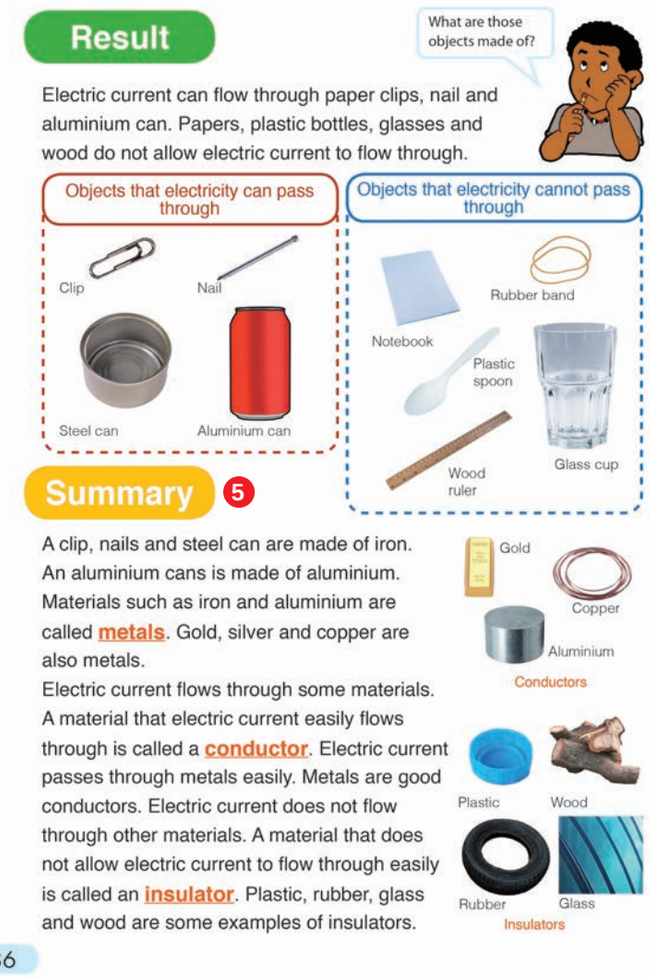
- Electric current easily passes through metals such as copper, aluminium, gold, and silver. Electric current also flow through salt water. This means that salt water is a good conductor. Since sweat on human's skin contains salt water, your body can be a conductor.
- Conductors and insulators are used to control and direct the flow of electric charges. The power cord of an appliance controls electric current. It contains both conductors and insulators. A power cord is usually made of metal wires surrounded by a rubber or plastic covering. These metal wires are conductors that carry electric current. The outer covering is an insulator that prevents the electric current from escaping.

## Lesson Objectives

Students will be able to:
- Define conductors and insulators.
- Identify the characteristics of conductors and insulators.

## Assessment

Students are able to:
- Explain the difference between conductors and insulators.
- Classify objects into conductor or insulators based on the results of activity
- Be curios about the investigation of scientific wonders.




### 4 Discussion for findings (20 min.)

- Ask students to present their results in the activity.
- Write down students' results on the blackboard.
- Confirm their findings with other students.
- Let the students compare their predictions to the result and confirm.
- **Based on their findings,** asks questions as discussion point.

Q:Which objects allow electricity to pass through or not? (Refer to "Black board Sample".)

Q:Classify objects into two groups. those that allow electricity can flow and those that don't.

- Confirm their findings with students.
- Conclude the discussion

### 5 Summary (5 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: What is a metal?
  Q: Give some examples of metal.
  Q: How are conductors and insulators are similar or different?
  Q: Give some examples of conductors and insulators.
- Ask students to copy the notes on the blackboard in their exercise books.

## Sample Blackboard Plan

Title:

"Conductors and Insulators"

Key question Which materials can electricity flow through?

Activity Connecting objects into an electric circuit

| Items | Prediction | Result |
|---|---|---|
| Paper clip | √ | √ |
| paper | × | × |
| Aluminium can | × | √ |
| Glass | × | × |
| …… | × | √ |

Discussion

Q: Which objects allow electricity to pass through or not?

Q: Classify objects into two groups. those that allow electricity can flow and those that don't.

| Objects that electricity can pass through | Objects that electricity cannot pass through |
|---|---|
| Paper clip | Glass |
| Nail | Paper |
| Aluminium can, etc | Wood |
| Any others | Plastic bottle, etc |

Summary

- A **metal** is a material such as gold, silver, copper and aluminium.
- Electric current can or cannot flow through some materials.
- A material that electric current easily flows through is called a **conductor**.
- Metals are good conductors.
- A material that electric current does not flow through easily is called an **insulator**.
- Plastic, rubber, glass and wood are examples of insulators.

| Unit | Chapter : **8. Electricity 1** | Total lesson No: 32 / 97 |
|---|---|---|
| **Energy** | Topic : **8.2. Function of Electricity** | Textbook page: 87 - 88 |

**Lesson** 7 / 9

**Lesson Title**

# Uses of Conductors and Insulators

**Preparation**

- External cord (broken), Cutter knife

## Lesson Flow

**1 Introduction (5 min.)**

- Review the previous lesson:

Q:What are conductors and insulators?

Q:Give some examples of conductors and insulators.

- Encourage students to think about the use of conductors and insulators by asking;

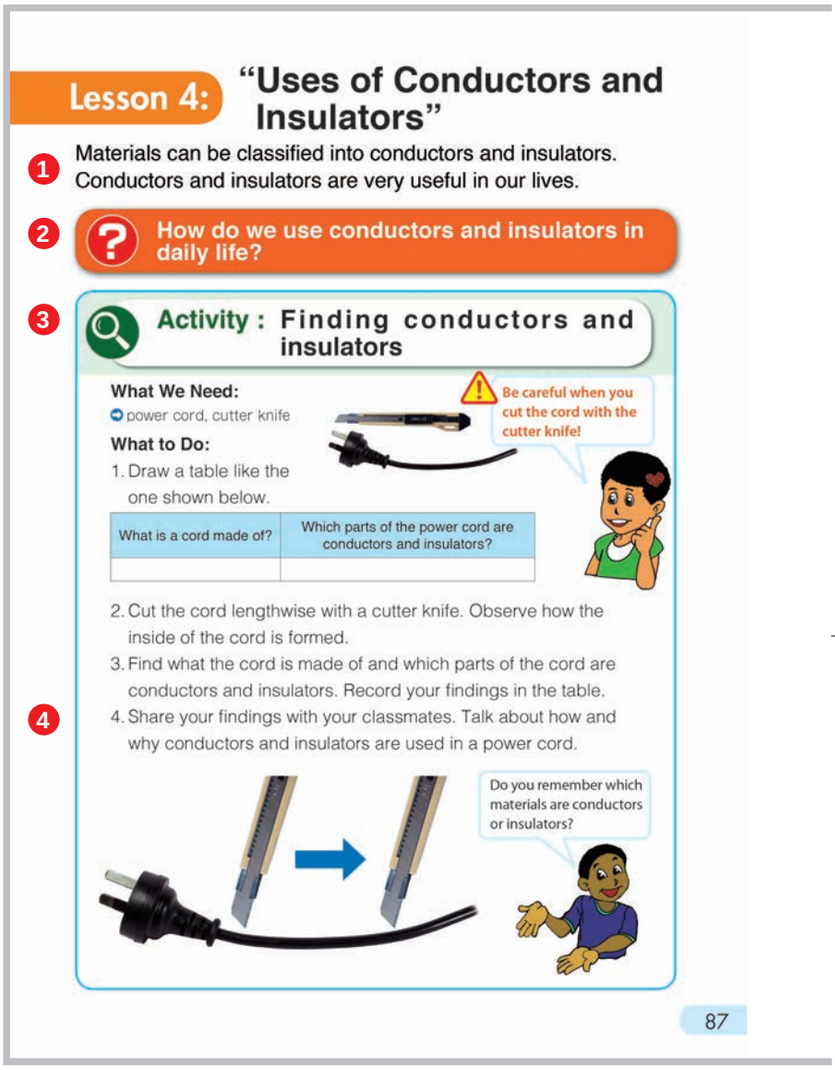
Q:How are conductors and insulators used in our daily life?

**2 Introduce the key question**

How do we use conductors and insulators in daily life?

**3 Activity (20 min.)**

- Arrange students into groups.
- Explain the steps of the activity
- Remind students to be cautious when handling a cutter knife.
- Assist students to cut a cord lengthwise.
- Have students observe the inside of the cord and ask them to record their observations in the table.
- Ask students to talk about how and why conductors and insulators are used for a power cord based on their findings in their group.



Lesson 4: "Uses of Conductors and Insulators"

1 Materials can be classified into conductors and insulators. Conductors and insulators are very useful in our lives.

2 How do we use conductors and insulators in daily life?

3 Activity : Finding conductors and insulators

What We Need:
power cord, cutter knife

What to Do:
1. Draw a table like the one shown below.

| What is a cord made of? | Which parts of the power cord are conductors and insulators? |
|---|---|
| | |

Be careful when you cut the cord with the cutter knife!

2. Cut the cord lengthwise with a cutter knife. Observe how the inside of the cord is formed.
3. Find what the cord is made of and which parts of the cord are conductors and insulators. Record your findings in the table.
4. Share your findings with your classmates. Talk about how and why conductors and insulators are used in a power cord.

Do you remember which materials are conductors or insulators?

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## Teacher's Notes

Why is an electric wire covered with plastic or rubber?

Most electrical wires are covered in a rubber or plastic coating for insulation. The purpose of insulation covering on the metal part of an electrical wire is to prevent accidental contact with other conductors of electricity. This might result in an unintentional electric current flow through other conductors.

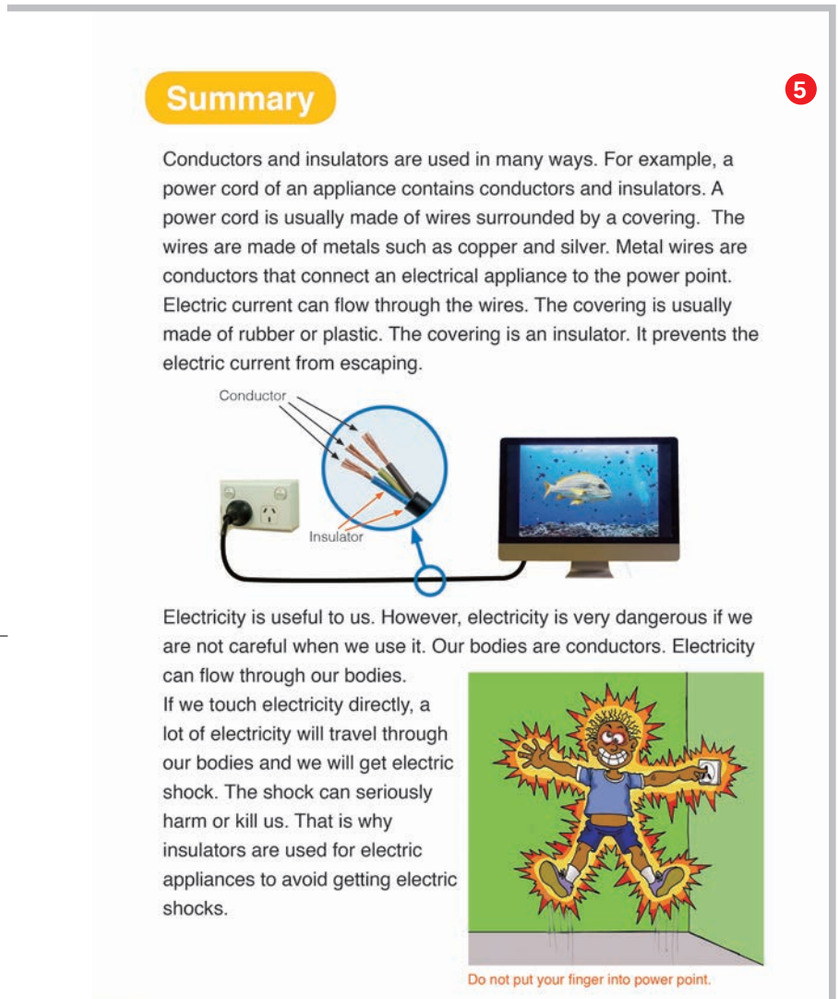
Some common insulatoring materials are glass, plastic, rubber, air, and wood. Insulators are used to protect us from the dangerous effects of electricity flowing through conductors. Because sometimes the voltage in an electrical circuit can be quite high and dangerous.

## Lesson Objectives

Students will be able to:
- Describe the uses of a conductor and an insulator in daily life.
- Identify conductors and insulators in electrical cord.
- Apply the properties of conductors and insulators for safety.

## Assessment

Students are able to:
- Explain how conductors and insulators are used in daily lives.
- Discuss how and why conductors and insulators are used in a power cord.
- State the dangers of electricity and how to protect electric shock.



Summary

Conductors and insulators are used in many ways. For example, a power cord of an appliance contains conductors and insulators. A power cord is usually made of wires surrounded by a covering. The wires are made of metals such as copper and silver. Metal wires are conductors that connect an electrical appliance to the power point. Electric current can flow through the wires. The covering is usually made of rubber or plastic. The covering is an insulator. It prevents the electric current from escaping.



Electricity is useful to us. However, electricity is very dangerous if we are not careful when we use it. Our bodies are conductors. Electricity can flow through our bodies. If we touch electricity directly, a lot of electricity will travel through our bodies and we will get electric shock. The shock can seriously harm or kill us. That is why insulators are used for electric appliances to avoid getting electric shocks.

Do not put your finger into power point.

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### 4 Discussion for findings (20 min.)

- Ask students to present their results in the activity.
- Write down students' results on the blackboard.
- Confirm their findings with other students.
- **Based on their findings,** asks question as discussion point.

Q:What materials are used for a power cord? (Metal or copper and rubber)

Q:Which material is a conductor or an insulator? (Metal or copper is a conductor. Rubber is an insulator.)

Q:What will happen when you touch a conductor with electricity flowing through it? (We will get electric shock and die.)

Q:Why do you think the electric cord is made of metal and rubber? (Metal allows electricity to flow. Rubber protects us from electric shock.)

- Conclude the discussion

### 5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: How do we use conductors and insulators in daily life?
  Q: Give examples of appliances that use conductors and insulators.
- Ask students to copy the notes on the blackboard in their exercise book.

## Sample Blackboard Plan

Title:
"Uses of Conductors and Insulators"

Key question
How do we use conductors and insulators in daily life?

Activity: Finding conductors and insulators

| What is the cord made of? | Which parts of a power cord are Conductors and Insulators? |
|---|---|
| Wires | Conductor |
| Rubber coating | Insulator |
| Metal pins | Conductor |

Discussion
Q: What materials are used for a power cord? (Metal or copper, rubber)
Q: Which material is a conductor or and insulator? (Metal or copper is a conductor. Rubber is an insulator.)
Q: What will happen when you touch a conductor with electricity flowing through it? (We will get electric shock and die.)
Q: Why do you think the electric cord is made of metal and rubber? (Metal allows electricity to flow. Rubber protects us from electric shock.)

Summary
- Conductors and insulators are used in many ways.
  For example:
  - A power cord is usually made of wires surrounded by a covering made of plastic or rubber.
  - Conductors are used to allow electricity to flow through.
  - Insulators are used to protect us from electric shock because electricity can flow through human body.

| Unit | Chapter : **8. Electricity 1** | Total lesson No: 33 / 97 |
|---|---|---|
| **Energy** | Topic : **8.2. Function of Electricity** | Textbook page: 89 - 91 |

**Lesson** 8 / 9

**Lesson Title**

# Summary and Exercise

**Tips of lesson**

## 1 Summary (20 min.)

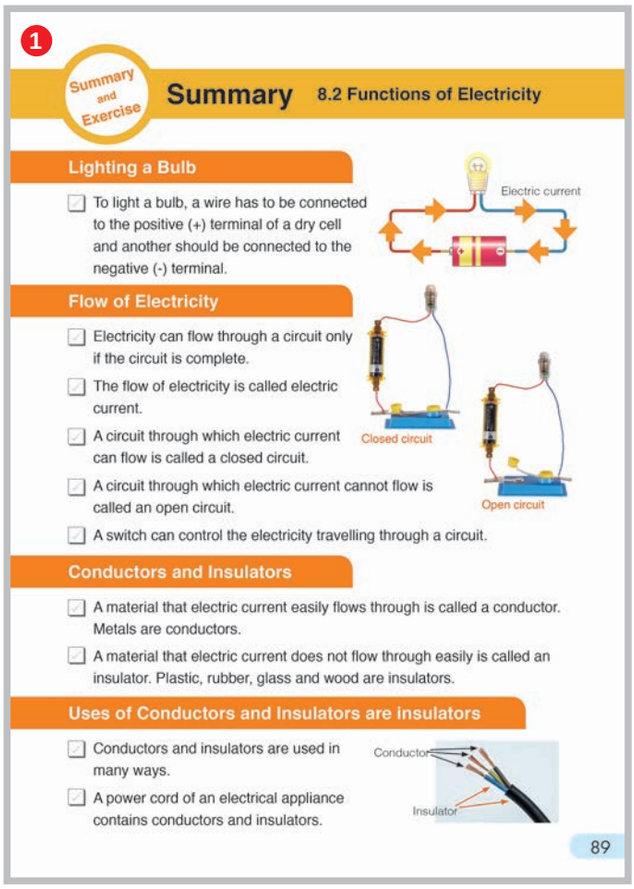
- Recap main learning contents in this topic.
- Ask focus some questions to students and verify student understanding.

Q:How should we connect the bulb to the battery to get it to light?

Q:How would the electricity flow through a circuit?

Q:How can a circuit be closed and opened?

- Explain and correct learning contents again if students still have misconceptions.
- Provoke student to give some example of conductors and insulators and to describe the differences between conductors and insulators.
- Ask students what kinds of materials are used as conductors and insulators in cord of appliances.



1

Summary and Exercise

**Summary** 8.2 Functions of Electricity

**Lighting a Bulb**

- To light a bulb, a wire has to be connected to the positive (+) terminal of a dry cell and another should be connected to the negative (-) terminal.

Electric current

**Flow of Electricity**

- Electricity can flow through a circuit only if the circuit is complete.
- The flow of electricity is called electric current.
- A circuit through which electric current can flow is called a closed circuit.
- A circuit through which electric current cannot flow is called an open circuit.
- A switch can control the electricity travelling through a circuit.

Closed circuit

Open circuit

**Conductors and Insulators**

- A material that electric current easily flows through is called a conductor. Metals are conductors.
- A material that electric current does not flow through easily is called an insulator. Plastic, rubber, glass and wood are insulators.

**Uses of Conductors and Insulators are insulators**

- Conductors and insulators are used in many ways.
- A power cord of an electrical appliance contains conductors and insulators.

Conductor

Insulator

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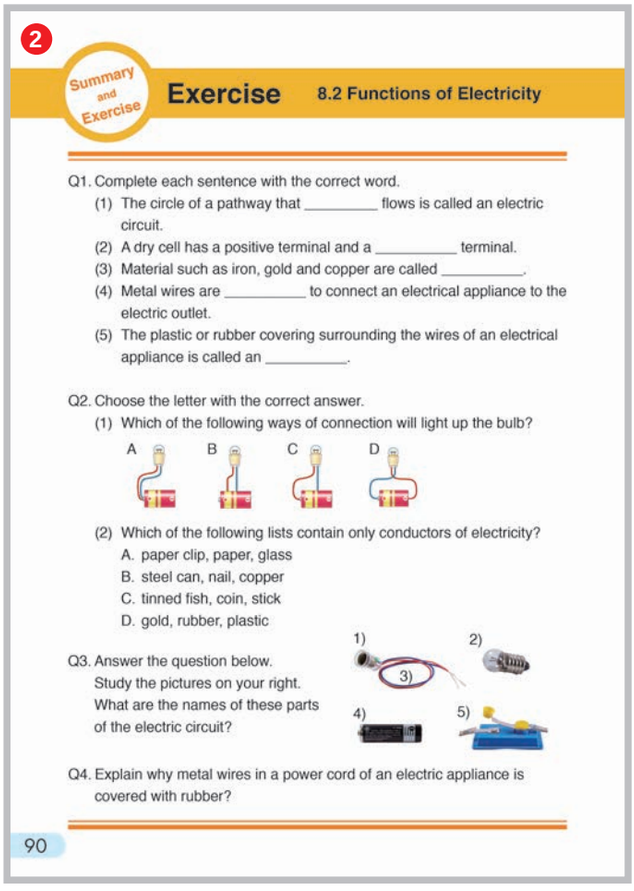
## 2 Exercise & Explanation (30 min.)

- Explain to students that they will have to answer all the parts of four (4) questions in the exercise even if they are not completely sure of the answer(s).
- Allow students enough time to answer the questions individually according to their understanding.
- After the test, use student's answers and to answer the questions.
- Explain how to solve the answer using the students' thoughts.



2

Summary and Exercise

**Exercise** 8.2 Functions of Electricity

Q1. Complete each sentence with the correct word.

(1) The circle of a pathway that _____ flows is called an electric circuit.

(2) A dry cell has a positive terminal and a _____ terminal.

(3) Material such as iron, gold and copper are called _____.

(4) Metal wires are _____ to connect an electrical appliance to the electric outlet.

(5) The plastic or rubber covering surrounding the wires of an electrical appliance is called an _____.

Q2. Choose the letter with the correct answer.

(1) Which of the following ways of connection will light up the bulb?

A B C D

(2) Which of the following lists contain only conductors of electricity?

A. paper clip, paper, glass

B. steel can, nail, copper

C. tinned fish, coin, stick

D. gold, rubber, plastic

Q3. Answer the question below.
Study the pictures on your right.
What are the names of these parts of the electric circuit?

1) 2) 3) 4) 5)

Q4. Explain why metal wires in a power cord of an electric appliance is covered with rubber?

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## Exercise answers

Q1.
(1) **electricity**
(2) **negative**
(3) **metal**
(4) **conductors**
(5) **insulator**

(3) All metals are good conductors of electricity.
(4) It is the metal wire that connects the appliances to the power points to supply power.
(5) The cord of electrical appliances are covered with insulators

.

Q2.
(1) **D**
(2) **B**

(1) To light bulb, one wire from the bulb needs to be connected to the positive (+) terminal of the battery and the other wire connected to the negative (-) terminal of the battery.
(2) The materials made from metal will conduct electricity.

Q3.
(1) **Bulb socket**
(2) **Bulb**
(3) **Wires**
(4) **Battery**
(5) **Switch**

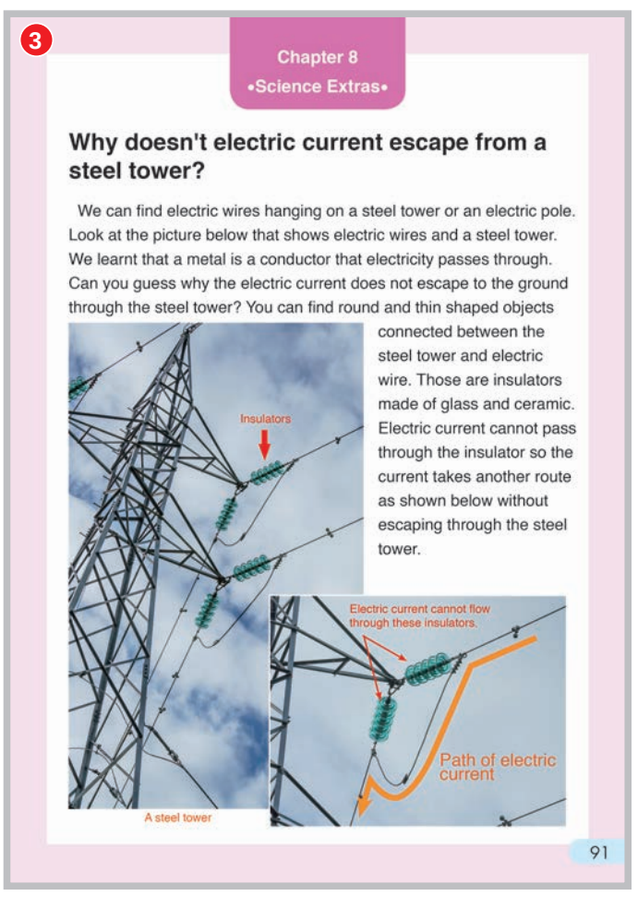
(1) This part of the circuit holds the bulb and connects it to the wires.
(2) The bulb lights to show the complete pathway of electricity in the circuit,
(3) Connects the bulb, the battery and the switch in order to complete the pathway for the electricity to flow.
(4) The electricity source that produce electricity when its positive and negative terminal are correctly in a circuit.
(5) The control of the flow of electricity in a circuit by closing to complete the circuit and opening to create a gap thus stopping the flow of electricity.

Q4. **(Example of the answer)**
**The rubber is an insulator. It prevents the electric current from flowing our body and getting electric shocks.**

### Explanation of Science Extras

**3 Science Extras (10 min.)**

- Give opportunities to students to closely observe the nature and its phenomena in the world.
- Allow students to ask questions that demonstrate curiosity about the content in the science extra.



**Lesson**
**9 / 9**

**Lesson Title**

# Chapter Test

**Answer of the Chapter Test**

*Chapter Test*

## 8. Electricity 1

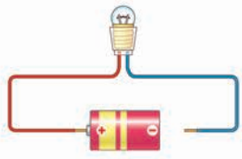
**Q1** Complete each sentence with the correct word.

(1) Electricity is a form of Energy which has an ability to do things.
(2) Two main sources of electricity are power points and batteries.
(3) The circle of a pathway that electricity flows is called an electric Current.
(4) A dry cell has a positive terminal and negative terminal.

**Q2** Choose the letter with the correct answer.

(1) Which of the sentences is correct about the circuit shown?

(A) The circuit is an open circuit.
B. The bulb lights.
C. The electric current can flow in the circuit.
D. The circuit is a closed circuit.



(2) Which of the following materials is a conductor of electricity?

A. Rubber band
B. Drinking glass
(C) Metal spoon
D. Wooden ruler

(3) What is the covering of the electrical cords made of?

A. Metal
B. Gold
C. Steel
(D) Rubber

(4) Which is the best example of a device that runs on batteries?

A. Electric stove
(B) Wrist watch
C. Television
D. Refrigerator

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## Q3

(1) Name two devices that use battery to work.

flashlight, cell phone, watch, camera, etc.

(2) Name two materials that electric current does not flow through easily.

plastic, rubber, wood, glass

(3) What is the function of a switch in an electric circuit?

A switch can control the electricity travelling through a circuit.

(4) Look at the picture on the right. How do we change the connection of the wire to light the bulb?

One of the wires keep connecting to the positive terminal of the dry cell, while the other must connect to the negative terminal of the dry cell.

## Q4

When we are using a computer, electric current travels through its power cord from a power point. Explain why you don't get electric shock when you touch the power cord.

A power code is covered by insulator such as rubber or plastic. Therefore, electric current traveling through the metal wire inside the power code does not escape to your body even if you touch the power code.

Strand : LIFE
Unit : ANIMALS

# Chapter 10. Life Cycle of Animals

## Chapter Objectives

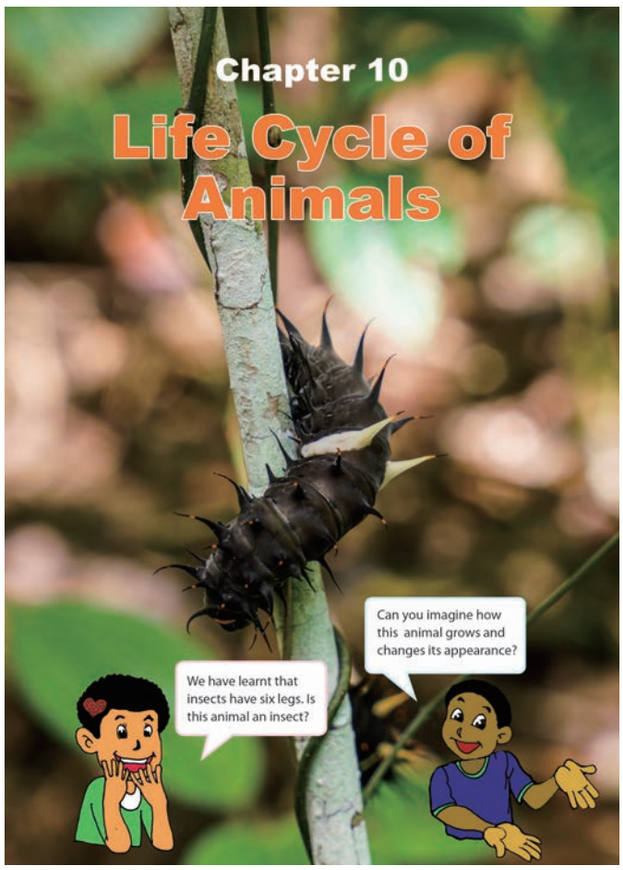
Students will be able to understand the life cycle of animals such as insects, fish, amphibians, reptiles, birds and mammals and recognise the similarities and differences in the cycle among the animal groups.

## Topic Objectives

### 10.1 Stages of Life Cycle of Animals

Students will be able to;

- Describe each stage of the life cycle of insects.
- Describe how fish and amphibians grow and change.
- Describe the similarities and differences in the life cycles of reptiles and birds.
- Describe the life cycle of mammals.




The picture at the chapter heading in the textbook shows a larva that will grow into a butterfly.

## Related Learning Contents

The learning contents in this chapter connect to the following chapters.

| Grade 3 | Grade 4 | Grade 5 | Grade 6 |
|---|---|---|---|
| - Characteristics of Animals | - Life Cycle of Animals | - Reproduction and Heredity in Animals | - Human Body System |

Prior knowledge for learning this chapter;

- Animals can be grouped as insects, fish, amphibians, reptiles, birds and mammals.
- Animals in the same group have common characteristics.

## Teaching Overview

This chapter consists of 6 lessons, each lesson is a double period.

| Topic | Lesson No. | Lesson Title and Key Question | Content standard in syllabus | Textbook page number |
|---|---|---|---|---|
| 10.1 Stages of Life Cycle of Animals | 1 | **Life Cycle of Insects**<br>What is a life cycle of an insect? | 4.1.2 | 105 -106 |
| | 2 | **Life Cycle of Fish and Amphibians**<br>What is the life cycle of a fish and an amphibian? | | 107 - 108 |
| | 3 | **Life Cycle of Reptiles and Birds**<br>What is the life cycle of a reptile and a bird? | | 109 - 110 |
| | 4 | **Life Cycle of Mammals**<br>What is the life cycle of mammals? | | 111 - 112 |
| | 5 | Summary and Exercise | | 113 - 115 |
| Chapter Test | 6 | Chapter Test | | 116 - 117 |

| Unit | Chapter : **10. Life Cycle of Animals** | Total lesson No: 39 / 97 |
|---|---|---|
| **Animals** | Topic : **10.1. Stages of Life Cycle of Animals** | Textbook page: 105 - 106 |

**Lesson** 1 / 6

**Lesson Title**

# Life Cycle of Insects

**Preparation**

- Pictures of each stage of butterfly and grasshopper

## Lesson Flow

**1 Introduction (10 min.)**

- Recap Grade 3 lesson on 'Observing Animals' by asking;

Q:Name the six main groups of animals

Q:What group does a butterfly belong to?

- Encourage students to think about the life cycle of a butterfly;

Q:How has this butterfly grown and changed?

**2 Introduce the key question**

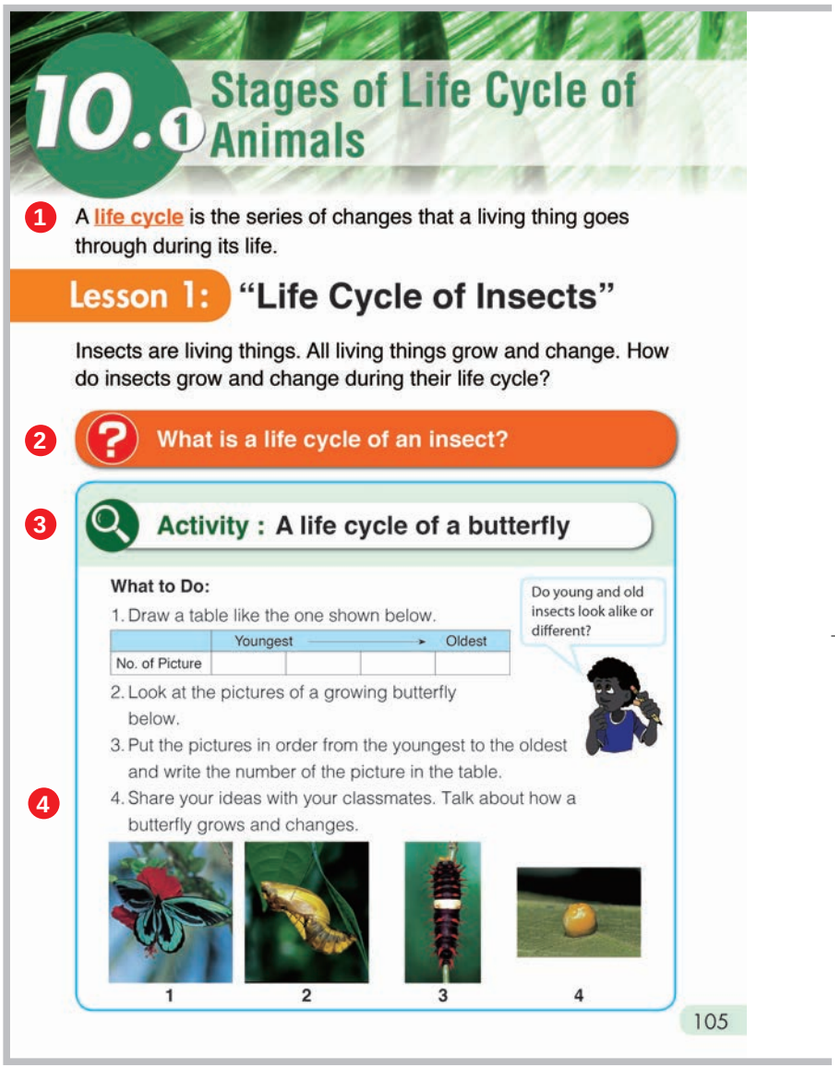
What is a life cycle of an insect?

**3 Activity (20 min.)**

- Explain the steps of the activity.
- Ask students to draw a table to fill with their findings.
- Ask students to do the activity.
- Give enough time to students for their investigation.

**4 Discussion for findings (20 min.)**

- Ask students to present their findings from the activity.
- Write down their results on the blackboard.
- Confirm their results with students.
- **Based on their findings,** explain the life cycle and each stage of a butterfly. **(Continue)**




## Teacher's Notes

Life cycle of Insects

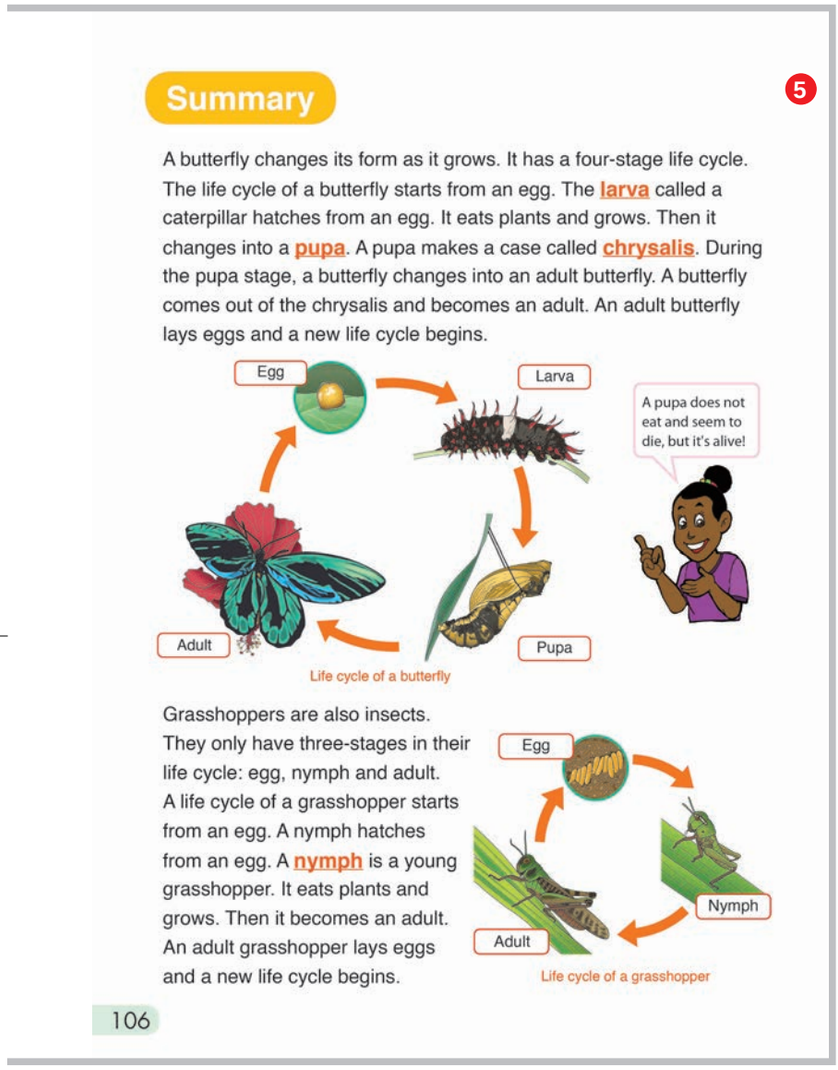
- Most insects start life inside an egg. The animal that comes out of the egg looks different from its parents and is called a pupa. It is inactive no feeding at this stage and does not have wings. It may not even have legs. As the insect grows, it starts to change shape. This change is called metamorphosis. There are two kinds of metamorphosis, called incomplete and complete. Depending upon the species, an insect's life stages are characterised by either complete or incomplete metamorphosis.
- Examples of insects that go through a complete metamorphosis are beetles, wasps, bees, ants, flies, moths and butterflies.
- Insects that undergo incomplete have three life stages: egg, nymph (larva) and adult.
- Insect species that undergo incomplete metamorphosis include silverfish, mayflies, dragonflies, damselflies, stoneflies, cockroaches, termites, praying mantis, earwigs, grasshoppers and stick-insects.
- Grade 4 students will study about only the complete metamorphosis.

## Lesson Objectives

Students will be able to:
- Describe each stage of a butterfly life cycle.
- Recognise that different insects have different life cycles.

## Assessment

Students are able to:
- Identify each stage of the butterfly life cycle which are egg, larva, pupa and adult.
- Compare the life cycle of a butterfly with that of a grasshopper.
- Explain the similarities and differences in the life cycle of a butterfly and a grasshopper.



**Summary** 5

A butterfly changes its form as it grows. It has a four-stage life cycle. The life cycle of a butterfly starts from an egg. The **larva** called a caterpillar hatches from an egg. It eats plants and grows. Then it changes into a **pupa**. A pupa makes a case called **chrysalis**. During the pupa stage, a butterfly changes into an adult butterfly. A butterfly comes out of the chrysalis and becomes an adult. An adult butterfly lays eggs and a new life cycle begins.



Life cycle of a butterfly

Grasshoppers are also insects. They only have three-stages in their life cycle: egg, nymph and adult. A life cycle of a grasshopper starts from an egg. A nymph hatches from an egg. A **nymph** is a young grasshopper. It eats plants and grows. Then it becomes an adult. An adult grasshopper lays eggs and a new life cycle begins.



Life cycle of a grasshopper

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- Ask the following questions as discussion point.

Q:What are the stages of the life cycle of a butterfly? (Egg, larva, pupa, adult)

Q:Do young and adult butterfly look similar or different? (They look different.)

Q:What does the life cycle of a butterfly begin with? (Egg)

- Let students open the textbook and explain the life cycle of a grasshopper.
- Ask the same questions in Q1, Q2, and Q3 about a grasshopper.
- Ask the following question;

Q:How are the stages of a butterfly and grasshopper alike or different? (Their life cycles begins with an egg. A butterfly goes through 4 stages and the young are totally different from the adult. For a grasshopper it goes through 3 stages and the young looks similar to the adult.)

- Conclude the discussion.

**5 Summary (5 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: What are the stages of a butterfly life cycle?
  Q: What are the stages of a grasshopper life cycle?
  Q: How are the stages of a butterfly and grasshopper alike or different?
- Ask students to copy the notes on the blackboard in their exercise books.

## Sample Blackboard Plan

Title:

"Life Cycle of Insects"

Key question

Q: What is a life cycle of an insect?

Activity

A life cycle of a butterfly

Arrange from young to old

| | youngest | | | oldest |
|---|---|---|---|---|
| No. of Pic | 4 | 3 | 2 | 1 |

Discussion

Q: What are the stages of the life cycle of a butterfly? Egg, Larva-, pupa, adult

Q: Do young and adult butterfly look similar or different? They looked different

Q: What are the stages of the life cycle of a grasshopper? Egg, Nymph, adult

Q: Do young and adult grasshopper look similar or different? They looked similar

Q: How are the stages of the butterfly and grasshopper alike or different?

Their life cycles begins with an egg. Their stages are different. Young butterfly is different from adult one. Young grasshopper is different from the adult one.

Summary

1. Life Cycle of a Butterfly:
   - Egg, larva, pupa and adult
   - A life cycle begins with an egg.
   - Young butterfly is different from an adult.
2. Life Cycle of a Grasshopper
   - Egg, Nymph, and adult
   - A life cycle begins with an egg.
   - Young grasshopper is similar to adult one.

| Unit | Chapter : **10. Life Cycle of Animals** | Total lesson No: 40 /97 |
|---|---|---|
| **Animals** | Topic : **10.1. Stages of Life Cycle of Animals** | Textbook page: 107 - 108 |

**Lesson** 2 / 6

**Lesson Title**

# Life Cycle of Fish and Amphibians

**Preparation**

- Pictures of each stage of fish and amphibians

## Lesson Flow

**1 Introduction (10 min.)**

- Review the previous lesson:

Q:What are the stages of a butterfly and a grasshopper life cycles?

Q:How are the stages of a butterfly and grasshopper alike or different?

- Encourage students to think about the life cycle of fish and amphibians by introducing "Key Question".

**2 Introduce the key question**

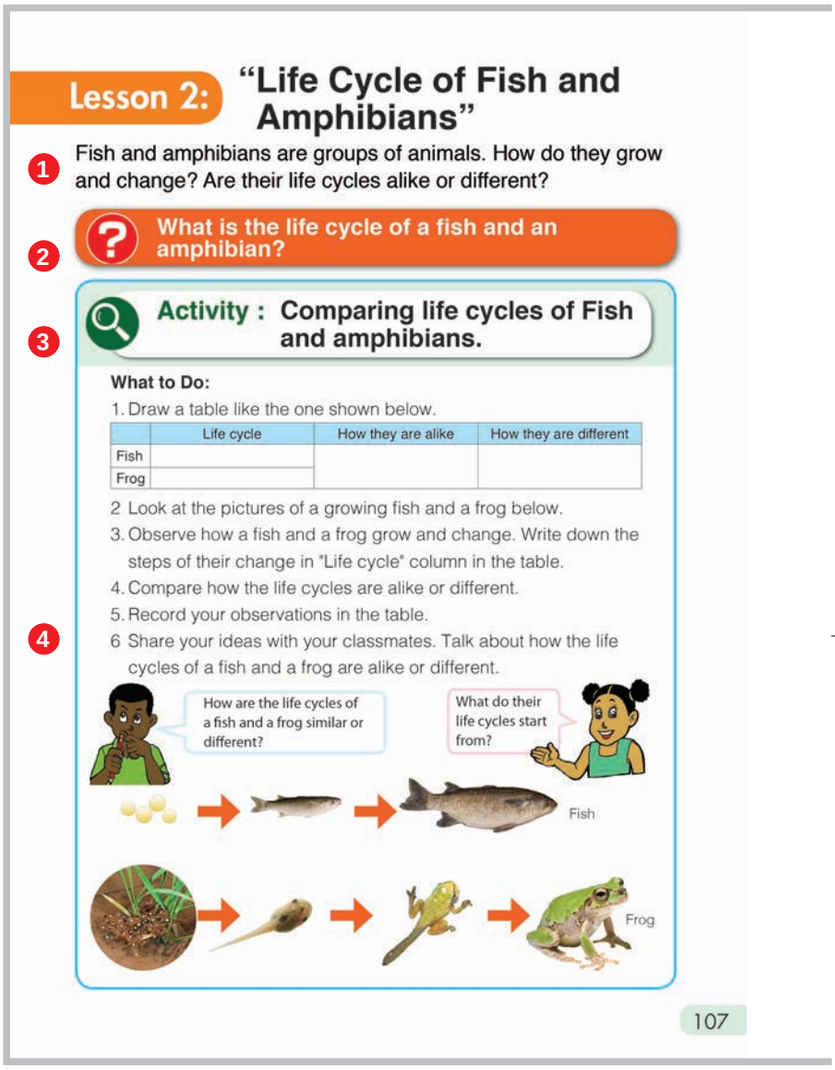
What is the life cycle of a fish and an amphibian?

**3 Activity (20 min.)**

- Organise students to groups.
- Explain the steps of the activity.
- Ask students to make a table and list their findings.
- Ask students to refer to the pictures and what the characters are saying in the activity for their investigation.
- Give enough time to students for their investigation.

**4 Discussion for findings (20 min.)**

- Ask students to present their findings from the activity.**(Continue)**



Lesson 2: "Life Cycle of Fish and Amphibians"

1 Fish and amphibians are groups of animals. How do they grow and change? Are their life cycles alike or different?

2 What is the life cycle of a fish and an amphibian?

3 Activity : Comparing life cycles of Fish and amphibians.

What to Do:

1. Draw a table like the one shown below.

| | Life cycle | How they are alike | How they are different |
|---|---|---|---|
| Fish | | | |
| Frog | | | |

2 Look at the pictures of a growing fish and a frog below.
3. Observe how a fish and a frog grow and change. Write down the steps of their change in "Life cycle" column in the table.
4. Compare how the life cycles are alike or different.
5. Record your observations in the table.
6 Share your ideas with your classmates. Talk about how the life cycles of a fish and a frog are alike or different.

4



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## Teacher's Notes

### Life Cycle of Amphibians

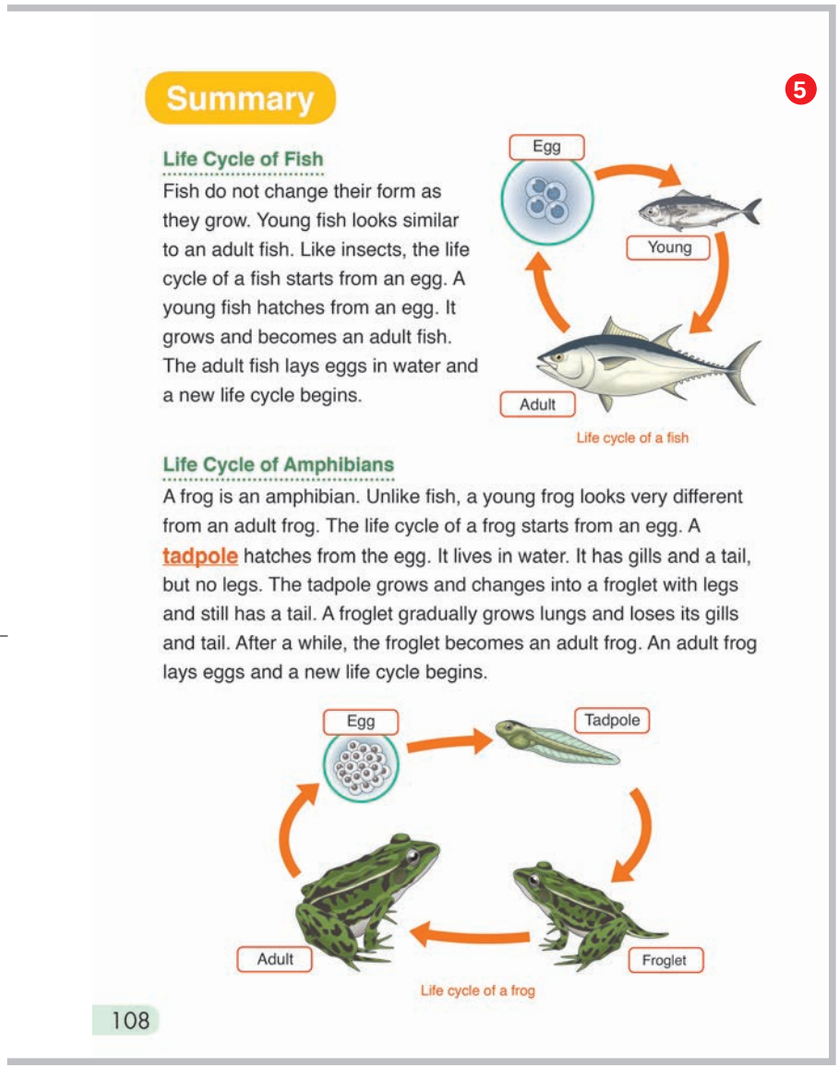
- Amphibians have a backbone and are cold-blooded; their body temperature is dependent on the environment. Amphibians have some of the typical characteristics of fish and reptiles.
- The fertilised eggs are just the first stage in a remarkable transformation called metamorphosis. This describes the process of change from egg to the larval stage, through to adult amphibian.
- They spend part of their lives on land and in water. They start their lives as eggs in water then develop into larva that breathe through gills like fish. They end their lives on land as adults that breathe air using their lungs and skin.
- Metamorphosis is the final process that changes the amphibian from larval to adult.
- Incomplete metamorphosis occurs where there are fewer than four stages. This is the case for many fish. Fish shortly after they hatch. Many fish essentially have all the features of an adult.

## Lesson Objectives

Students will be able to:
- Describe how fish and amphibians grow and change.
- Compare the life cycles of a fish and a frog.

## Assessment

Students are able to:
- Explain the similarities and differences in the life cycle of fish and amphibians.
- State each stage of the frog life cycle.



Summary

5

**Life Cycle of Fish**

Fish do not change their form as they grow. Young fish looks similar to an adult fish. Like insects, the life cycle of a fish starts from an egg. A young fish hatches from an egg. It grows and becomes an adult fish. The adult fish lays eggs in water and a new life cycle begins.



Life cycle of a fish

**Life Cycle of Amphibians**

A frog is an amphibian. Unlike fish, a young frog looks very different from an adult frog. The life cycle of a frog starts from an egg. A tadpole hatches from the egg. It lives in water. It has gills and a tail, but no legs. The tadpole grows and changes into a froglet with legs and still has a tail. A froglet gradually grows lungs and loses its gills and tail. After a while, the froglet becomes an adult frog. An adult frog lays eggs and a new life cycle begins.



Life cycle of a frog

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- Write down their results on a blackboard.
- Confirm the results with students.
- **Based on their findings,** ask the following questions.

Q:What are the life cycles of a fish and a frog? (Fish: egg-young fish-adult fish)
Frog: egg- tadpole- froglet- adult frog)

Q:How are the life cycle of a fish and a frog similar? (Both animal cycles begin with egg)

Q:How are the life cycle of fish and a frog different? (Their stages are different. Young fish is similar to adult fish, but young frog is different from adult frog.)

- Conclude the discussion.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: What are the stages of fish life cycle?
  Q: What are the stages of frog life cycle?
  Q: How are the life cycles of a fish and a frog similar?
  Q: How are the life cycle of a fish and a frog different?
- Ask students to copy the notes on the blackboard in their exercise books.

## Sample Blackboard Plan

Title:
"Life Cycles of Fish and Amphibians"

Key question
What is the life cycle of a fish and an amphibian?

Activity: Similarities and differences of life cycles

| | Life Cycle | How they are alike | How they are different |
|---|---|---|---|
| Fish | Egg - young - adult | Both animal cycles begin with egg | Young fish is similar to adult fish. Young frog is different from adult frog. |
| Frog | Egg - tadpole - froglet - adult | | |

Discussion

Q: What are the life cycle of fish and a frog?
Fish: egg-young fish-adult fish
Frog: egg- tadpole- froglet-adult frog

Q: How are the life cycle of fish and a frog similar?
Both animal cycles begin with egg

Q: How are the life cycle of fish and a frog different?
Their stages are different. Young fish is similar to adult fish, but young frog is different from adult frog.

Summary

1. Life Cycle of Fish:
   - Egg, young fish, adult
   - Young fish is similar to adult fish.
2. Life Cycle of Frog
   - Egg, tadpole, froglet and adult
   - Young frog is not similar to adult frog.
3. Similarity and Difference
   The life cycle of fish and frog begin with egg. Their stages are different. Young fish is similar to adult fish, but young frog is different is from adult one.

| Unit | Chapter : **10. Life Cycle of Animals** | Total lesson No: 41 /97 |
|---|---|---|
| **Animals** | Topic : **10.1. Stages of Life Cycle of Animals** | Textbook page: 109 - 110 |

**Lesson** 3 / 6

**Lesson Title**

# Life Cycle of Reptiles and Birds

**Preparation**

- Pictures of each stage of reptiles and birds

## Lesson Flow

**1 Introduction (10 min.)**

- Review the previous lesson:

Q:What are the stages of fish and a frog life cycle?

Q:How are the stages of fish and a frog similar or different?

- Encourage students to think about the life cycle of reptiles and birds by introducing "Key Question"

**2 Introduce the key question**

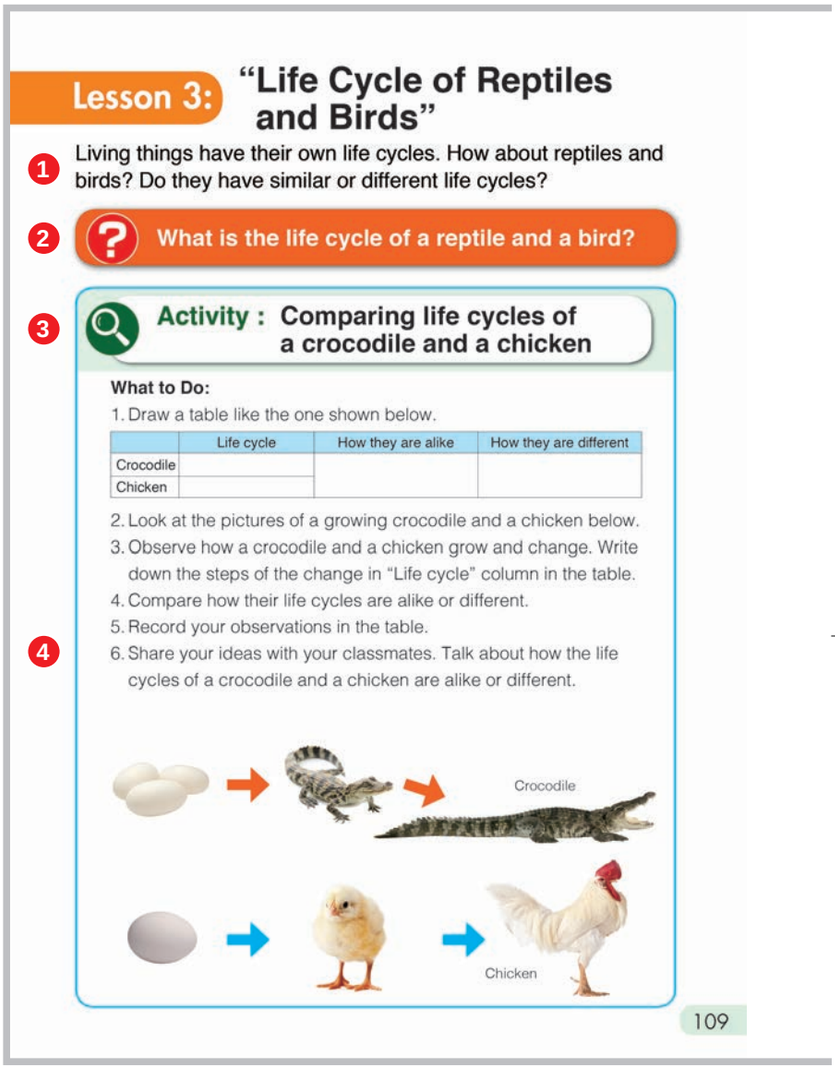
What is the life cycle of a reptile and a bird?

**3 Activity (20 min.)**

- Organise students in groups.
- Explain the steps of the activity.
- Ask students to make a table and list their findings.
- Refer students to the pictures of the growth of a crocodile and a chicken and compare the similarities and differences between their life cycles.
- Give enough time to the students for their investigation.

**4 Discussion for findings (20 min.)**

- Ask students to present their findings from the activity.**(Continue)**



Lesson 3: "Life Cycle of Reptiles and Birds"

1 Living things have their own life cycles. How about reptiles and birds? Do they have similar or different life cycles?

2 What is the life cycle of a reptile and a bird?

3 Activity : Comparing life cycles of a crocodile and a chicken

What to Do:

1. Draw a table like the one shown below.

| | Life cycle | How they are alike | How they are different |
|---|---|---|---|
| Crocodile | | | |
| Chicken | | | |

2. Look at the pictures of a growing crocodile and a chicken below.
3. Observe how a crocodile and a chicken grow and change. Write down the steps of the change in "Life cycle" column in the table.
4. Compare how their life cycles are alike or different.
5. Record your observations in the table.
6. Share your ideas with your classmates. Talk about how the life cycles of a crocodile and a chicken are alike or different.

4



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## Teacher's Notes

### Life Cycle of Reptiles and Birds

- Reptiles begin their lives as embryos in amniotic eggs. This means the embryos are cushioned and protected by a surrounding amniotic membrane. These eggs are larger than eggs that do not have amniotic membranes. Once a batch of eggs is fertilized, the female reptile will bury the eggs in a hole or lay them underground. In most cases, the female reptile leaves the eggs to hatch alone. Juvenile reptiles look similar to the adults of their species; they do not undergo the metamorphosis common in insects and amphibians. Reptiles grow slowly until they reach adult size and sexual maturity.
- A bird's life begins within an egg. A baby bird that has just hatched is called a hatchling. While the hatchling is growing in the nest and being fed by its parents we call it a nestling. When a nestling grows its flight feathers and is ready to leave the nest it takes its first flight or fledges. We call a bird that has just fledged a fledgling. When a fledgling or juvenile has finished growing it becomes a mature or adult bird.

## Lesson Objectives

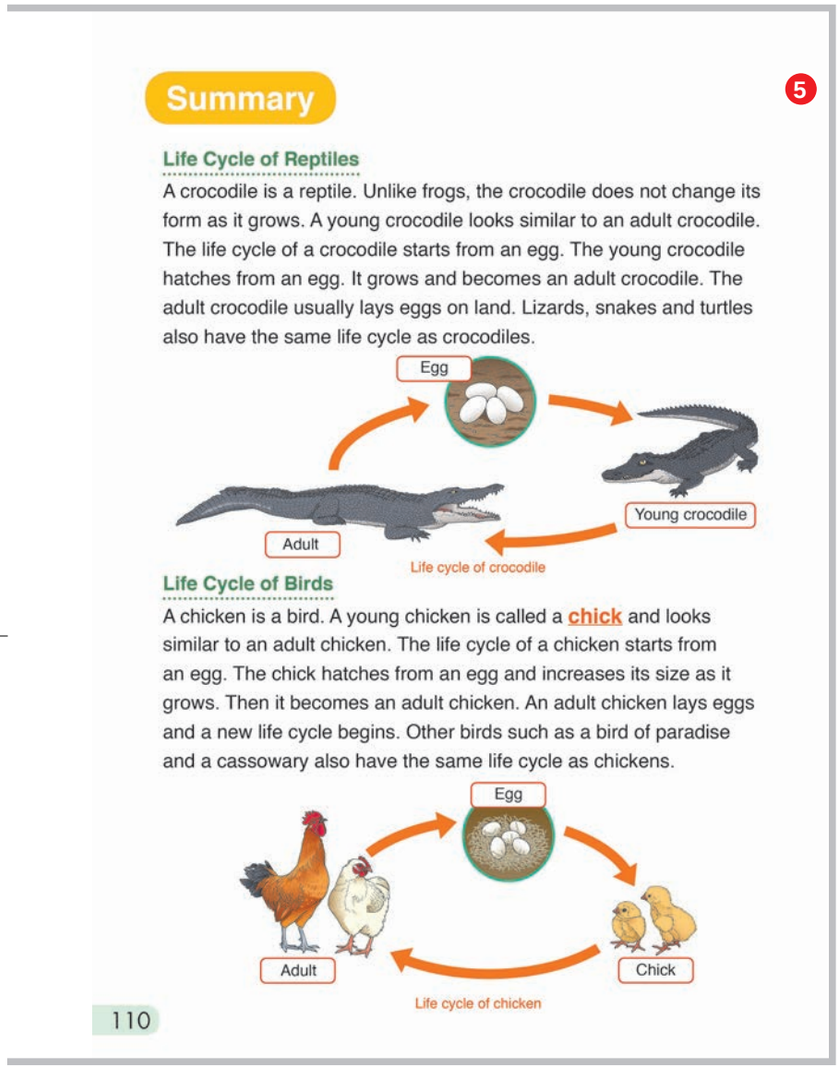
Students will be able to:

- Describe the similarities and differences in the life cycle of reptiles and birds.
- Compare how reptiles and birds grow and change.

## Assessment

Students are able to:

- Explain the similarities and differences in the life cycle of a crocodile and a chicken.
- State that reptiles and birds hatch from eggs and as their young grow they looks similar to its adults.



Summary

5

**Life Cycle of Reptiles**

A crocodile is a reptile. Unlike frogs, the crocodile does not change its form as it grows. A young crocodile looks similar to an adult crocodile. The life cycle of a crocodile starts from an egg. The young crocodile hatches from an egg. It grows and becomes an adult crocodile. The adult crocodile usually lays eggs on land. Lizards, snakes and turtles also have the same life cycle as crocodiles.



**Life Cycle of Birds**

A chicken is a bird. A young chicken is called a **chick** and looks similar to an adult chicken. The life cycle of a chicken starts from an egg. The chick hatches from an egg and increases its size as it grows. Then it becomes an adult chicken. An adult chicken lays eggs and a new life cycle begins. Other birds such as a bird of paradise and a cassowary also have the same life cycle as chickens.



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- Write down their results on a blackboard.
- Confirm the results with students.
- **Based on their findings,** ask the following questions.

Q:What is the life cycle of a crocodile? (Egg-young crocodile-adult crocodile)

Q:What is the life cycle of a chicken? (Egg-chick-adult chicken)

Q:How is the life cycle of a crocodile and a chicken similar or different?
(Both animal cycles begin with eggs. Both young animals are similar to their adults.)

Q:What are examples of animals that belong to reptiles? (Crocodiles, lizards, snakes, etc.)

Q:What are examples of animals that belong to birds. (Chicken,duck, cassowary, etc.)

- Conclude the discussion.

**5 Summary (5 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: Explain the life cycle of reptiles.
  Q: Explain the life cycle of birds.
  Q: How is the life cycle of a crocodile and a chicken similar or different?
- Ask students to copy the notes on the blackboard in their exercise books.

## Sample Blackboard Plan

Title:

"Life Cycles of Reptiles and Birds"

Key question

What is the life cycle of a reptile and a bird?

Activity: Comparing life cycles of a crocodile and a chicken

| A Life Cycle of a crocodile | A Life Cycle of a chicken |
|---|---|
| Starts life cycle by laying eggs<br>Lays eggs on land | Starts life cycle by laying eggs<br>Lays egg on land |
| Appearance remains the same as they grow up.<br>Has three stages in the life cycle. | Appearance remains same as they grow up.<br>Has three stages in life cycle. |

Discussion

Q: What is the life cycle of a crocodile?
Egg-young crocodile-adult crocodile

Q: What is the life cycle of a chicken?
Egg-chick-adult chicken

Q: How is the life cycle of a crocodile and a chicken similar or different?
Both animal cycles begin with eggs and appearance remains the same like an adult throughout the stages.

Summary

1. Life Cycle of Reptiles:
   - Egg, young, adult
   - Young is similar to adult.
2. Life Cycle of Birds:
   - Egg, young, adult
   - Young is similar to adult.
3. Similarities and Differences
   - Most reptiles and Birds begin their life cycle by laying eggs.
   - Young reptiles and birds look similar to their adults as they change and grow.

| Unit | Chapter : **10. Life Cycle of Animals** | Total lesson No: 42 / 97 |
|---|---|---|
| **Animals** | Topic : **10.1. Stages of Life Cycle of Animals** | Textbook page: 111 - 112 |

**Lesson** 4 / 6

**Lesson Title**

# Life Cycle of Mammals

**Preparation**

- Pictures of each stage of different mammals

## Lesson Flow

**1 Introduction (10 min.)**

- Review the previous lesson:

Q:What is the life cycle of a crocodile and a chicken?

Q:How is the life cycle of a crocodile and a chicken similar or different?

- Encourage students to think about the life cycle of mammals by introducing "Key Question"

**2 Introduce the key question**

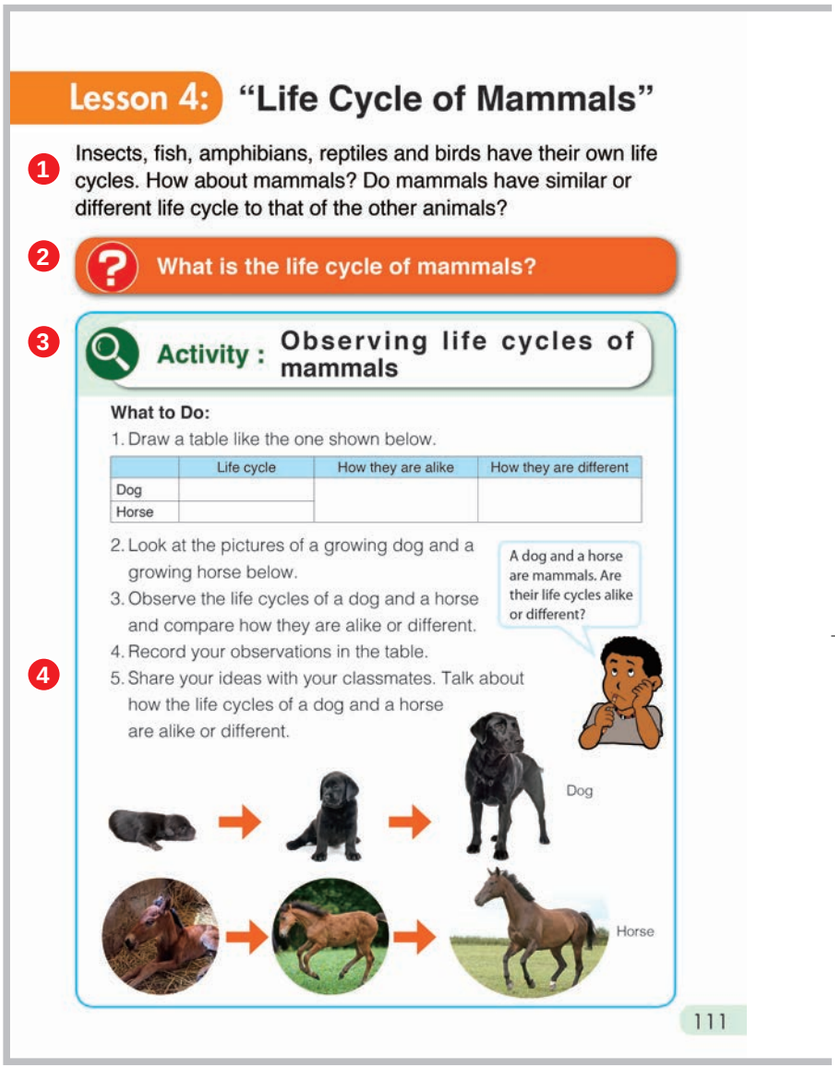
What is the life cycle of mammals?

**3 Activity (20 min.)**

- Organise students in groups.
- Explain the steps of the activity.
- Ask students to make a table and list their findings.
- Refer students to the pictures of the growth of a crocodile and a chicken and compare the similarities and differences between their life cycles.
- Give enough time for the students for their investigations.

**4 Discussion for findings (20 min.)**

- Ask students to present their findings from the activity.
- Write down their results on the blackboard.
- Confirm the results with students. **(Continue)**



Lesson 4: "Life Cycle of Mammals"

1 Insects, fish, amphibians, reptiles and birds have their own life cycles. How about mammals? Do mammals have similar or different life cycle to that of the other animals?

2 What is the life cycle of mammals?

3 Activity : Observing life cycles of mammals

What to Do:

1. Draw a table like the one shown below.

| | Life cycle | How they are alike | How they are different |
|---|---|---|---|
| Dog | | | |
| Horse | | | |

2. Look at the pictures of a growing dog and a growing horse below.
3. Observe the life cycles of a dog and a horse and compare how they are alike or different.
4. Record your observations in the table.
5. Share your ideas with your classmates. Talk about how the life cycles of a dog and a horse are alike or different.

4

A dog and a horse are mammals. Are their life cycles alike or different?

Dog

Horse

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## Teacher's Notes

### Additional information about a life cycle of mammals

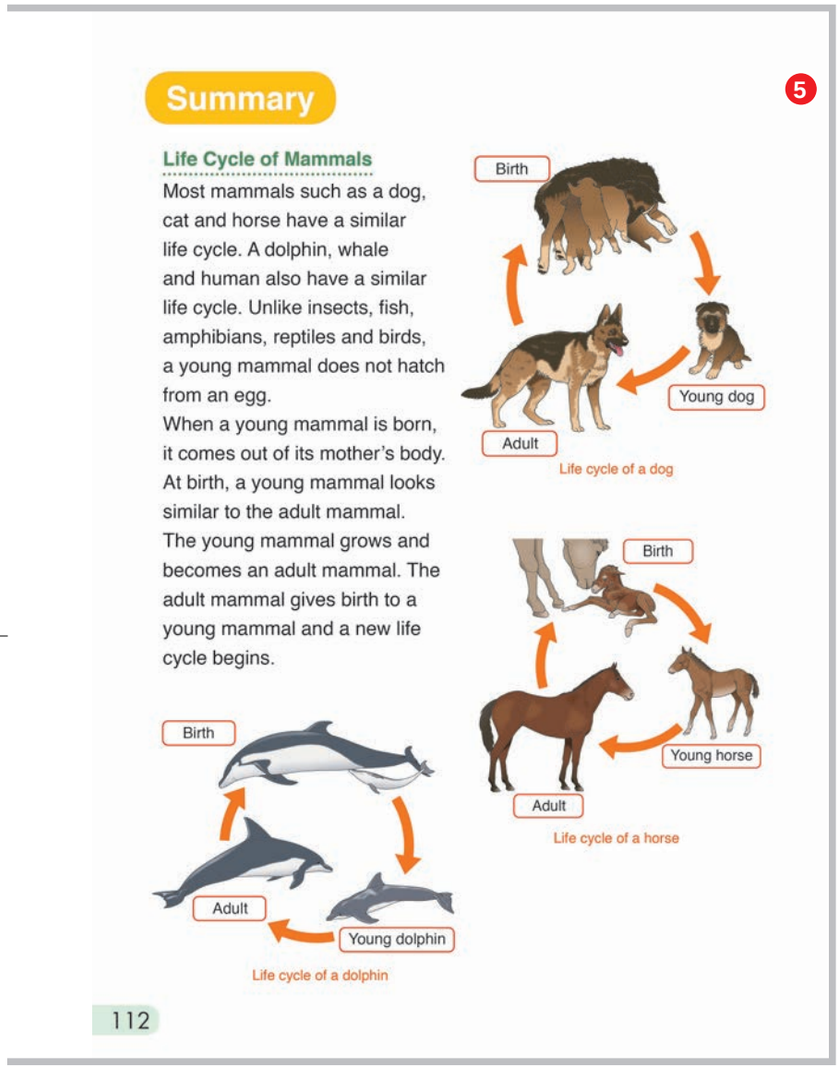
- Most mammals have very simple life cycle. They have 3 stages; before birth, young and adult, however, the complicated transformation like insects occurs in mother's body before birth (reproduction). Therefore, a life cycle of mammals seems to be simple. The "reproduction in human" will be studied in Grade 5. Please refer to that lesson for more information.
- Mammals are classified into three different groups; monotreme, marsupial and placental mammals. The simple life cycle is for placental mammals and monotremes and marsupials have a different live cycle.
- Placental mammals is the majority of mammal species alive today. There are about 5000 placental mammals on the Earth. It completes embryo development inside the mother, nourished by an organ called the placenta.
- Marsupial is a mammal that raises its newborn offspring inside an external pouch in front or on underside of its bodies. There are about 500 species on the Earth and many of them are found in PNG. More information is introduced in "science extra" on page 115.
- Monotreme is a mammal that lay eggs. There are 2 spices, platypus (duck bill) and echidna (spiny anteater). The female monotreme lays one leathery-egg directly into a shallow pouch in her belly. A tiny baby hatches usually in about ten days and is kept in the pouch. Monotremes don't have nipples. Milk seeps out of pores in the mother's abdomen and the young laps it up.

## Lesson Objectives

Students will be able to:
- Describe the life cycle of mammals.
- Compare the life cycles of different kinds of mammals.

## Assessment

Students are able to:
- List how dogs and horses grow and change in their life cycles.
- State the common characteristics of mammal life cycle.
- Identify the differences of the life cycle between mammals and other animal groups.




- **Based on their findings,** ask the questions as discussion point.

Q:What is common life cycle of a dog and a horse? (They are born from their adult. They grow and become an adult. The young looks similar to the adult.)

Q:How is the life cycle of mammal different from other animal groups? (Mammals give birth to their young, but the other animal groups begin their life cycle with an egg.)

- Have students think about dolphins:

Q:Is dolphin a mammal or a fish? (mammal)

Q:Can you guess the life cycle of a dolphin? Why is it called a mammal? (A dolphin is also born from its adult, the young grows and becomes an adult. The young is similar to their adult. So, a dolphin is a mammal.)

- Conclude the discussion.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: What is common about life cycle of mammals?
  Q: How is the life cycle of mammals different from other animal groups?
- Ask students to copy the notes on the blackboard in their exercise books.

## Sample Blackboard Plan

Title:

"Life cycle of Mammals"

Key question

What is the life cycle of Mammals?

Activity: Observing life cycles of mammals

| | Life Cycle | How they are alike | How they are different |
|---|---|---|---|
| Dog | Born – young -adult | They are born from their adult, young and adult. The young is similar to their adult. | No difference |
| Horse | Adult | | |

Discussion

Q: What is common life cycle of a dog and a horse? They are born from their adult. They grow and become an adult. The young looks similar to the adult.

Q: How is the life cycle of mammal different from other animal groups? Mammals gives birth to their young, but the other animal groups begin with an egg.

Q: Is dolphin a mammal or a fish? Mammal

Q: Can you guess the life cycle of a dolphin? Why it called a mammal? A dolphin is also born from its adult, the young grows and becomes an adult. The young is similar to their adult. So, a dolphin is a mammal.

Summary

1. Life Cycle of Mammals:
   - Born from adult, young, and adult
   - Young is similar to adult.

2. Difference of Life Cycle between mammals and other animal groups:
   - Mammal gives birth to their young.
   - The other animals groups begin their

| Unit | Chapter : **10. Life Cycle of Animals** | Total lesson No: 43 / 97 |
|---|---|---|
| **Animals** | Topic : **10.1. Stages of Life Cycle of Animals** | Textbook page: 113 - 115 |

**Lesson** 5 / 6

**Lesson Title**

# Summary and Exercise

**Tips of lesson**

## 1 Summary (20 min.)

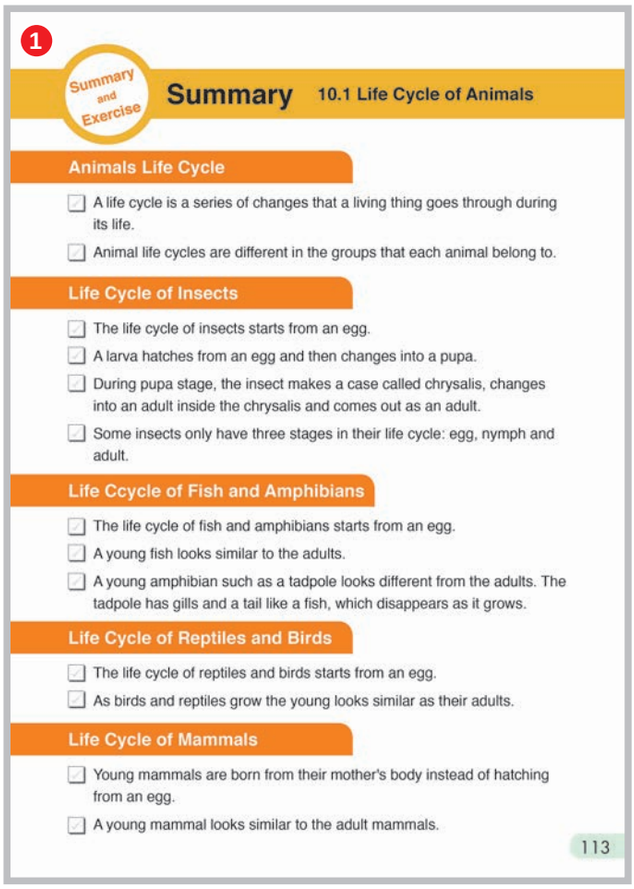
- Recap main learning contents in this topic 'Life cycle of Animals'.
- Ask some questions and to verify student understanding.

Q: How do insects change and grow?

Q:What is the difference in the life cycles of a fish and an amphibian?

Q: How are birds and reptiles similar?

- Explain and correct learning contents again if they still have misconceptions.
- Provoke students to explain and give examples of why a mammal's life cycle is different from all other animals' life cycles.
- Ask students about other animals and their life cycles.



1

Summary and Exercise

**Summary** 10.1 Life Cycle of Animals

**Animals Life Cycle**

- A life cycle is a series of changes that a living thing goes through during its life.
- Animal life cycles are different in the groups that each animal belong to.

**Life Cycle of Insects**

- The life cycle of insects starts from an egg.
- A larva hatches from an egg and then changes into a pupa.
- During pupa stage, the insect makes a case called chrysalis, changes into an adult inside the chrysalis and comes out as an adult.
- Some insects only have three stages in their life cycle: egg, nymph and adult.

**Life Ccycle of Fish and Amphibians**

- The life cycle of fish and amphibians starts from an egg.
- A young fish looks similar to the adults.
- A young amphibian such as a tadpole looks different from the adults. The tadpole has gills and a tail like a fish, which disappears as it grows.

**Life Cycle of Reptiles and Birds**

- The life cycle of reptiles and birds starts from an egg.
- As birds and reptiles grow the young looks similar as their adults.

**Life Cycle of Mammals**

- Young mammals are born from their mother's body instead of hatching from an egg.
- A young mammal looks similar to the adult mammals.

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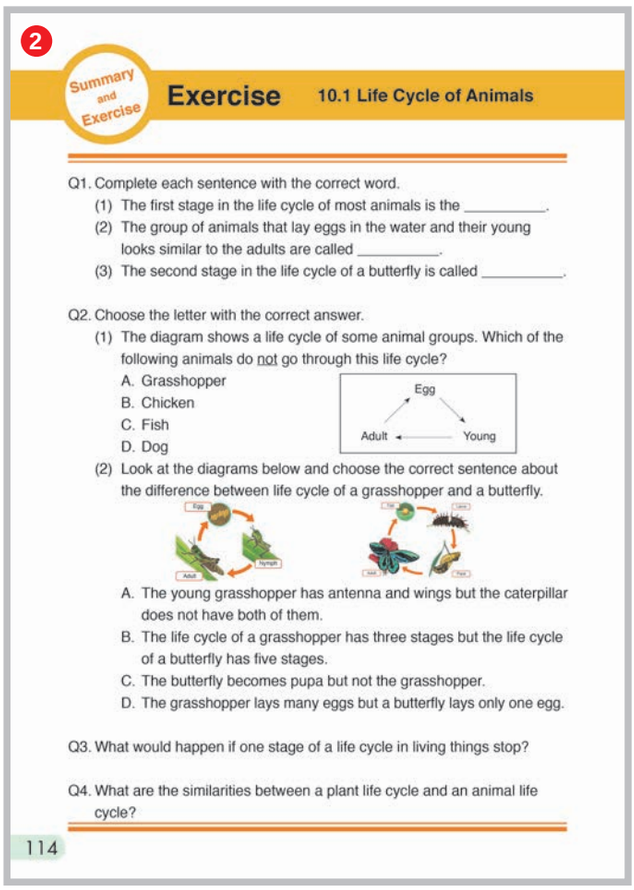
## 2 Exercise & Explanation (35 min.)

- Allow student to enough time to answer the questions individually according to their understanding.
- After the exercise, give them answer of the questions and explain how to solve with asking student's answers and thought



2

Summary and Exercise

**Exercise** 10.1 Life Cycle of Animals

Q1. Complete each sentence with the correct word.

(1) The first stage in the life cycle of most animals is the _____.

(2) The group of animals that lay eggs in the water and their young looks similar to the adults are called _____.

(3) The second stage in the life cycle of a butterfly is called _____.

Q2. Choose the letter with the correct answer.

(1) The diagram shows a life cycle of some animal groups. Which of the following animals do not go through this life cycle?

A. Grasshopper
B. Chicken
C. Fish
D. Dog




(2) Look at the diagrams below and choose the correct sentence about the difference between life cycle of a grasshopper and a butterfly.



A. The young grasshopper has antenna and wings but the caterpillar does not have both of them.
B. The life cycle of a grasshopper has three stages but the life cycle of a butterfly has five stages.
C. The butterfly becomes pupa but not the grasshopper.
D. The grasshopper lays many eggs but a butterfly lays only one egg.

Q3. What would happen if one stage of a life cycle in living things stop?

Q4. What are the similarities between a plant life cycle and an animal life cycle?

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## Exercise answers

Q1.
(1) **Egg**
(2) **Fish**
(3) **Larva**

Q2.
(1) **D**
(2) **C**

Q3

**The living things cannot lay eggs and their offspring cannot start their life cycles and maintain their numbers. The living things will disappear from the world.**

Q4.

**Both plants and animals start to grow from seeds or eggs. They gradually grow by changing shapes and finally reproduce their seeds or eggs and continue life cycle of next generations.**

### Explanation of Science Extras

**3 Science Extras (10 min.)**

- Give opportunities to students to closely observe the nature and its phenomena in the world.
- Allow students to ask questions that demonstrate curiosity about the content in the science extra.

3

Chapter 10
•Science Extras•

**Young mammals that grow inside of mother's pouch**

Marsupials are the group of mammals commonly known as pouched mammals. Many kinds of marsupials such as wallabies, cuscus, tree-kangaroos, possums and sugar gliders live in Papua New Guinea. Why are they called "pouched mammals"?

Most baby mammals spend enough time in their mother's body to grow. They come out from their mother when they are ready to live outside. For example, dogs are pregnant for about 2 months. Pregnancy in female horses is around 11-12 months.
However, marsupials have a slightly different life cycle. They give birth very early but the tiny baby continues to grow in the pouch outside of the mother's body. Female wallabies are pregnant for around 28 days and keep young wallabies for the next 7-8 months in the pouch. The gestation period for a pregnant female cuscus is only around 13 days, but the young cuscus remains in the pouch for about 6–7 months. The pouch is a flap of skin covering the nipples for the young to get milk from.



A mother wallaby and her child in the pouch

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**Lesson**
**6 / 6**

**Lesson Title**

# Chapter Test

**Answer of the Chapter Test**

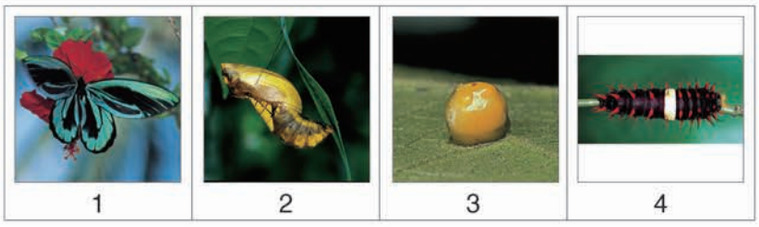
*Chapter Test*

## 10. Life Cycle of Animals

**Q1** Complete each sentence with the correct word.

(1) The first stage in the life cycle of most animals is eggs.
(2) When a frog first hatches from an egg, it is called a tadpole.
(3) A fully grown animal is called an Adult.
(4) When animals make their young again and again is called Reproduce.

**Q2** Look at the pictures below and answer the following questions.




(1) Choose the correct order of stages in life cycle of butterfly.
A. 3 → 4 → 2 → 1 B. 3 → 2 → 4 → 1
C. 2 → 3 → 4 → 1 D. 3 → 4 → 1 → 2

(2) Which of the following statement is about the life cycle of a butterfly?
A. A caterpillar does not have antennae and wings.
B. The pupa feeds on leaves and grows fast.
C. The adult structures develop within the pupa.
D. The young butterfly looks similar to adult.

(3) At which stage of the life cycle of a butterfly does it eat a lot of leaves?
A. 1 B. 2 C. 3 D. 4

(4) At which stage does it stop feeding?
A. 1 B. 2 C. 3 D. 4

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**Q3** Study the pictures of below and answer the following question.



(1) State how the chick looks like the adult chicken?

While the size is different and shape is slightly different, both of them have 2 legs, 2 wings and beak.

(2) What is the difference between life cycle of chickens and pigs?

Chicken lays eggs but a young pig does not hatch from an egg. When a young pig is born, it comes out of its mother's body.

**Q4** Geraldine found many tadpoles in a pond that used their tails to swim around the pond and they also had gills like structures. After some days, he noticed that the tadpoles have disappeared from the pond but there were a lot small frogs with four legs around the pond.

(1) If the four-legged frogs came from pond, what happened to their tails?

The strange frogs with tail in are the form of young normal frogs. They are changing shape from tadpole to frog. The tail of them has disappeared and legs had been grown when they change the shape to normal frog.

(2) What would the tadpoles use their gill like structures for?

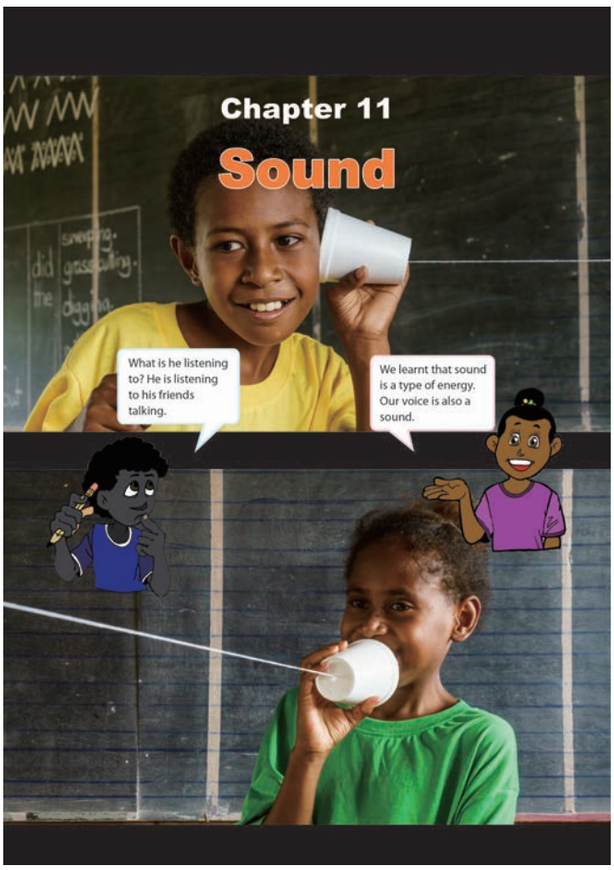
The tadpole can breathe through gills in water and as it changes to frog the lungs are formed to breathe in air and the gills disappeared.

Strand : PHYSICAL SCIENCE
Unit : ENERGY

# Chapter 11. Sound

## Chapter Objectives

Students will be able to understand properties of sound including how sound is made, the way that sound travels through a medium and the relationship between vibrations of sound, volume and pitch.




The picture at the chapter heading in the textbook shows an activity in which students are talking through a string telephone.

## Topic Objectives

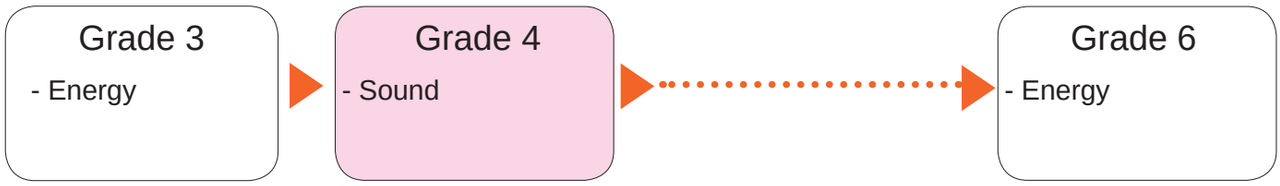
### 11.1 Properties of Sound

Students will be able to;

- Explain that sound is made when the objects vibrate.
- Explain how sound travels.
- Identify the relationship between the sizes of vibrations and the volume of sound.
- Identify the relationship between the speed of vibrations and the pitch of sound.

## Related Learning Contents

The learning contents in this chapter connect to the following chapters.




Prior knowledge for learning this chapter;

- Sound is a form of energy that can be heard.

## Teaching Overview

This chapter consists of 6 lessons, each lesson is a double period.

| Topic | Lesson No. | Lesson Title and Key Question | Content standard in syllabus | Textbook page number |
|---|---|---|---|---|
| 11.1 Properties of Sound | 1 | **Sound**<br>How is sound made? | 4.2.1 | 119 - 120 |
| | 2 | **Sound Travelling**<br>How does sound travel? | | 121 - 122 |
| | 3 | **Soft and Loud Sound**<br>What makes sound soft or loud? | | 123 - 124 |
| | 4 | **High and Low Sound**<br>What makes sound high or low? | | 125 - 126 |
| | 5 | Summary and Exercise | | 127 - 129 |
| Chapter Test | 6 | Chapter Test | | 130 - 131 |

| Unit | Chapter : **11. Sound** | Total lesson No: 45 / 97 |
|---|---|---|
| **Energy** | Topic : **11.1. Properties of Sound** | Textbook page: 119 - 120 |

**Lesson** 1 / 6

**Lesson Title**

# Sound

**Preparation**

- long ruler, rubber band

## Lesson Flow

**1 Introduction (5 min.)**

- Let students close their eyes and listen to the sound around them. Ask the question:

Q:What sound can you hear?

- Encourage students to think about how sounds are made by asking:

Q:What makes sounds?

**2 Introduce the key question**

How is sound made?

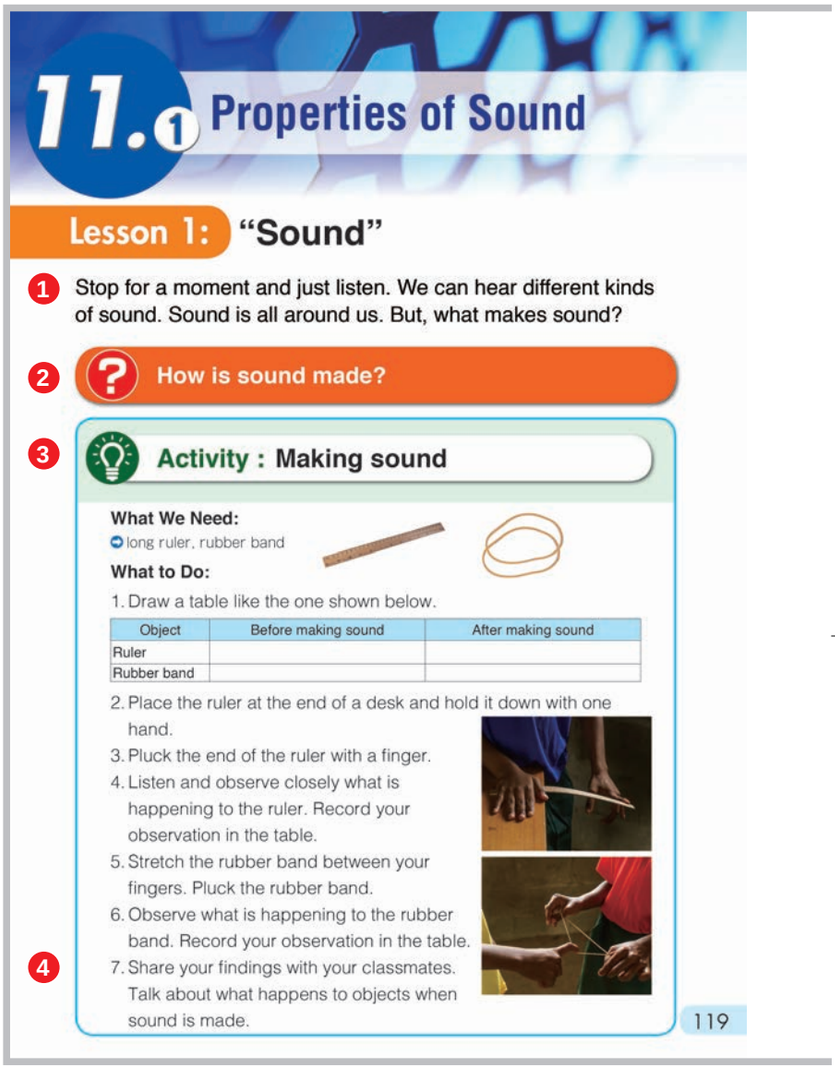
**3 Activity (25 min.)**

- Organise students into groups.
- Explain the steps of the activity.
- Distribute the necessary materials.
- Have students do the activity and ask them to record their findings in the table.
- Give enough time for students to explore their ideas during the activity.

**4 Discussion for findings (20 min.)**

- Ask students to present the results of the activity.
- Write down students' findings on a blackboard.
- Confirm students' results with students.

**(Continue)**



11.1 Properties of Sound

Lesson 1: "Sound"

1 Stop for a moment and just listen. We can hear different kinds of sound. Sound is all around us. But, what makes sound?

2 How is sound made?

3 Activity : Making sound

What We Need:

long ruler, rubber band

What to Do:

1. Draw a table like the one shown below.

| Object | Before making sound | After making sound |
|---|---|---|
| Ruler | | |
| Rubber band | | |

2. Place the ruler at the end of a desk and hold it down with one hand.
3. Pluck the end of the ruler with a finger.
4. Listen and observe closely what is happening to the ruler. Record your observation in the table.
5. Stretch the rubber band between your fingers. Pluck the rubber band.
6. Observe what is happening to the rubber band. Record your observation in the table.
7. Share your findings with your classmates. Talk about what happens to objects when sound is made.

4

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## Teacher's Notes

Tips on how to generate sound

- **Bucket**
  Hit the various sides of the bucket with the palm of the hand.
- **Pet bottle and gravel**
  Put a hand full of smalle sized gravel or some dried seeds into a pet bottle or tin can then shake.
- **Rubber band**
  Stretch the rubber band then have someone pluck the rubber band.
  Be careful not to stretch too much or it will break and cause harm.
- **Plastic bottle**
  Rest your bottom lip on the mouth of the bottle and blow into it.
- Encourage other ways of making sounds
  eg. Clapping hands, snapping fingers, tapping a foot on the floor etc…

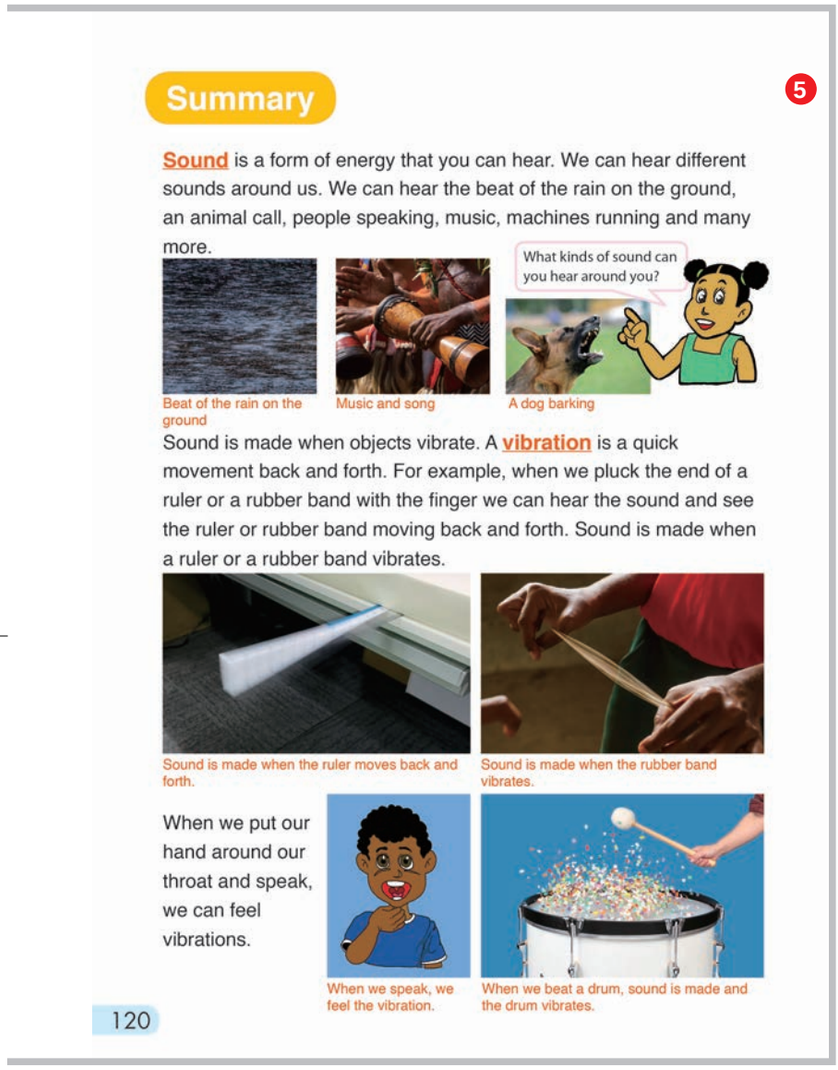
Sounds are produced in different ways with various kinds of materials. Some sounds are very clear and loud enough to hear while others are low and faint or not so clear to hear. Therefore in this lesson allow students to discover freely how sound can be made by themselves and describe how a sound sounds when produced with certain materials.

## Lesson Objectives

Students will be able to:
- Define what sound is.
- Explain how sound is made.

## Assessment

Students are able to:
- Record the results of their observations in a table.
- Relate the vibrations of objects to making a sound based on the results of the activity.
- Take part in the investigation actively.



Summary

**Sound** is a form of energy that you can hear. We can hear different sounds around us. We can hear the beat of the rain on the ground, an animal call, people speaking, music, machines running and many more.



Beat of the rain on the ground | Music and song | A dog barking

Sound is made when objects vibrate. A **vibration** is a quick movement back and forth. For example, when we pluck the end of a ruler or a rubber band with the finger we can hear the sound and see the ruler or rubber band moving back and forth. Sound is made when a ruler or a rubber band vibrates.

Sound is made when the ruler moves back and forth. | Sound is made when the rubber band vibrates.

When we put our hand around our throat and speak, we can feel vibrations.

When we speak, we feel the vibration. | When we beat a drum, sound is made and the drum vibrates.

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- **Based on their findings,** ask the questions as discussion point.

Q:What happened to the ruler before you plucked the ruler? (The ruler didn't move, etc)

Q:What happened to the ruler while the ruler was making sounds? (The ruler was vibrating, it was moving, etc)

Q:What happened to the rubber band before you plucked the rubber band? (The rubber band didn't move, etc)

Q:What happened to the rubber band while it was making sounds? (The rubber band was vibrating, it was moving, etc)

Q:What happened to the objects when sound was made? (They were vibrating, moving, etc.)

- Conclude the discussion.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these question as assessment:
  Q: What is sound?
  Q: How is sound made?
  Q: How can we make a sound?
- Ask students to copy the notes on the blackboard into their exercise books.

## Sample Blackboard Plan

Title:
"Sound"
Key question
How is sound made?
Activity
Making sound

| objects | Before making sound | After making sound |
|---|---|---|
| Ruler | Don't move | Moving, vibrating |
| Rubber band | Don't move | Moving, vibrating |

Discussion
Q: What happened to the ruler before you plucked the ruler? The ruler didn't move, etc
Q: What happened to the ruler while the ruler was making sounds? The ruler was vibrating, it was moving, etc
Q: What happened to the rubber band before you plucked the rubber band? The rubber band didn't move, etc
Q: What happened to the rubber band while it was making sounds? The rubber band was vibrating, it was moving, etc
Q: What happened to the objects when sound was made? They were vibrating, moving, etc.

Summary
- Sound is energy that we can hear.
- There are many different kinds of sound such as animal call, people speaking, music, etc.
- Sound is made when objects vibrates.
- When we pluck, strike, beat, blow, shake, and scratch objects, sound can be made because the objects vibrate.

| Unit | Chapter : **11. Sound** | Total lesson No: 46 / 97 |
|---|---|---|
| **Energy** | Topic : **11.1. Properties of Sound** | Textbook page: 121 - 122 |

**Lesson** 2 / 6

**Lesson Title**

# Sound Travelling

**Preparation**

- Two foam (paper) cups, 3~5 m string

## Lesson Flow

**1 Introduction (5 min.)**

- Review the previous lesson by asking:

Q:What is sound?

Q:How is sound made?

- Encourage students to think about how sound travels by asking:

Q:Why can we hear sound?

**2 Introduce the key question**

How does sound travel?

**3 Activity (25 min.)**

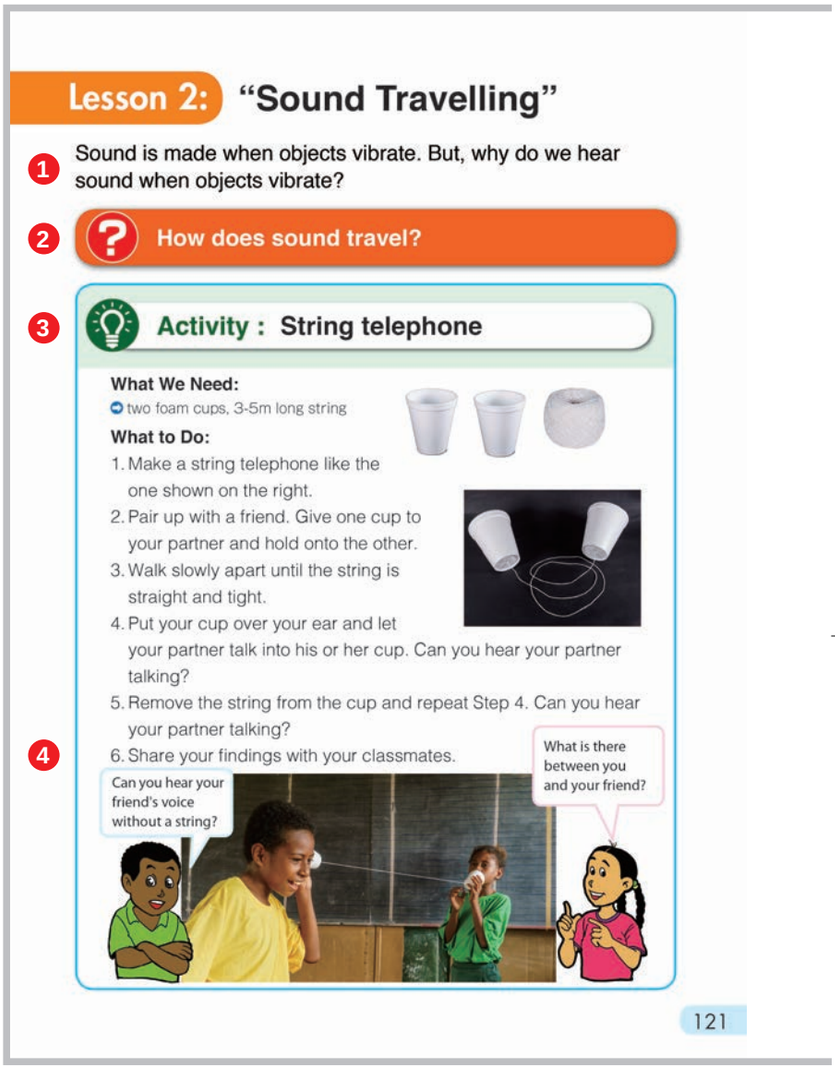
- Organise students into groups.
- Explain the steps of the activity.
- Ask students to make a string telephone. Teacher assists students to make it.
- For step 2, 3, and 4, instruct students to make a string straight and tight.
- For step 5, instruct students not to talk into the cup loudly.
- Have students do the activity and ask them to record their findings in the table.

**4 Discussion for findings (25 min.)**

- Ask students to present the results of their activity by asking:

Q:Can you hear your partner talking when two cups are connected with a string? (Yes.)

**(Continue)**



Lesson 2: "Sound Travelling"

1 Sound is made when objects vibrate. But, why do we hear sound when objects vibrate?

2 How does sound travel?

3 Activity : String telephone

What We Need:

two foam cups, 3-5m long string

What to Do:

1. Make a string telephone like the one shown on the right.
2. Pair up with a friend. Give one cup to your partner and hold onto the other.
3. Walk slowly apart until the string is straight and tight.
4. Put your cup over your ear and let your partner talk into his or her cup. Can you hear your partner talking?
5. Remove the string from the cup and repeat Step 4. Can you hear your partner talking?
6. Share your findings with your classmates.

4



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## Teacher's Notes

### Vibration

- The world is filled with different sounds. All the sounds we hear seem different yet they all share one thing-vibration. All sounds comes from something that vibrates. Sound can be seen by the vibrations on a guitar string but sound waves cannot be seen.
- Sound waves can travel through liquids, solids, air and other gases as well. Sound travels faster through water and other liquid than it does in air. Sound travels the fastest through solids.

### MUST Consider:

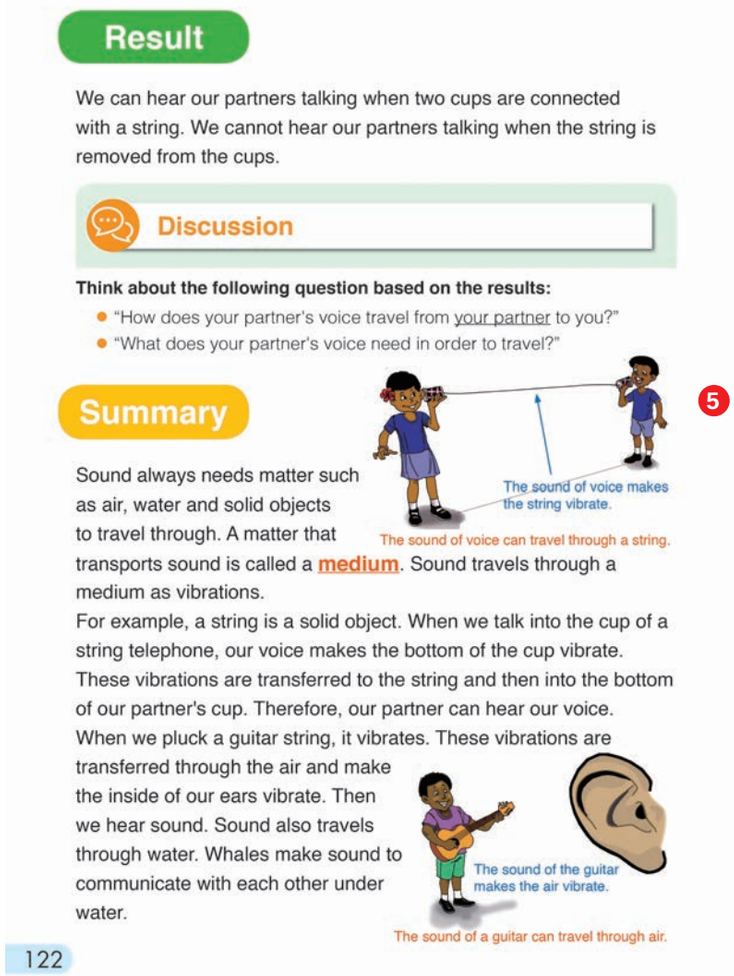
- Take special notice of students with hearing impairment and help them to understand how sound travels.

## Lesson Objectives

Students will be able to:
- Explain how sound travels.
- Observe the way that sound travels through a medium.
- Identify the different kinds of medium that transport sound.

## Assessment

Students are able to:
- Explain the reason why sound cannot be heard without a string.
- State that sound can travel through solid, liquid and gaseous objects.
- Describe why we can hear sound.
- Develop a sense of curiosity on how sound travels through various materials.



**Result**

We can hear our partners talking when two cups are connected with a string. We cannot hear our partners talking when the string is removed from the cups.

**Discussion**

**Think about the following question based on the results:**

- "How does your partner's voice travel from your partner to you?"
- "What does your partner's voice need in order to travel?"

**Summary**

Sound always needs matter such as air, water and solid objects to travel through. A matter that transports sound is called a **medium**. Sound travels through a medium as vibrations.

For example, a string is a solid object. When we talk into the cup of a string telephone, our voice makes the bottom of the cup vibrate. These vibrations are transferred to the string and then into the bottom of our partner's cup. Therefore, our partner can hear our voice.

When we pluck a guitar string, it vibrates. These vibrations are transferred through the air and make the inside of our ears vibrate. Then we hear sound. Sound also travels through water. Whales make sound to communicate with each other under water.



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Q:Can you hear your partner talking when two cups are not connected with a string? (No)
- Write down students' findings on the blackboard.
- Confirm results with students.
- **Based on student findings,** ask the questions as discussion point.

Q:What condition is different between Step 4 and Step 5? (In step 4, two cups are connected with a string, but two cups are not connected with a string.)

Q:How does the voice travel from your partner to you? (The voice travels through a string.)

Q:What does the voice need in order to travel? (A string)
- Conclude the discussion.

**5 Summary (5 min.)**
- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these question as assessment:
  Q: What is a medium?
  Q: How can sound travel?
  Q: What kinds of medium can allow sound to travel?
- Ask students to copy the notes on the blackboard into their exercise books.

## Sample Blackboard Plan

Title:
"Sound travelling"

Key question
How does sound travel?

Activity String telephone

Discussion

Q: Can you hear your partner talking when two cups are connected with a string?
Yes

Q: Can you hear your partner talking when two cups are not connected with a string?
No

Q: What condition is different between Step 4 and Step 5?
In step 4, two cups are connected with a string, but two cups are not connected with a string.

Q: How does the voice travel from your partner to you?
The voice travels through a string.

Q: What does the voice need in order to travel?
A string

Summary
- Sound needs a medium to travel.
- A medium is a matter that transports sound such as solid, liquid and gas objects.
- Sound can travel through medium as vibration.
- When we make a sound, the sound vibrate medium and that vibration are transferred through air and make the inside of our ear vibrate. So we can hear sound.

| Unit | Chapter : **11. Sound** | Total lesson No: 47 / 97 |
|---|---|---|
| **Energy** | Topic : **11.1. Properties of Sound** | Textbook page: 123 - 124 |

**Lesson** 3 / 6

**Lesson Title**

# Soft and Loud Sound

**Preparation**

- Rubber band and a small box

## Lesson Flow

**1 Introduction (5 min.)**

- Review the previous lessons by asking:

Q:What is a medium?

Q:How can sound travel?

- Encourage students to think about the volume of sound by asking:

Q:How can we make soft and loud sound?

**2 Introduce the key question**

What makes sound soft or loud?

**3 Activity (20 min.)**

- Explain the steps of the activity
- Let students guess the results of the activity and record their prediction in their exercise books.
- Have students do the activity and ask them to record their findings in the table.
- Give enough time for students to explore new ideas through the activity by themselves.

**4 Discussion for findings (20 min.)**

- Ask students to present the findings from their activity.
- Write down students' findings on the blackboard.
- Confirm students findings with students.

**(Continue)**

Lesson 3: "Soft and Loud Sound"

1 You speak out loud to call your friend from far away. You can use a soft voice in your home at night too. You can change your voice to soft or loud.

2 What makes sound soft or loud?

3 Activity : Making loud and soft sound

What We Need:

rubber band, box

What to Do:

1. Draw a table like the one shown below.

| | Soft or loud sound | How the rubber band vibrates |
|---|---|---|
| Pluck rubber band gently | | |
| Pluck rubber band strongly | | |

2. Wrap a rubber band around the box across the open top.
3. Pluck the rubber band gently with your finger.
4. Listen to the sound and observe how the rubber band vibrates. Record your observation in the table.
5. Repeat Step 3 and 4 by plucking the rubber band strongly.
6. Share your findings with your classmates.

4



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## Teacher's Notes

- Teacher must make students observe for loudness of sound (amplitude) when plucked gently or strongly. Pluck the rubber band down wards into the box to give a good amplitude of the sound produced and clear visual of the vibrating rubber band. Sound tone can be amplified by other medium such as megaphones, louder hailers and speakers.
- Use a box and strap the rubber band length wise as seen in the picture in the textbook. This helps to amplify the sound and you can see the relationship of bigger vibrations producing a loud sound but quickly decrease to smaller vibrations producing a softer sound.

Safety:

- Do not use the rubber bands to shoot your friends.
- Make sure the rubber band is secure around the fingers before plucking it.
- Be carefully when pulling the rubber band too strong as it may snap

## Lesson Objectives

Students will be able to:
- Identify the relationship between the sizes of vibrations and the volume of sound.
- Define the volume of sound.
- Explain how soft and loud sounds are made.

## Assessment

Students are able to:
- Record the results of their observations in a table.
- State that the volume of sound depends on the size of vibrations.
- Give some examples of how to change the different volumes of sounds.
- Develop a curiosity to investigate the volume of sound.

### Result

When we pluck the rubber band gently, we hear soft sound and the vibrations of the rubber band are small. When we pluck the rubber band strongly, we hear loud sound and the vibrations of the rubber band are big.

Results of the activity

| | Soft or loud sound | How the rubber band vibrates |
|---|---|---|
| Pluck rubber band gently | soft | small |
| Pluck rubber band strongly | loud | big |

### Summary

5

We can make soft and loud sounds. The **volume** of sound is how soft or loud sound is. The volume of sound depends on the amount of force used to make the object vibrate. When bigger force is used, objects vibrate bigger. Bigger vibrations produce louder sounds. When smaller force is used, objects vibrate smaller. Smaller vibrations produce softer sound.

For example, the volume of a drum depends on how hard or soft we strike the drum. When we strike a drum hard, the sound will be louder because the drum vibrates bigger. When we strike a drum softly, the sound will be softer because the drum vibrates smaller.

When we strike a drum softly, the sound will be softer.

When we strike a drum hard, the sound will be louder.

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- **Based on their findings,** ask the questions as discussion point.

Q:What happened to the sound you heard and the vibration of the rubber band when you plucked the rubber band gently? (We heard soft or small sounds. The vibrations were small.)

Q:What happened to the sound you heard and the vibration of the rubber band when you plucked the rubber band strongly? (We heard loud or big sounds. The vibrations were big.)

Q:What is the relationship between the vibrations of a rubber band and the volume of sound? (The smaller the size of vibration is, the softer the sound is. The bigger the size of vibration is, the louder the sound is.)

- Conclude the discussion.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these question as assessment:
  Q: What is volume of sound?
  Q: How can we change the size of the vibration?
  Q: What is the relationship between the vibrations of an object and the volume of sound?
- Ask students to copy the notes on the blackboard into their exercise books.

## Sample Blackboard Plan

Title:
"Soft and Loud Sounds"

Key question
What makes sounds soft and loud?

Activity: Making soft and loud sound
Your prediction: .

| | Volume of sound | Size of vibration |
|---|---|---|
| Pluck rubber band gently | Soft<br>Small | Small |
| Pluck rubber band strongly | Loud<br>Big | Big |

Discussion

Q: What happened to the sound and the vibration of the rubber band when you plucked the rubber band gently? We heard soft or small sounds. The vibrations were small.

Q: What happened to the sound and the vibration of the rubber band when you plucked the rubber band strongly? We heard loud or big sounds. The vibrations were big.

Q: What is the relationship between the vibrations of a rubber band and the volume of sound? The smaller the size of vibration is, the softer the sound is. The bigger the size of vibration is, the louder the sound is.

Summary

- Volume of sound is how soft or loud sound is.
- The volume of sound depends on the amount of force used to make the object vibrate.

1: Loud sound:
Bigger force → Bigger vibration of object → Louder sound.

2: Soft sound
Smaller force → Smaller vibration of object → Softer sound.

| Unit | Chapter : **11. Sound** | Total lesson No: 48 / 97 |
|---|---|---|
| **Energy** | Topic : **11.1. Properties of Sound** | Textbook page: 125 - 126 |

**Lesson** 4 / 6

**Lesson Title**

# High and Low Sound

**Preparation**

- 30 cm ruler

## Lesson Flow

**1 Introduction (5 min.)**

- Review the previous lessons by asking:

Q:What is the volume of sound?

Q:What is the relationship between the vibrations of an object and the volume of sound?

- Encourage students to think about high and low sound by asking:

Q:How are sounds different when we play a guitar?

Q:How can we make high and low sounds?

**2 Introduce the key question**

What makes sound high or low?

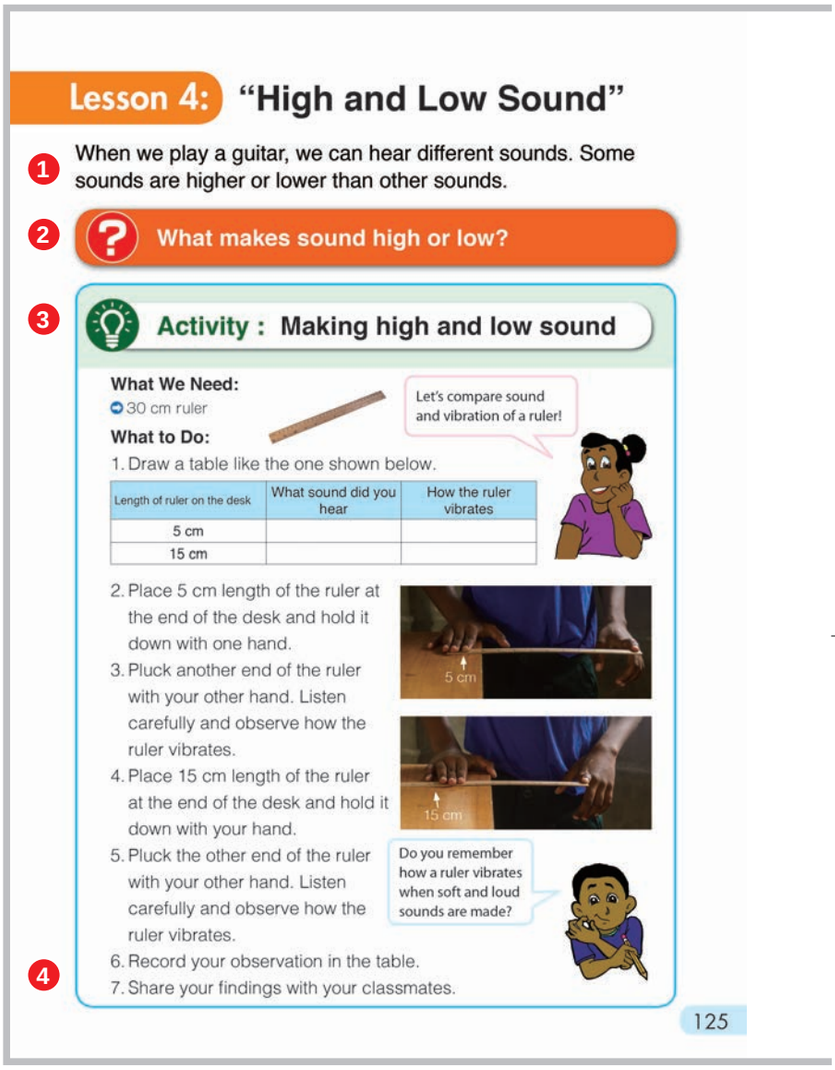
**3 Activity (20 min.)**

- Explain the steps of the activity.
- Let students guess the results of the activity and record their predictions in their exercise books.
- Have students do the activity and ask them to record their findings in the table.
- Give enough time to students to explore new ideas through the activity.

**4 Discussion for findings (20 min.)**

- Ask students to present the findings from their activity.
- Write down students' findings on the blackboard.

**(Continue)**



Lesson 4: "High and Low Sound"

1 When we play a guitar, we can hear different sounds. Some sounds are higher or lower than other sounds.

2 What makes sound high or low?

3 Activity : Making high and low sound

What We Need:
- 30 cm ruler

What to Do:

1. Draw a table like the one shown below.

| Length of ruler on the desk | What sound did you hear | How the ruler vibrates |
|---|---|---|
| 5 cm | | |
| 15 cm | | |

Let's compare sound and vibration of a ruler!

2. Place 5 cm length of the ruler at the end of the desk and hold it down with one hand.
3. Pluck another end of the ruler with your other hand. Listen carefully and observe how the ruler vibrates.
4. Place 15 cm length of the ruler at the end of the desk and hold it down with your hand.
5. Pluck the other end of the ruler with your other hand. Listen carefully and observe how the ruler vibrates.
6. Record your observation in the table.
7. Share your findings with your classmates.

5 cm

15 cm

Do you remember how a ruler vibrates when soft and loud sounds are made?

4

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## Teacher's Notes

Safety:

- Do not use very small looped rubber bands as it can break easily.
- Be cautious when strapping the rubber band onto the box as it may snap.
- Be careful when plucking the rubber band to produce high pitch.

How to change the pitch

- To change the pitch of the sound, move the pencil under the rubber band from left to right as you pluck along the length of the box from one end to the other.
- To produce a high pitch sound, move the pencil under the rubber band towards the plucking finger. To produce a low pitch sound, move the pencil away from the hand plucking the rubber band.

## Lesson Objectives

Students will be able to:
- Define the pitch of sound.
- Identify the relationship between the speed of vibrations and the pitch of sound.
- Describe how high and low sound is made.

## Assessment

Students are able to:
- Record the results of their observations in a table.
- Describe that quick vibrations produce high pitch and slow vibrations produce a low pitch.
- Give some examples of how to produce different pitches of sounds.
- Co-operate with classmate to investigate the volume of sound.

### Result

When we placed 5 cm length of the ruler at the end of the desk, we heard a low sound and the ruler vibrated more slowly. When we placed 15 cm length of the ruler at the end of the desk, we heard a high sound and the ruler vibrated more quickly.

Results of the activity

| Length of ruler on the desk | What sound did you hear? | How the ruler vibrates |
|---|---|---|
| 5 cm | Lower sound | More slowly |
| 15 cm | Higher sound | More quickly |

### Summary

We can make high and low sound. The **pitch** of a sound is how high or low a sound is. The pitch of the sound depends on how fast an object vibrates. When objects vibrate more slowly, a lower sound can be made. When objects vibrate more quickly, a higher sound can be made.


When a ruler vibrates more slowly, a lower sound can be made.

When a ruler vibrates more quickly, a higher sound can be made.

Many musical instruments can produce different pitches of sound. For example, a guitar makes different pitches of sound by changing the length, thickness and tension of the string. A shorter, thinner and tighter string produces a high pitch of sound. A longer, thicker and looser string produces a low pitch sound.

The tension of strings can be changed by tuning the peg heads.

The strings can be shortened by putting a finger on the fret board.

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- Confirm their findings with students.
- **Based on their findings,** ask the questions as discussion point.

Q:When you heard lower sound, how did the ruler vibrate? (The vibrations were more slowly.)

Q:When you heard higher sound, how did the ruler vibrate? (The vibrations were more quickly.)

Q:What is the relationship between the vibrations of the ruler and the higher and lower sound? (The slower the vibration is, the lower the sound is. The quicker the vibration is, the higher the sound is.)

Q:How can we change the sound high or low?(By changing the length of a ruler)

- Conclude the discussion.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these question as assessment:
  Q: What is the pitch of sound?
  Q: What is the relationship between the vibrations of an object and the pitch of sound?
  Q: How can we change the pitch of sound?
- Ask students to copy the notes on the blackboard into their exercise books.

## Sample Blackboard Plan

Title:

"High and Low Sound"

Key question

What makes sound high or low?

Activity: Making high and low sound

Your prediction: ……

| | What sound you hear | How the ruler vibrates |
|---|---|---|
| 5 cm length | Lower sound | more slowly |
| 15 cm length | Higher sound | more quickly |

Discussion

Q: When you heard lower sound, how did the ruler vibrate? The vibrations were more slowly.

Q: When you heard higher sound, how did the ruler vibrate? The vibrations were more quickly.

Q: What is the relationship between the vibrations of the ruler and the higher and lower sound? The slower the vibration is, the lower the sound is. The quicker the vibration is, the higher the sound is.

Q: How can we change the sound high or low? By changing the length of a ruler

Summary

- High and low sounds are called the pitch of sound.
- The pitch of the sound depends on how fast an object vibrates.
  1. Higher sound
  →The vibration of an object is much quicker.
  2. Lower sound
  →The vibration of an object is much slower.
- The different pitches of a sound is made by changing the length, thickness and tension of an object.

| Unit | Chapter : **11. Sound** | Total lesson No: 49 / 97 |
|---|---|---|
| **Energy** | Topic : **11.1. Properties of Sound** | Textbook page: 127 - 129 |

**Lesson** 5 / 6

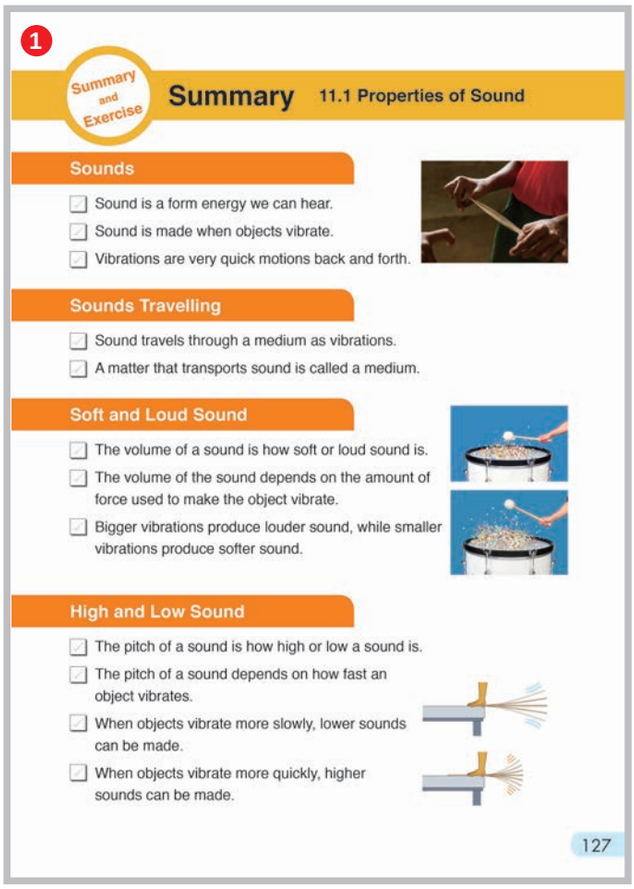
**Lesson Title**

# Summary and Exercise

**Tips of lesson**

## 1 Summary (20 min.)

- Recap main learning contents in this topic 'Properties of Sound'.
- Ask some questions to students and verify student understanding. Explain and correct learning contents again if they still have misconception.
- Ask the student to state what sound is and give examples of how sound is made in various ways by different things or objects.
- Provoke students to describe the difference between pitch and volume and state some examples.



1

Summary and Exercise

**Summary** 11.1 Properties of Sound

**Sounds**

- Sound is a form energy we can hear.
- Sound is made when objects vibrate.
- Vibrations are very quick motions back and forth.

**Sounds Travelling**

- Sound travels through a medium as vibrations.
- A matter that transports sound is called a medium.

**Soft and Loud Sound**

- The volume of a sound is how soft or loud sound is.
- The volume of the sound depends on the amount of force used to make the object vibrate.
- Bigger vibrations produce louder sound, while smaller vibrations produce softer sound.

**High and Low Sound**

- The pitch of a sound is how high or low a sound is.
- The pitch of a sound depends on how fast an object vibrates.
- When objects vibrate more slowly, lower sounds can be made.
- When objects vibrate more quickly, higher sounds can be made.

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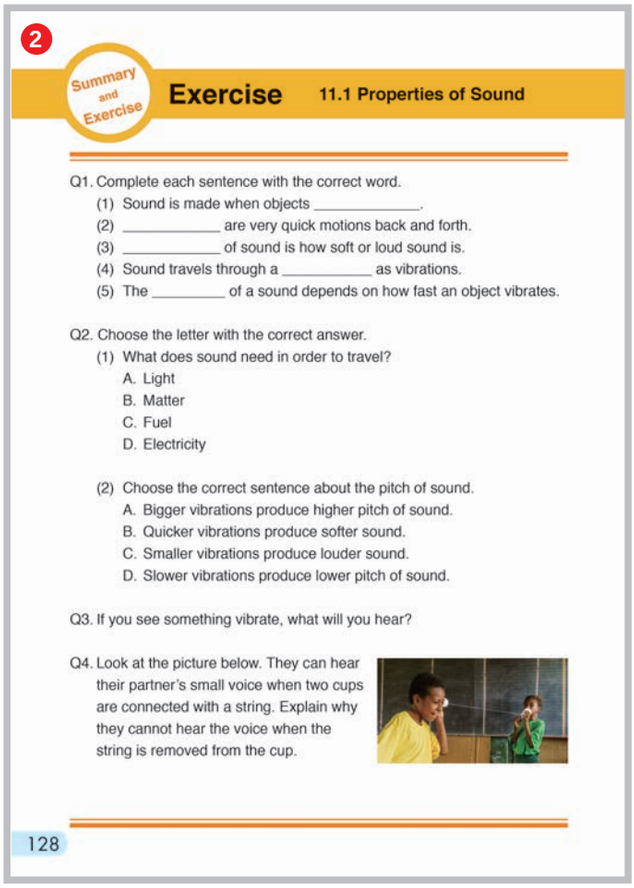
## 2 Exercise & Explanation (40 min.)

- Refer the students to the exercise and allow them to answer the questions individually with enough time given for the students to complete the exercises.
- Encourage the students to answer all the questions.
- Go through each question and allow them to give the answers freely.
- After each exercise, give the answers of the questions and explain how to solve the questions expanding on student's answers and thoughts of how they got their answers.
- Provide examples of daily experiences of sounds being produced by different things in various ways.
- Explain using daily examples of how properties of sound are used to help people.



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Summary and Exercise

**Exercise** 11.1 Properties of Sound

Q1. Complete each sentence with the correct word.

(1) Sound is made when objects _____.
(2) _____ are very quick motions back and forth.
(3) _____ of sound is how soft or loud sound is.
(4) Sound travels through a _____ as vibrations.
(5) The _____ of a sound depends on how fast an object vibrates.

Q2. Choose the letter with the correct answer.

(1) What does sound need in order to travel?
A. Light
B. Matter
C. Fuel
D. Electricity

(2) Choose the correct sentence about the pitch of sound.
A. Bigger vibrations produce higher pitch of sound.
B. Quicker vibrations produce softer sound.
C. Smaller vibrations produce louder sound.
D. Slower vibrations produce lower pitch of sound.

Q3. If you see something vibrate, what will you hear?

Q4. Look at the picture below. They can hear their partner's small voice when two cups are connected with a string. Explain why they cannot hear the voice when the string is removed from the cup.

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## Exercise answers

Q1.
(1) **vibrate**
(2) **Vibrations**
(3) **Volume**
(4) **medium**
(5) **pitch**

Q2.
(1) **B**
(2) **D**
The pitch of the sound depends on how fast an object vibrates.

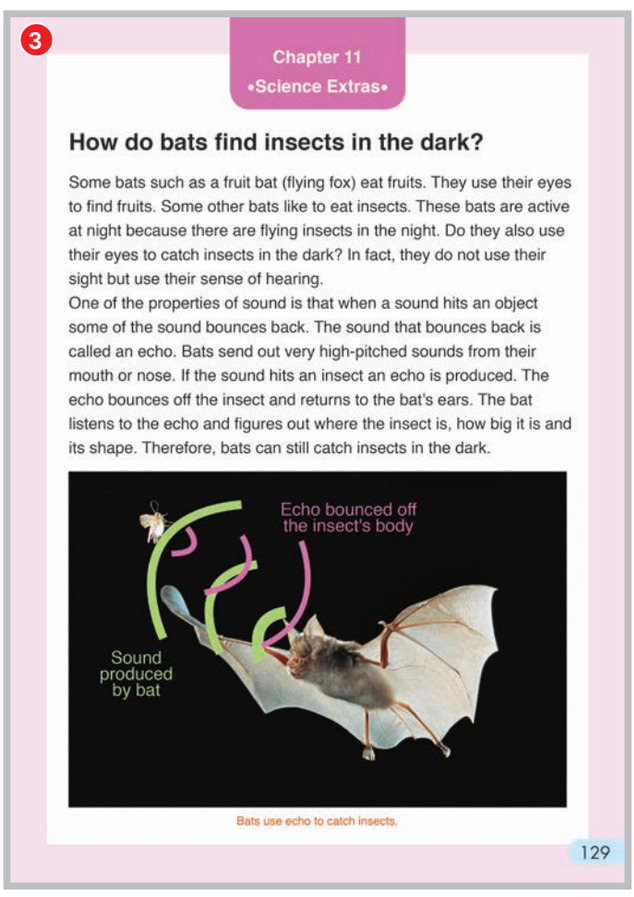
Q3. **Sound**
Sound is made when objects vibrate.

Q4.
**(Example of the Answer)**
**Because there is not enough medium which the vibrations of their small voice travels through.**
Sound travel through medium as vibration. In this case, the string is a matter. Their small voices cannot travel far enough without the string.

### Explanation of Science Extras

**3 Science Extras (10 min.)**

- Give students' opportunities to closely observe the nature and its phenomena in the world.
- Allow students to ask questions that demonstrate curiosity about the content in the science extra.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Chapter 11
•Science Extras•

**How do bats find insects in the dark?**

Some bats such as a fruit bat (flying fox) eat fruits. They use their eyes to find fruits. Some other bats like to eat insects. These bats are active at night because there are flying insects in the night. Do they also use their eyes to catch insects in the dark? In fact, they do not use their sight but use their sense of hearing.
One of the properties of sound is that when a sound hits an object some of the sound bounces back. The sound that bounces back is called an echo. Bats send out very high-pitched sounds from their mouth or nose. If the sound hits an insect an echo is produced. The echo bounces off the insect and returns to the bat's ears. The bat listens to the echo and figures out where the insect is, how big it is and its shape. Therefore, bats can still catch insects in the dark.



Bats use echo to catch insects.

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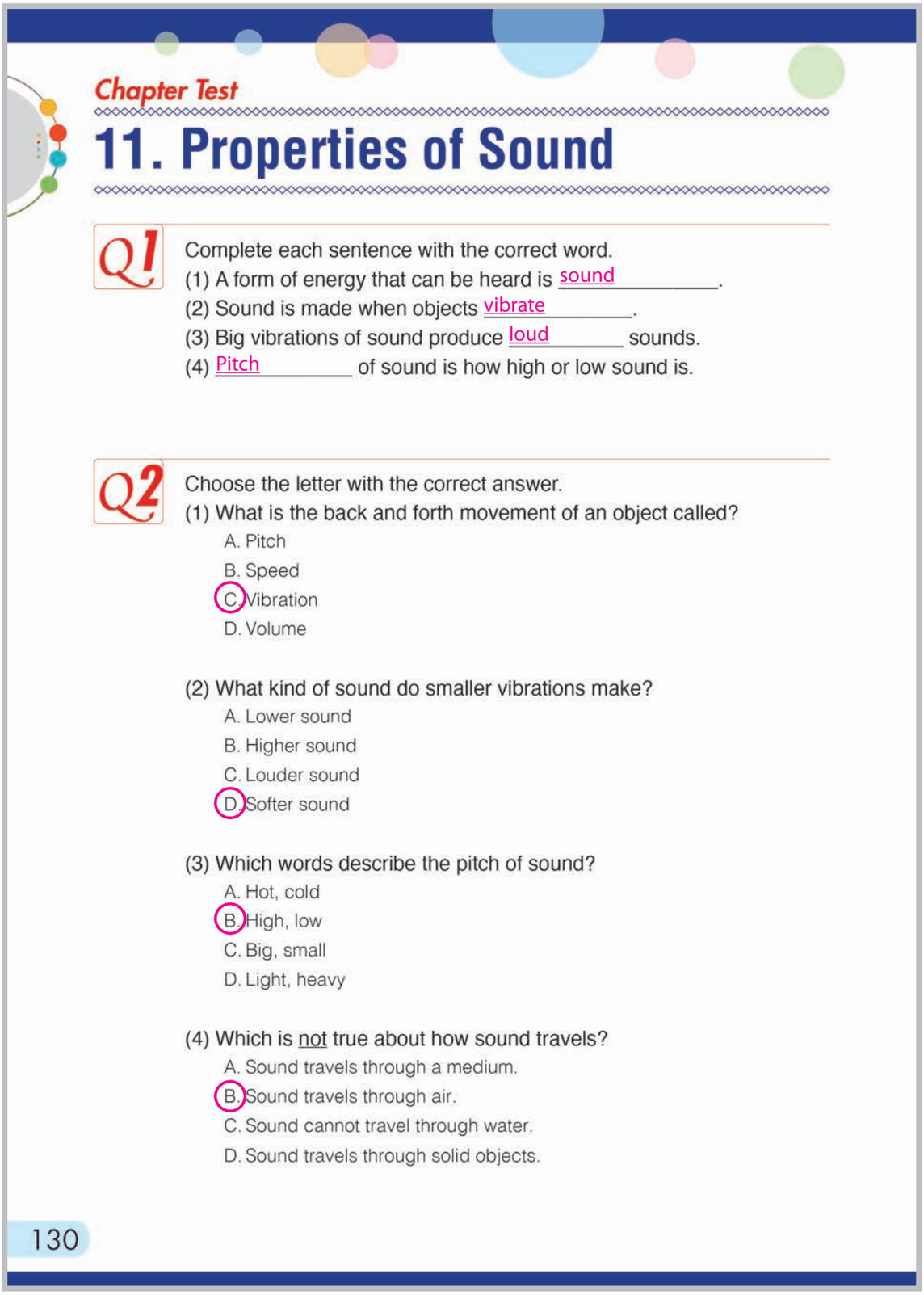
**Lesson**
**6 / 6**

**Lesson Title**

# Chapter Test

**Answer of the Chapter Test**



*Chapter Test*

## 11. Properties of Sound

**Q1** Complete each sentence with the correct word.

(1) A form of energy that can be heard is sound.
(2) Sound is made when objects vibrate.
(3) Big vibrations of sound produce loud sounds.
(4) Pitch of sound is how high or low sound is.

**Q2** Choose the letter with the correct answer.

(1) What is the back and forth movement of an object called?
A. Pitch
B. Speed
C. Vibration
D. Volume

(2) What kind of sound do smaller vibrations make?
A. Lower sound
B. Higher sound
C. Louder sound
D. Softer sound

(3) Which words describe the pitch of sound?
A. Hot, cold
B. High, low
C. Big, small
D. Light, heavy

(4) Which is not true about how sound travels?
A. Sound travels through a medium.
B. Sound travels through air.
C. Sound cannot travel through water.
D. Sound travels through solid objects.

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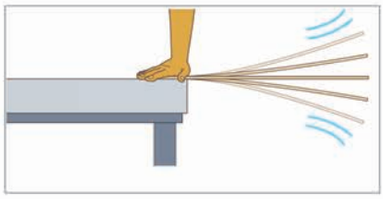
## Q3

(1) What does the softness and loudness of sound represent?

Volume

(2) Alice plucked a 30 cm ruler on the edge of the table about 20 cm out. After that, she placed the ruler on the edge of the table about 5 cm out and plucked it. Then, she heard higher sound.



What change would she have observed about the vibration of the ruler?

Ruler vibrated more quickly

(3) What can be done to change the volume of sound produced by a drum from loud to soft?

When we strike a drum softly, the sound will be softer because the drum vibrates smaller.

## Q4

Jonathan was playing in a room. He was jumping off the bed onto the floor. Salome could hear the footsteps and stamping while lying on the concrete floor in the living room.

How was Salome able to hear the footsteps and the stamping?

The footsteps and stamping vibrated the floor. The vibrations transferred through the concrete floor to Salome's ears which she heard.

Strand : PHYSICAL SCIENCE
Unit : MATTER

# Chapter 12. Matter Change

## Chapter Objectives

Students will be able to understand the differences between physical and chemical changes in matter and changes in the states of water in relation to temperature through observation.

Students will be able to also measure the temperature of boiling water and melting ice.

## Topic Objectives

### 12.1 Physical and Chemical Changes in Matter

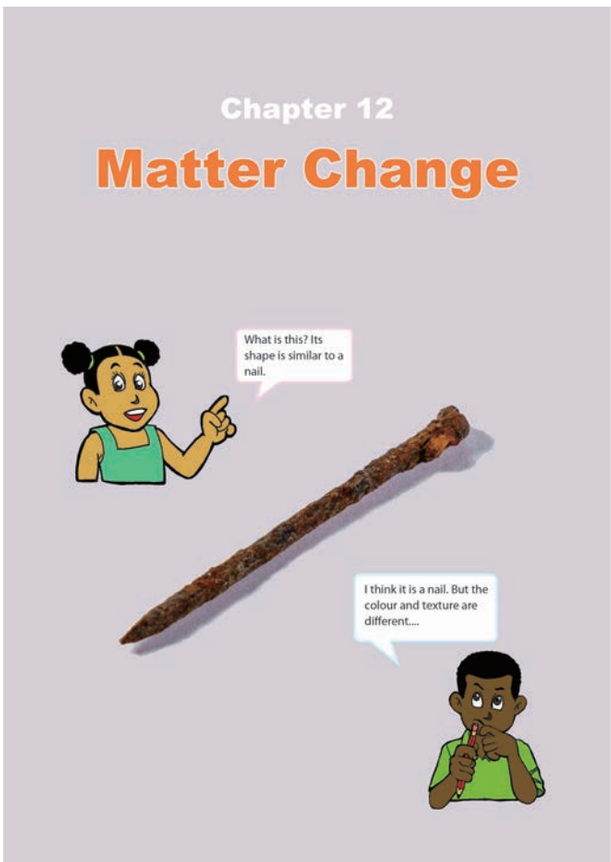
Students will be able to;

- Define physical property of matter such as shape, size and colour.
- Identify different ways of changing physical properties of matter.
- Define chemical changes in matter.
- Explain the differences between physical and chemical changes in matter.

### 12.2 States of Water

Students will be able to;

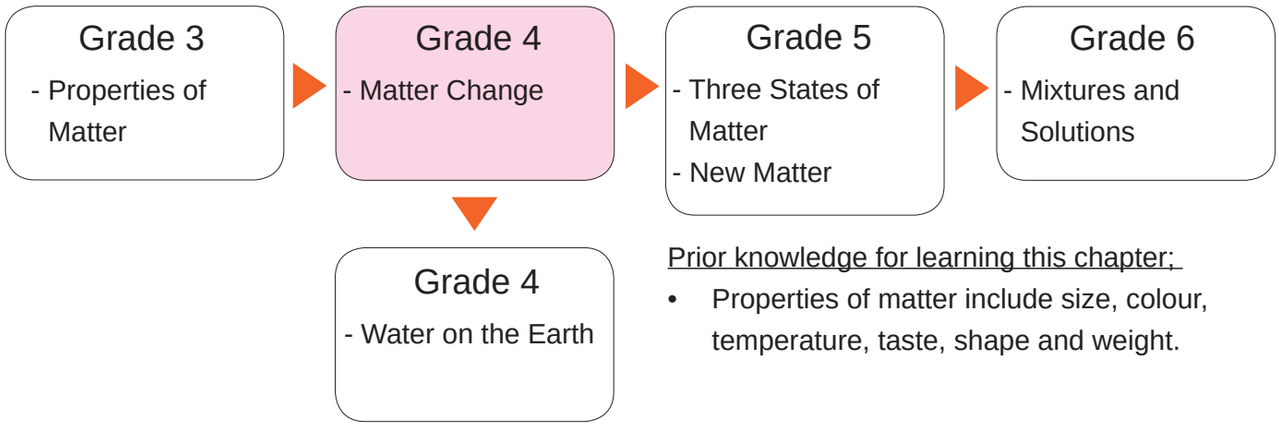
- Identify the different forms of water such as ice, water and steam.
- Describe the changes in water when heated.
- Explain what makes up steam.
- Describe how ice melts in room temperature.
- Describe changes in the states of water in relation to their temperature.
- Measure the temperature of boiling water and melting ice.




The picture at the chapter heading in the textbook shows a nail that was placed outside for a long time.

## Related Learning Contents

The learning contents in this chapter connect to the following chapters.




Prior knowledge for learning this chapter;

- Properties of matter include size, colour, temperature, taste, shape and weight.

## Teaching Overview

This chapter consists of 12 lessons, each lesson is a double period.

| Topic | Lesson No. | Lesson Title and Key Question | Content standard in syllabus | Textbook page number |
|---|---|---|---|---|
| 12.1 Physical and Chemical Changes in Matter | 1 | **Physical Properties**<br>What are physical properties of matter? | 4.2.5 | 133 - 134 |
| | 2 | **Physical Changes in Matter**<br>How does matter change if its physical properties change? | | 135 - 136 |
| | 3 | **Chemical Changes in Matter**<br>Does a matter change in a different way? | | 137 - 138 |
| | 4 | **Comparing Physical and Chemical Changes**<br>How are physical and chemical changes different? | | 139 - 140 |
| | 5 | Summary and Exercise | | 141 - 142 |
| 12.2 States of Water | 6 | **Water around Us**<br>In which forms can water exist? | | 143 - 144 |
| | 7 | **Heating Water**<br>How does water change its form when it is heated? | | 145 - 146 |
| | 8 | **What is Steam?**<br>What is steam made of? | | 147 - 148 |
| | 9 | **Melting Ice**<br>How does ice change its form when it melts? | | 149 - 150 |
| | 10 | **Changes in States of Water**<br>How does water change in its form? | | 151 - 152 |
| | 11 | Summary and Exercise | | 153 - 155 |
| Chapter Test | 12 | Chapter Test | | 156 - 157 |

| Unit | Chapter : **12. Matter Change** | Total lesson No: 51 / 97 |
|---|---|---|
| **Matter** | Topic : **12.1. Physical and Chemical Changes in Matter** | Textbook page: 133 - 134 |

**Lesson** 1 / 12

**Lesson Title**

# Physical Properties

**Preparation**

- Nil

## Lesson Flow

**1 Introduction (5 min.)**

- To begin the new topic 'Physical and Chemical Changes in Matter', review Grade 3 lessons on the topic 'Describing Matter'.

Q:How can you describe matter?

Q:What kinds of property does matter have?

- Encourage students to think about two kinds of properties; physical and chemical property by asking:

Q:How are physical and chemical properties alike or different?

**2 Introduce the key question**

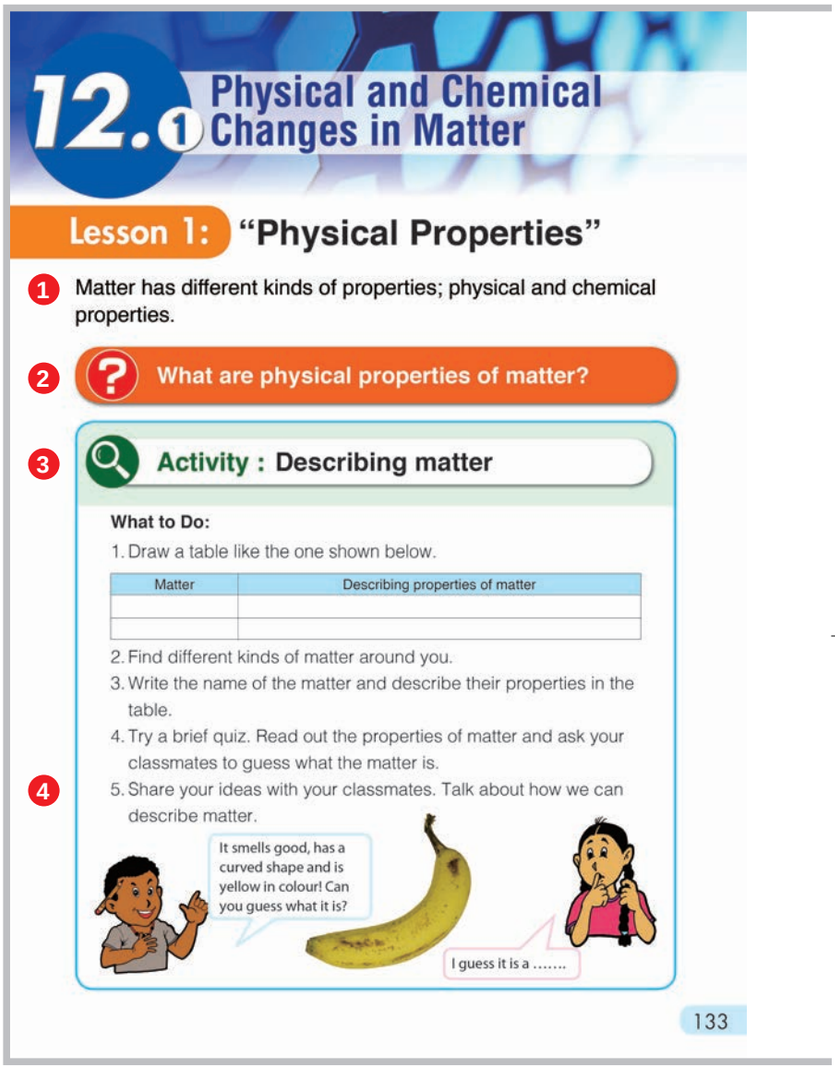
What are physical properties of matter?

**3 Activity (25 min.)**

- Explain the steps of the activity.
- For Step 2, let them find different matter around them.
- Write the name of the matter and its properties in the table.
- Let a student to read out the properties of matter. Allow other students to guess what the matter is based on its properties.

**4 Discussion for findings (20 min.)**

- Ask students to present the findings from their activity. **(Continue)**


12.1 Physical and Chemical Changes in Matter

Lesson 1: "Physical Properties"

1 Matter has different kinds of properties; physical and chemical properties.

2 What are physical properties of matter?

3 Activity : Describing matter

What to Do:

1. Draw a table like the one shown below.

| Matter | Describing properties of matter |
|---|---|
| | |
| | |

2. Find different kinds of matter around you.
3. Write the name of the matter and describe their properties in the table.
4. Try a brief quiz. Read out the properties of matter and ask your classmates to guess what the matter is.
5. Share your ideas with your classmates. Talk about how we can describe matter.

4



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## Teacher's Notes

### Physical properties

Physical properties can be observed or measured without changing the composition of matter. Physical properties are used to observe and describe matter. Physical properties include: appearance, texture, colour, odour, melting point, boiling point, density, solubility, polarity, and many others.

The three states of matter are: solid, liquid, and gas. The melting point and boiling point are related to changes of the state of matter. All matter may exist in any of the three physical states of matter. Such as in ice - solid and liquid forms of water.

Matter has mass and volume, as demonstrated by the stone. You can observe its mass by feeling how heavy it is when you try to pick it up. You can observe its volume by looking at it and noticing its size. Mass and volume are both examples of extensive physical properties.

## Lesson Objectives

Students will be able to:
- Define physical property of matter.
- Identify the physical properties of matter.
- Communicate scientifically the physical properties of matter.

## Assessment

Students are able to:
- Describe the different physical properties of matter.
- Infer matter according to its physical properties.
- Observe the properties of matter by using five senses.
- Enjoy exploring the physical properties of matter.

### Summary

Every matter has its own properties. Properties can be used to describe and identify matter. A characteristic of matter that can be measured or observed with the five senses without changing the matter is called **physical property**. Shape, size and colour are kinds of physical properties. Texture, smell, sound and taste are also physical properties.

All matter have their own physical properties.

Physical properties can be observed using our five senses. For example, we can observe shape and colour by seeing with our eyes. Texture or hardness can be observed by touching.

| Five Senses | | Types of Properties |
|---|---|---|
| | Sight | Shape, size, colour |
| | Hearing | Sound - loud, soft, high and low |
| | Smell | Smell, odour |
| | Taste | Sweet, sour, bittter and salty |
| | Touch | Texture - hardness, smoothness, roughness |

Five senses and types of properties.

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- Write down students' findings on the blackboard.
- Confirm the findings with students.
- **Based on their findings**, ask the following questions.

Q:How did you describe the matter around you? (Matter can be described by its properties such as shape, size, colour and texture.)

Q:How did you identify the properties of matter? (By seeing with eyes, hearing with ears, smelling with nose, tasting with mouth and touching with hands)

- Conclude the discussion by explaining what physical property is.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard. \
- Ask these questions as assessment:
  Q: How can we describe matter?
  Q: What is physical property of matter?
  Q: How can we identify the physical properties of matter?
- Ask students to copy the notes on the blackboard into their exercise books.

## Sample Blackboard Plan

Title:
"Physical Properties"

Key question
What are physical properties of matter?

Activity: Describing matter

| Matter | Describing Properties of matter |
|---|---|
| Globe | Round, big, blue, smooth surface |
| Reading book | Rectangular, small, hard, etc |
| Leaf | Green, medium, rough, bitter, etc |
| ..... | ..... |

Discussion

Q: How did you describe the matter around you?
Matter can be described by properties such as shape, size, colour and texture.

Q: How did you identify the properties of matter?
By seeing with eyes, hearing with ears, smelling with nose, tasting with mouth and touching with hands.

Summary

- All matter has its own properties.
- Properties can be used to describe and identify matter.
- A characteristic of matter that can be measured or observed with the five senses without changing the matter is called physical property.
- Shape, size, and colour are kinds of physical properties.
- Physical properties can be observed using the five senses.

| Unit | Chapter : **12. Matter Change** | Total lesson No: 52 / 97 |
|---|---|---|
| **Matter** | Topic : **12.1. Physical and Chemical Changes in Matter** | Textbook page: 135 - 136 |

**Lesson** 2 / 12

**Lesson Title**

# Physical Changes in Matter

**Preparation**

- Sheets of paper
- Scissors
- Assorted marking pen

## Lesson Flow

**1 Introduction (5 min.)**

- Review the previous lesson on 'Physical Properties' by showing a book:

Q:What are the physical properties of this book?

Q:What is physical property of matter?

- Encourage students to think about physical change by asking:

Q:What will happen to matter when matter changes its physical properties?

**2 Introduce the key question**

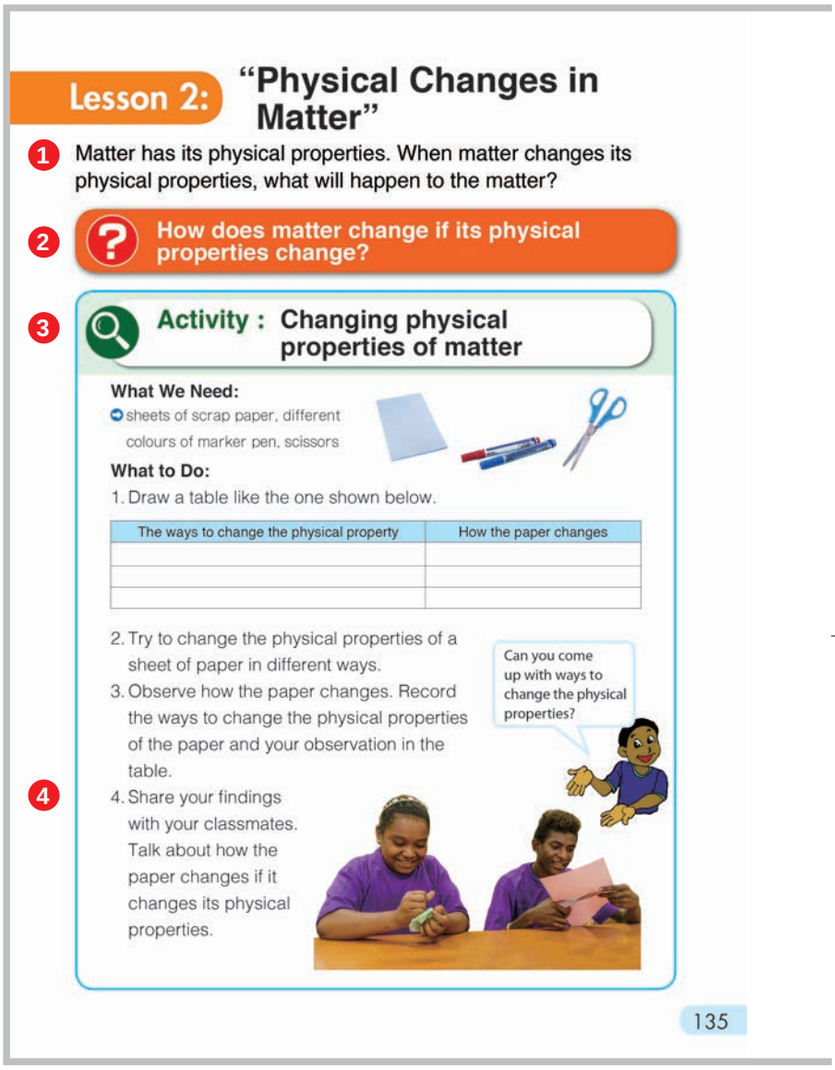
How does matter change if its physical properties change?

**3 Activity (20 min.)**

- Organise students into groups.
- Explain the steps of the activity.
- Before the activity, let students predict how they can change the physical properties of matter.
- Have students do the activity and ask them to record their findings in the table.
- Give enough time for students to think about how matter changes if its physical properties change based on their results by themselves.

**4 Discussion for findings (25 min.)**

- Ask students to present the results of their activity. **(Continue)**



Lesson 2: "Physical Changes in Matter"

1 Matter has its physical properties. When matter changes its physical properties, what will happen to the matter?

2 How does matter change if its physical properties change?

3 Activity : Changing physical properties of matter

What We Need:
sheets of scrap paper, different colours of marker pen, scissors

What to Do:
1. Draw a table like the one shown below.

| The ways to change the physical property | How the paper changes |
|---|---|
| | |
| | |
| | |

2. Try to change the physical properties of a sheet of paper in different ways.
3. Observe how the paper changes. Record the ways to change the physical properties of the paper and your observation in the table.
4. Share your findings with your classmates. Talk about how the paper changes if it changes its physical properties.

Can you come up with ways to change the physical properties?

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## Teacher's Notes

SAFETY RULE

- Remind students to be careful when cutting the sheets of paper using a pair of scissors.

Physical change

A physical change takes place without any changes taking place in the matter. The same matter is present before and after the change. The same matter is present throughout the changes. Physical changes are related to physical properties since some measurements require that changes be made.

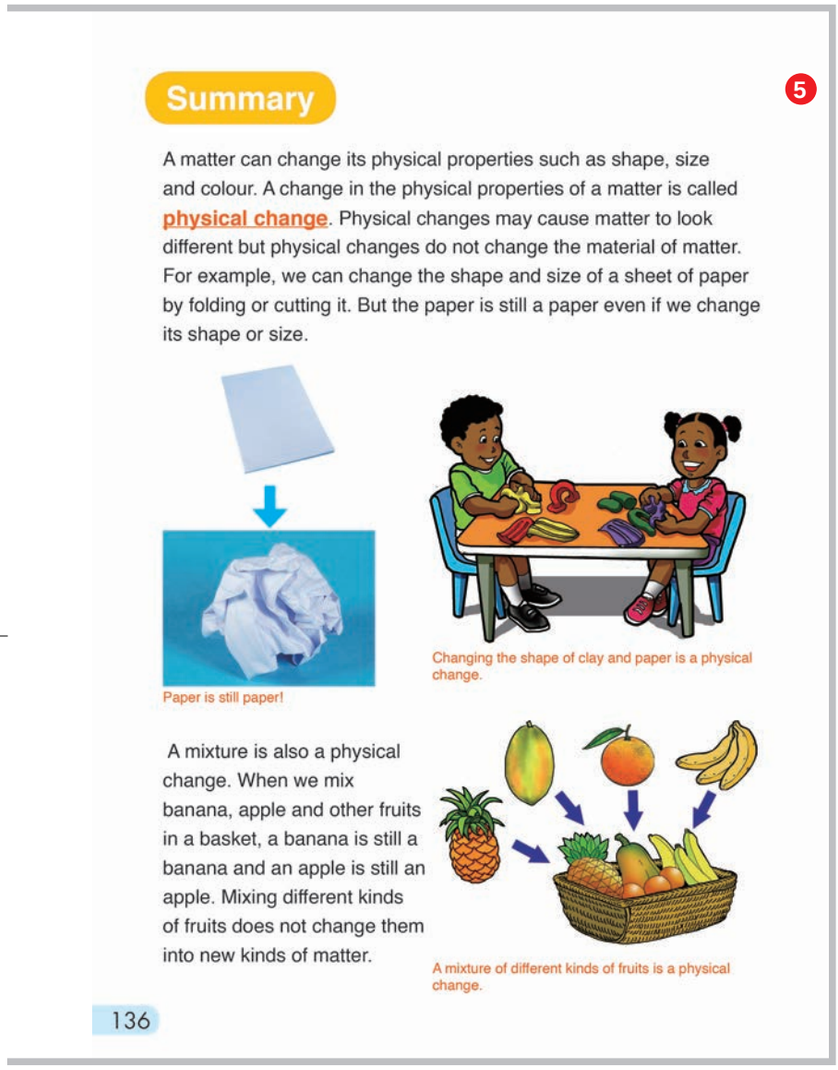
- Melting Point: As solid matter is heated it eventually melts or changes into a liquid state at the melting point.
- Ice (a solid form of water) melts at 0 °C and changes to the liquid state.
- Boiling Point: As the liquid matter is heated further it eventually boils or vaporises into a gas at the boiling point. Liquid water boils and changes into a gas, usually called steam or water vapour at 100 °C. In all three states the same molecules of water ($H_2O$) are present.

## Lesson Objectives

Students will be able to:
- Define physical change.
- Identify the different ways of changing physical properties of matter.

## Assessment

Students are able to:
- Demonstrate how to change the properties of matter physically.
- Explain what physical change is.
- Describe why a mixture is a physical change.
- Investigate the physical changes with interest.



### Summary

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A matter can change its physical properties such as shape, size and colour. A change in the physical properties of a matter is called **physical change**. Physical changes may cause matter to look different but physical changes do not change the material of matter. For example, we can change the shape and size of a sheet of paper by folding or cutting it. But the paper is still a paper even if we change its shape or size.

Paper is still paper!

Changing the shape of clay and paper is a physical change.

A mixture is also a physical change. When we mix banana, apple and other fruits in a basket, a banana is still a banana and an apple is still an apple. Mixing different kinds of fruits does not change them into new kinds of matter.

A mixture of different kinds of fruits is a physical change.

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- Write down students' findings on the blackboard.
- Confirm results with students.
- **Based on their observation,** ask these questions.

Q:How did you change the physical properties of the paper? (By folding, cutting, tearing, colouring, squeezing, etc)

Q:How did the paper change? (Shape changes, size changes, colour changes, etc)

Q:Did the sheet of paper change to a new matter? (No, it was still a paper.)

- Conclude the discussion by explaining what physical change is.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  - Q: How does a matter change if its physical properties change?
  - Q: What is physical change in matter?
  - Q: Why is a mixture of matters called a physical change?
- Ask students to copy the notes on the blackboard into their exercise books.

## Sample Blackboard Plan

Title:

"Physical Changes in Matter"

Key question How does matter change if its physical properties change?

Activity Changing physical properties of matter

| The way to change the physical property | How the paper changes |
|---|---|
| Folding it | Shape change |
| Cutting or tearing | Size and shape change |
| Colouring | Colour change |
| Squeezing | Size and shape change |

Discussion

Q: How did you change the physical properties of the paper?

By folding, cutting, tearing, colouring, squeezing, etc

Q: How did the paper change?

Shape changes, size changes, colour changes, etc

Q: Did the sheet of paper change into a new matter?

No, it was still a paper.

Summary

- Matter has different physical properties, such as shape, size, colour, texture.
- A change in the physical properties of matter is called a physical change.
- Physical changes in matter may cause matter to look different but does not change into a new matter.
- A mixture is physical change.

| Unit | Chapter : **12. Matter Change** | Total lesson No: 53 / 97 |
|---|---|---|
| **Matter** | Topic : **12.1. Physical and Chemical Changes in Matter** | Textbook page: 137 - 138 |

**Lesson** 3 / 12

**Lesson Title**

# Chemical Changes in Matter

**Preparation**

- Wooden matches, Ceramic plate

## Lesson Flow

**1 Introduction (5 min.)**

- Review the previous lesson by asking:

Q:What is a physical change in matter?

Q:Name some examples of the physical changes in matter.

- Encourage students to think about chemical change by asking:

Q:Are there different ways that matter changes?

**2 Introduce the key question**

Does a matter change in a different way?

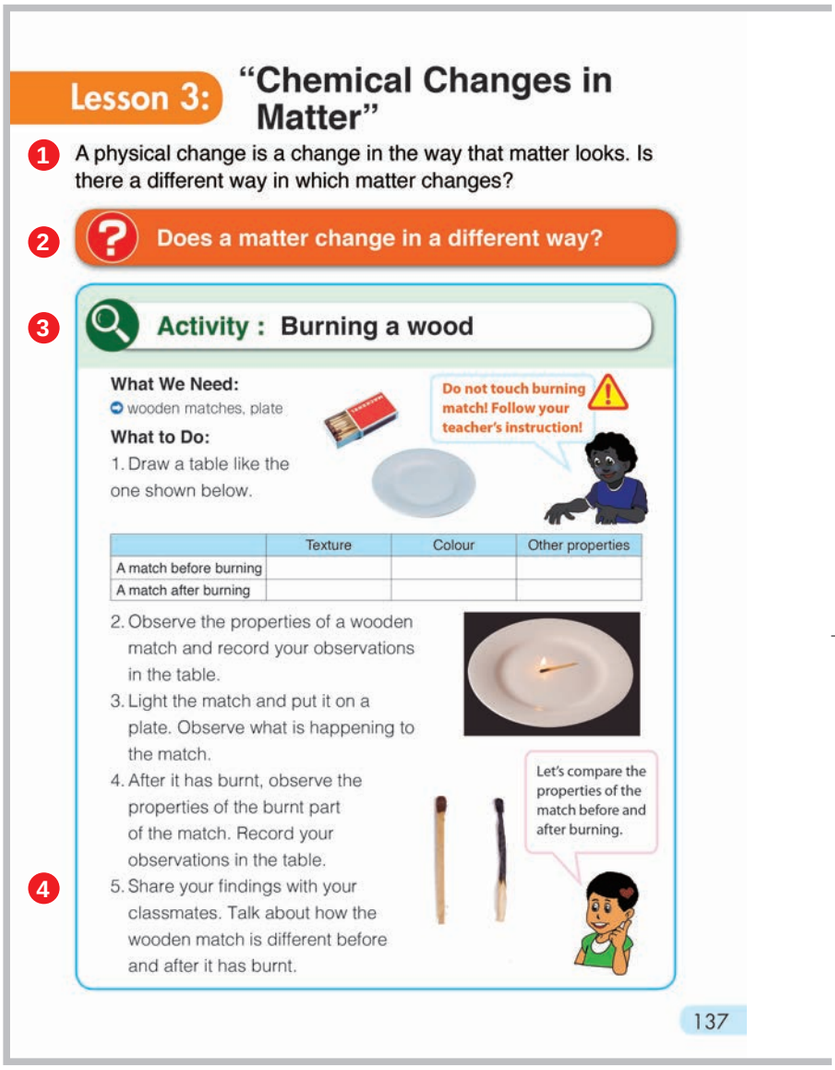
**3 Activity (20 min.)**

- Organise students into groups.
- Explain the steps of the activity.
- Before the activity, remind students of the important safety rules about fire.
- Have students do the activity and ask them to record their findings in the table.
- Assist students to light the match.
- Provide enough time for students to observe the properties of the burnt match.

**4 Discussion for findings (25 min.)**

- Ask students to present the results of their activity.
- Write down students' findings on the blackboard.

**(Continue)**



Lesson 3: "Chemical Changes in Matter"

1 A physical change is a change in the way that matter looks. Is there a different way in which matter changes?

2 Does a matter change in a different way?

3 Activity : Burning a wood

What We Need:
wooden matches, plate

What to Do:
1. Draw a table like the one shown below.

Do not touch burning match! Follow your teacher's instruction!

| | Texture | Colour | Other properties |
|---|---|---|---|
| A match before burning | | | |
| A match after burning | | | |

2. Observe the properties of a wooden match and record your observations in the table.
3. Light the match and put it on a plate. Observe what is happening to the match.
4. After it has burnt, observe the properties of the burnt part of the match. Record your observations in the table.
5. Share your findings with your classmates. Talk about how the wooden match is different before and after it has burnt.

Let's compare the properties of the match before and after burning.

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## Teacher's Notes

### Safety Rules

- Do not strike the match until when you are told to do so.
- Do not taste the burned wooden match.

### Chemical Changes

In a chemical change, there is a common property, not only a new substance been created, but the change has created heat. There are several chemical properties that help you determine if a chemical change is taking place or not and one of those is heat, whether the substance is giving off or taking in heat.

List of other properties that will let you know that a chemical change has occurred;

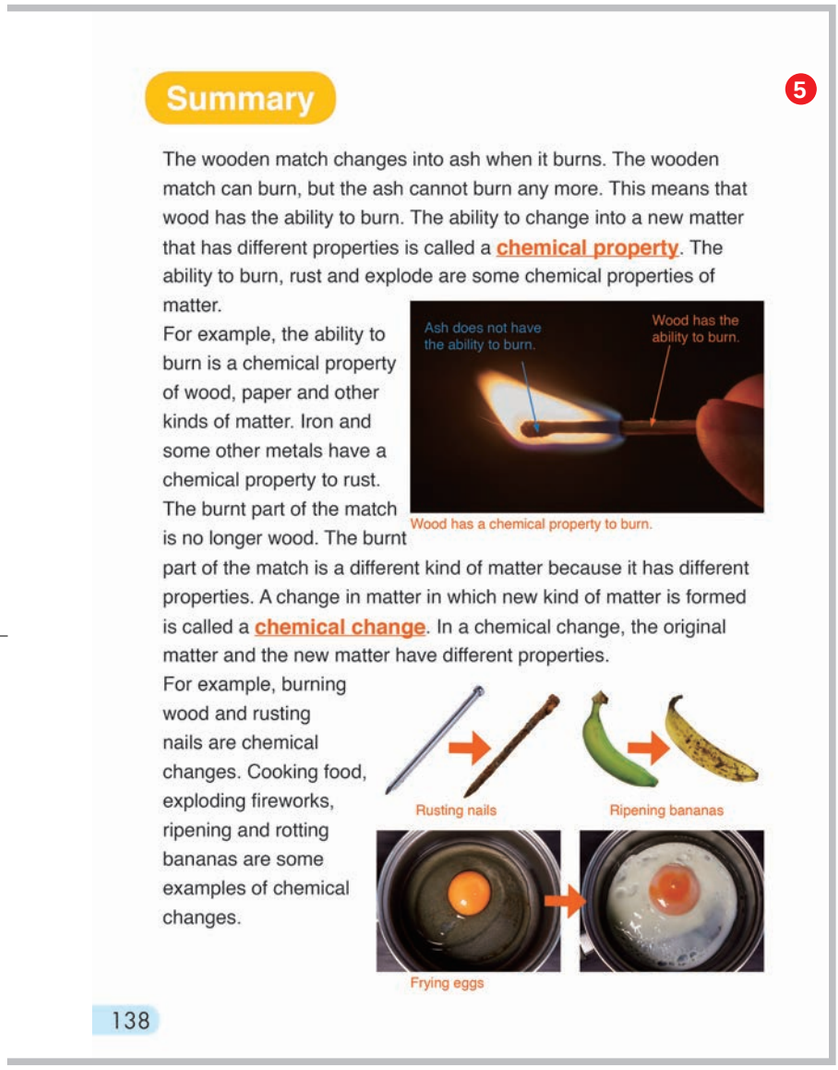
- Rusting
- An explosion
- Emission of light
- Colour change of the matter

## Lesson Objectives

Students will be able to:
- Explain chemical property of matter.
- Define the chemical changes in matter.
- Observe chemical changes in matter in a burning wood

## Assessment

Students are able to:
- State some examples of chemical changes in matter.
- Record the changes in the properties of a match after burning the wood.
- Describe the chemical change in the burnt part of a match.
- Listen to others opinions with respect.



Summary

The wooden match changes into ash when it burns. The wooden match can burn, but the ash cannot burn any more. This means that wood has the ability to burn. The ability to change into a new matter that has different properties is called a **chemical property**. The ability to burn, rust and explode are some chemical properties of matter.

For example, the ability to burn is a chemical property of wood, paper and other kinds of matter. Iron and some other metals have a chemical property to rust. The burnt part of the match is no longer wood. The burnt part of the match is a different kind of matter because it has different properties. A change in matter in which new kind of matter is formed is called a **chemical change**. In a chemical change, the original matter and the new matter have different properties.


Wood has a chemical property to burn.

For example, burning wood and rusting nails are chemical changes. Cooking food, exploding fireworks, ripening and rotting bananas are some examples of chemical changes.

Rusting nails

Ripening bananas

Frying eggs

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- Confirm results with students.
- **Based on their findings,** ask the question as discussion points.

Q:What happened to the wooden part of the match when it was lit? (The wooden part of the match was burnt.)

Q:How were the physical properties of the wooden part different before and after burning? (It has changed its colour, size, shape, texture and smell.)

Q:What ability does the wood have? (Wood has the ability to burn.)

Q:Is the wood the same or different before and after burning? Why do you think so? (No, because its properties are different before and after burning)

- Conclude the discussion by explaining what a chemical property is.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: What is a chemical property?
  Q: What is a chemical change in matter?
  Q: What are some examples of chemical changes around us?
- Ask students to copy the notes on the blackboard into their exercise books.

## Sample Blackboard Plan

Title:

"Chemical Changes in Matter"

Key question

Does a matter change in a different way?

Activity: Burning a wood

| | Texture | Colour | Others |
|---|---|---|---|
| Match before burning | Smooth | White, brown | Straight |
| Match after burning | Rough | Black | Bent, Burnt Dour |

Discussion

Q: What happened to the wooden part of a match when it was lit? The wooden part of the match burnt.

Q: How were the physical properties of the wooden part different before and after burning? It has changed its colour, size, shape, texture and smell.

Q: What ability does the wood have? Wood has the ability to burn.

Q: Is the wood the same or different before and after burning? Why do you think so? No, because its properties are different before and after burning

Summary

- The ability to change into new matter that has different properties is called the chemical properties of matter.
- The ability to burn, to rust and to ripen is examples of chemical properties.
- Chemical change is a change in matter where new kind of matter is formed.
- Burning wood, rusting nail and ripening fruits are examples of chemical changes

| Unit | Chapter : **12. Matter Change** | Total lesson No: 54 / 97 |
|---|---|---|
| **Matter** | Topic : **12.1. Physical and Chemical Changes in Matter** | Textbook page: 139 - 140 |

**Lesson** 4 / 12

**Lesson Title**

# Comparing Physical and Chemical Change

**Preparation**

- Pictures of common chemical changes
- Rulers/scissors

## Lesson Flow

**1 Introduction (5 min.)**

- Recall Lessons 2 and 3 by asking:

Q:What are some examples of physical changes in matter?

Q:What are some examples of chemical changes in matter?

- Encourage students to think about the differences between physical and chemical changes by asking:

Q:What are the differences between physical and chemical change?

**2 Introduce the key question**

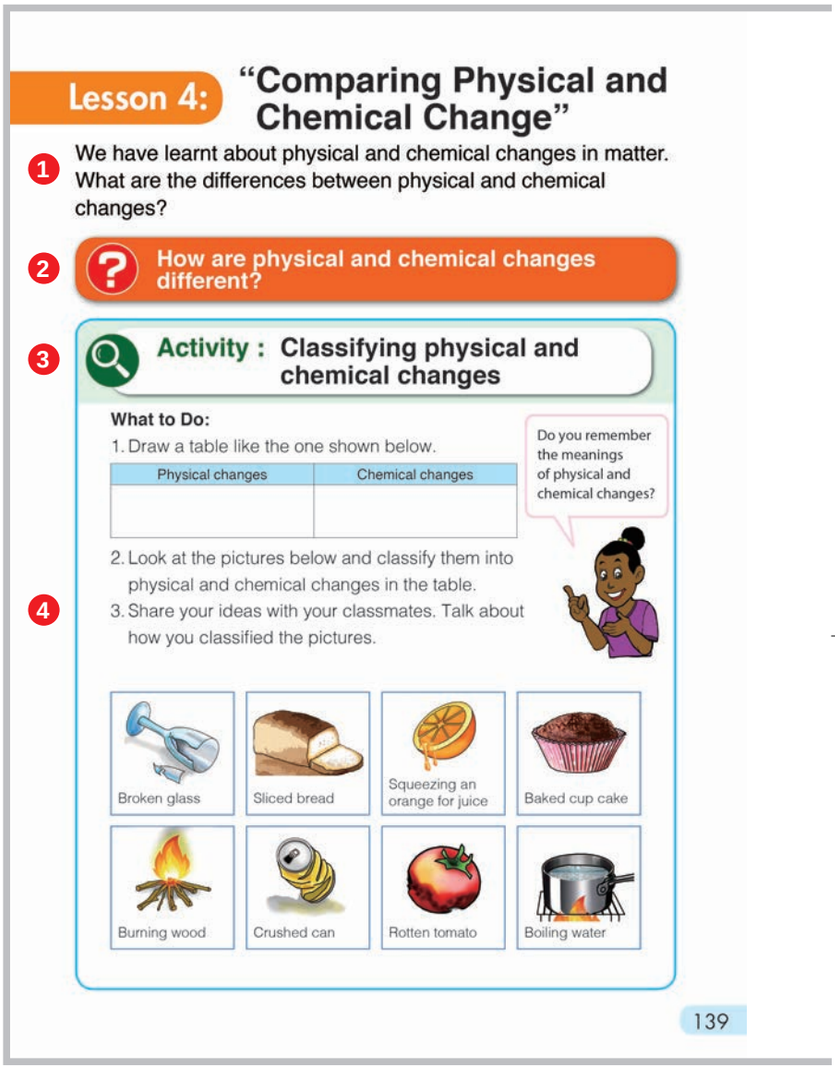
How are physical and chemical changes different?

**3 Activity (20 min.)**

- Organise students into groups.
- Explain the steps of the activity.
- Have students do the activity and ask them to record their findings in the table.
- Provide enough time for students to investigate the activity.

**4 Discussion for findings (25 min.)**

- Ask students to present the results of their activity.
- Write down students' findings on the blackboard.
- Confirm results with the students. **(Continue)**



Lesson 4: "Comparing Physical and Chemical Change"

1 We have learnt about physical and chemical changes in matter. What are the differences between physical and chemical changes?

2 How are physical and chemical changes different?

3 Activity : Classifying physical and chemical changes

What to Do:

1. Draw a table like the one shown below.

| Physical changes | Chemical changes |
|---|---|
| | |

2. Look at the pictures below and classify them into physical and chemical changes in the table.
3. Share your ideas with your classmates. Talk about how you classified the pictures.

4

Do you remember the meanings of physical and chemical changes?



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## Teacher's Notes

### Physical change

A physical change is a process in which a substance experiences change in its physical properties like shape, size, color, volume, appearance, state (i.e. solid, liquid, gas), density, etc. without making any changes to their internal structure or forming a new substance. Some examples of the physical change are melting and freezing of water, melting of wax, cutting of trees, dissolving sugar in water, etc.

### Chemical change

A chemical change is a process in which the atoms of one or more substance are rearranged or combined to form a new substance. When a substance undergoes a chemical change, the chemical properties of the substance changes. It is transformed into a different substance with different chemical compositions. Some examples of the chemical change are burning of wood or paper, rusting of iron, digestion of food in the stomach, etc.

## Lesson Objectives

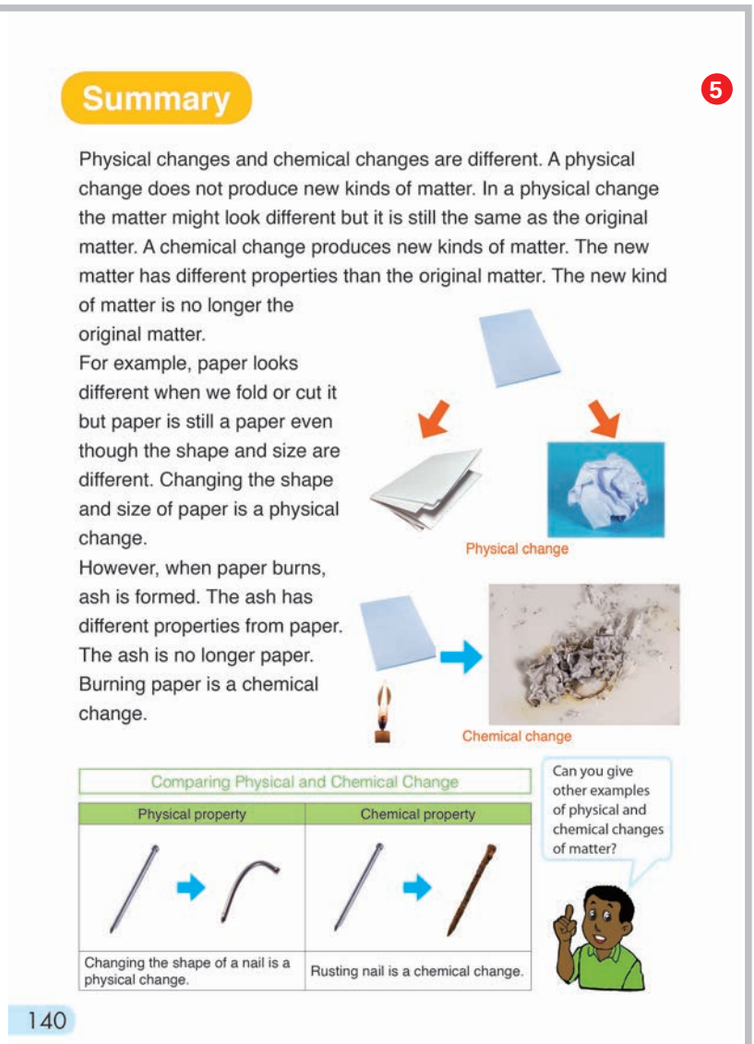
Students will be able to:

- Explain the differences between the physical and chemical changes in matter.
- Identify the physical changes and chemical changes around them in their daily life.

## Assessment

Students are able to:

- Classify some phenomena in their daily life into physical and chemical changes.
- State how physical and chemical changes are different by giving some examples.
- Develop confidence in classifying changes in matter into physical and chemical changes



### Summary

Physical changes and chemical changes are different. A physical change does not produce new kinds of matter. In a physical change the matter might look different but it is still the same as the original matter. A chemical change produces new kinds of matter. The new matter has different properties than the original matter. The new kind of matter is no longer the original matter.

For example, paper looks different when we fold or cut it but paper is still a paper even though the shape and size are different. Changing the shape and size of paper is a physical change.

However, when paper burns, ash is formed. The ash has different properties from paper. The ash is no longer paper. Burning paper is a chemical change.

Physical change

Chemical change

Comparing Physical and Chemical Change

| Physical property | Chemical property |
|---|---|
| Changing the shape of a nail is a physical change. | Rusting nail is a chemical change. |

Can you give other examples of physical and chemical changes of matter?

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- **Based on their findings,** ask the questions as discussion points.

Q:Which pictures show physical change and chemical change? (Physical change: Breaking glass, sliced bread, squeezing an orange, crushed can and boiling water. Chemical change: The rest of pictures)

Q:Why is the crushed can classified as a physical change? (Because the shape and size only changes but the can still remains as it is.)

Q:Why is baking cup cake a chemical change? (Because the cup cake batter totally changed after it was baked. It became a new matter (cup cake).)

Q:How are physical and chemical changes different? (A physical change doesn't produce new matter, but a chemical change produce new matter.)

- Conclude the discussion.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: How are physical and chemical changes different?
  Q: What are some examples of physical and chemical changes?
- Ask students to copy the notes on the blackboard into their exercise books.

## Sample Blackboard Plan

Title:
"Comparing Physical and Chemical change"

Key question How are physical and chemical changes different?

Activity: Classifying physical and chemical changes

| Physical Change | Chemical Change |
|---|---|
| Breaking glass | Baking cup cake |
| Slicing bread | Burning wood |
| Squeezing orange | Rotten tomato |
| Crushed can | |
| Boiling water | |

Discussion

Q: Which pictures show physical change and chemical change? Physical change: Breaking glass, sliced bread, squeezing an orange, crushed can and boiling water. Chemical change: The rest of the pictures

Q: Why is the crushed can classified as a physical change? Because the shape and size only changes but the can still remains as it is.

Q: Why is baking cup cake a chemical change? Because the cup cake totally changed after it was baked. It became a new matter (cup cake).

Q: How are physical and chemical changes different? A physical change doesn't produce new matter, but a chemical change produce new matter.

Summary

- A physical change does not produce a new matter, e.g. breaking a glass, slicing bread, cutting paper, etc.
- A chemical change produces new matter. The new matter has different properties, e.g. burning wood, spoiling milk, rusting nail, rotten fruits, etc

| Unit | Chapter : **12. Matter Change** | Total lesson No: 55 / 97 |
|---|---|---|
| **Matter** | Topic : **12.1. Physical and Chemical Changes in Matter** | Textbook page: 141 - 142 |

**Lesson**
**5 / 12**

**Lesson Title**

# Summary and Exercise

**Tips of lesson**

## 1 Summary (20 min.)

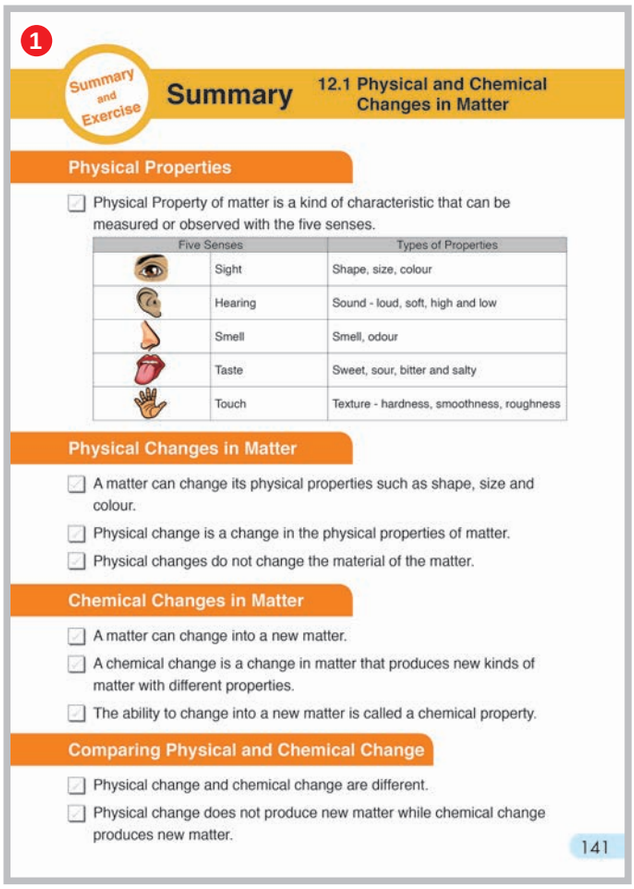
- Recap the main learning contents in this topic 'Physical and Chemical Change'
- Ask some questions and verify students understanding.

Q:What are some physical properties of matter?
(Size, shape, colour and texture)

Q:Which type of changes in matter produces new matter? (A chemical change in matter.)

Q:How can we describe the physical properties of matter? (By using the five senses)

- Explain and correct learning contents again if they still have misconception.
- Have students copy the summary into their note books.



1

Summary and Exercise

**Summary** 12.1 Physical and Chemical Changes in Matter

**Physical Properties**

- Physical Property of matter is a kind of characteristic that can be measured or observed with the five senses.

| Five Senses | Types of Properties |
|---|---|
| Sight | Shape, size, colour |
| Hearing | Sound - loud, soft, high and low |
| Smell | Smell, odour |
| Taste | Sweet, sour, bitter and salty |
| Touch | Texture - hardness, smoothness, roughness |

**Physical Changes in Matter**

- A matter can change its physical properties such as shape, size and colour.
- Physical change is a change in the physical properties of matter.
- Physical changes do not change the material of the matter.

**Chemical Changes in Matter**

- A matter can change into a new matter.
- A chemical change is a change in matter that produces new kinds of matter with different properties.
- The ability to change into a new matter is called a chemical property.

**Comparing Physical and Chemical Change**

- Physical change and chemical change are different.
- Physical change does not produce new matter while chemical change produces new matter.

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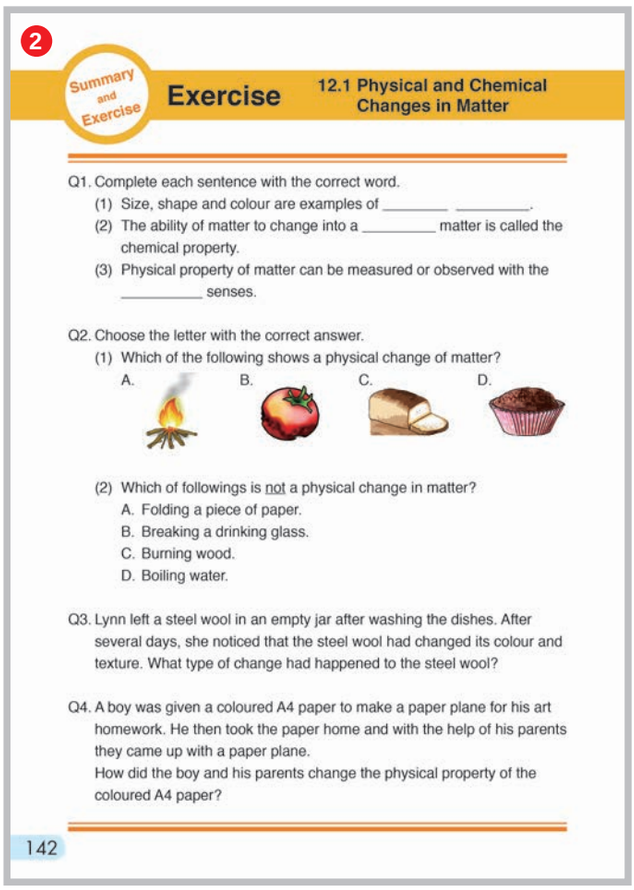
## 2 Exercise & Explanation (30 min.)

- Explain to the students each type of question.
  Question 1: Filling in Blanks
  Question 2: Multiple Choices
  Question 3: Short Answer items
  Question 4: Comprehension items
- Allow students to answer the questions individually with enough time in response to their understanding.
- After the exercise, provide the answers of the questions and explain to justify the answer.



2

Summary and Exercise

**Exercise** 12.1 Physical and Chemical Changes in Matter

Q1. Complete each sentence with the correct word.
(1) Size, shape and colour are examples of _____ _____.
(2) The ability of matter to change into a _____ matter is called the chemical property.
(3) Physical property of matter can be measured or observed with the _____ senses.

Q2. Choose the letter with the correct answer.
(1) Which of the following shows a physical change of matter?
A. B. C. D.

(2) Which of followings is not a physical change in matter?
A. Folding a piece of paper.
B. Breaking a drinking glass.
C. Burning wood.
D. Boiling water.

Q3. Lynn left a steel wool in an empty jar after washing the dishes. After several days, she noticed that the steel wool had changed its colour and texture. What type of change had happened to the steel wool?

Q4. A boy was given a coloured A4 paper to make a paper plane for his art homework. He then took the paper home and with the help of his parents they came up with a paper plane.
How did the boy and his parents change the physical property of the coloured A4 paper?

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## Exercise answers

Q1.

(1) **physical properties**

Size, shape, colour, texture, smell and taste are some physical properties of matter which can be observed or measured using the five senses. Sight, hearing, smell, taste and touch.

(2) **new**

Matter has the ability to change and such ability is used to produce a new matter. For example, wood has the ability to burn and change into ash as new matter.

(3) **five**

Our five senses are very useful to identify and describe what a matter is in terms of its physical properties.

Q2.

(1) **C**

Slicing of bread is a physical change in matter because it does not change into something new when sliced while the other three are chemical changes in matter as they produce a new matter.

(2) **C**

Q3. **A chemical change**

Steel wool rusted and a new matter produced by chemical change.

Q4. **(Example of answer)**

**By folding the coloured A4 paper to make the paper plane.**

(Accept other ways too, such as, tearing, or cutting)

| Unit | Chapter : **12. Matter Change** | Total lesson No: 56 / 100 |
|---|---|---|
| **Matter** | Topic : **12.2. States of Water** | Textbook page: 143 - 144 |

**Lesson** 6 / 12

**Lesson Title**

# Water around Us

**Preparation**

- Nil

## Lesson Flow

**1 Introduction (10 min.)**

- Encourage students to think about how water can change its form and where water can be found around us by asking questions.

Q:Can water change its form?
Q:How can water change its form?
Q:Where can the different forms of water be found?

**2 Introduce the key question**

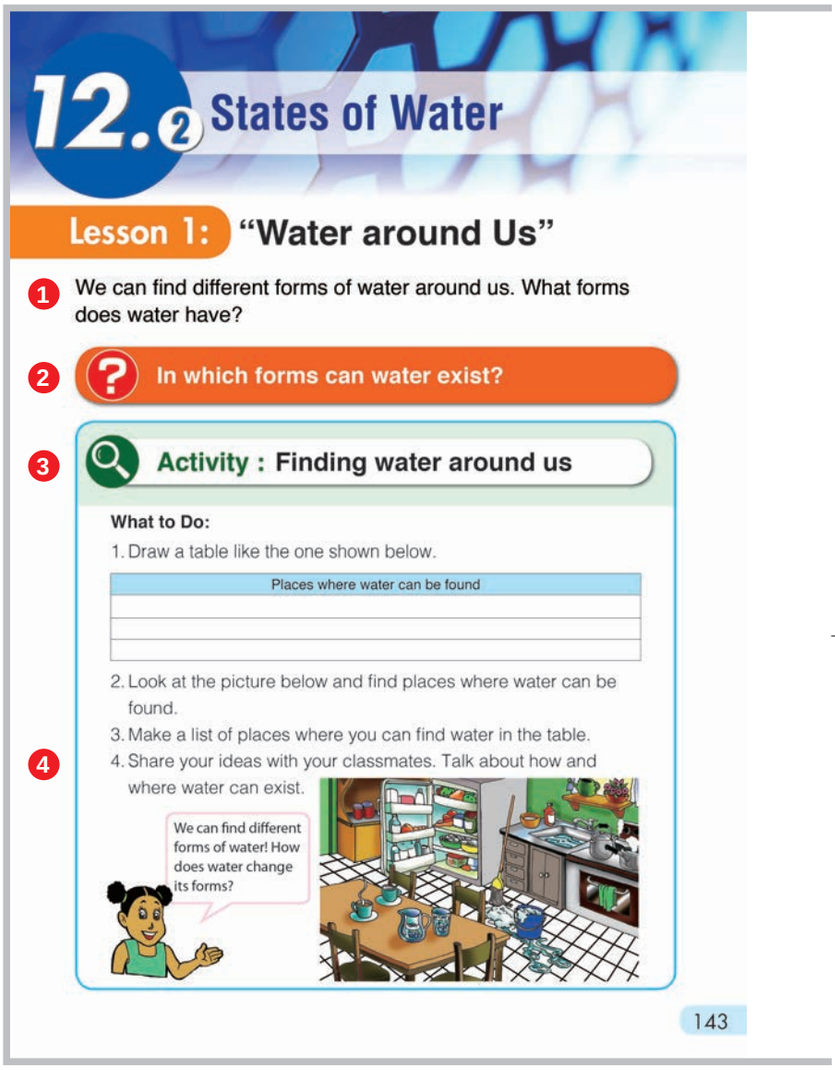
In which forms can water exist?

**3 Activity (15 min.)**

- Explain the steps of activity.
- Ask students to copy the table.
- Ask students to refer to the pictures and character talking in the activity for their investigation.
- Have students do the activity and ask them to record their findings in the table.
- Give time for students to record their findings in the table

**4 Discussion for findings (20 min.)**

- Ask students to present the findings from their activity.
- Write down students' findings on the blackboard.
- Confirm findings with students. **(Continue)**


12.2 States of Water

Lesson 1: "Water around Us"

1 We can find different forms of water around us. What forms does water have?

2 In which forms can water exist?

3 Activity : Finding water around us

What to Do:

1. Draw a table like the one shown below.

| Places where water can be found |
|---|
| |
| |
| |

2. Look at the picture below and find places where water can be found.
3. Make a list of places where you can find water in the table.
4. Share your ideas with your classmates. Talk about how and where water can exist.

4



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## Teacher's Notes

Notes for the activity

- Teacher should allow the students to use their experiences for the activity.
- Students share their ideas while working in small groups.

**Key Vocabulary**

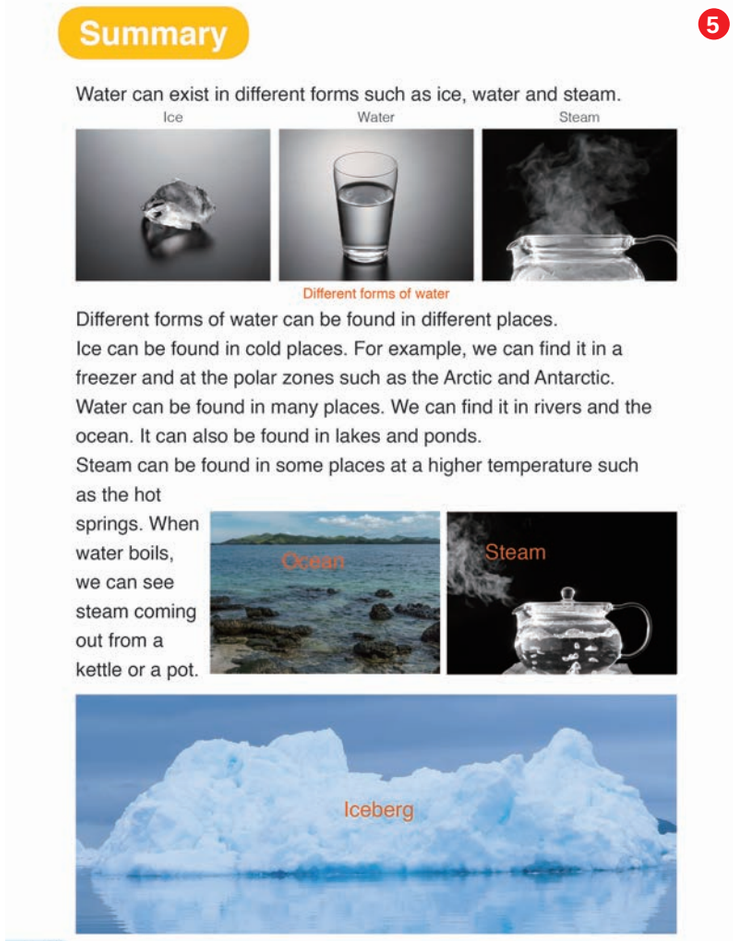
Water – liquid that comes down from the clouds as rain and forms streams, lakes seas etc.
Form – the shape or appearance of something (another word for state)
Ice – water that has frozen and become solid.
Steam – hot vapour into which water is changed when heated.
Temperature – degree of heat in a place or object.
Thermometer – An instrument used in measuring temperature.
Iceberg- A large floating mass of ice that broke from glaciers or shelf ice and floats out to open sea (ocean)

## Lesson Objectives

Students will be able to:
- Explain that water exist around us in different places.
- Identify the different forms of water.

## Assessment

Students are able to:
- State that water can be in the form of ice, steam and water.
- Relate the forms of water to the temperature of the places where water can be found.
- Enjoy finding different forms of water around us.



Summary

Water can exist in different forms such as ice, water and steam.

Ice Water Steam

Different forms of water

Different forms of water can be found in different places.
Ice can be found in cold places. For example, we can find it in a freezer and at the polar zones such as the Arctic and Antarctic.
Water can be found in many places. We can find it in rivers and the ocean. It can also be found in lakes and ponds.
Steam can be found in some places at a higher temperature such as the hot springs. When water boils, we can see steam coming out from a kettle or a pot.

Ocean

Steam

Iceberg

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- **Based on their findings,** ask the questions as discussion point.

Q:What forms of water can be found around us? (water, ice, steam, water vapour)

Q:What forms of water can be found in a freezer? (Ice)

Q:What form of water can be found on the table or near the sink? (water)

Q:What form of water can be found in the pan on the stove? (water, steam)

Q:What is the relationship between the forms of water and the temperature of the place where water can be found? (In the places at higher temperature, water is in the form of steam. In the places at lower temperature, water is in the form of ice. )

- Conclude the discussion.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: What forms of water can be found around us?
  Q: State the relationship between the forms of water and the temperature of the place where water can be found.
- Ask students to copy the notes on the blackboard into their exercise books.

## Sample Blackboard Plan

Title:
"Water around us"

Key question
Q: In which forms can water exist?

Activity
Finding water around us

| Places where water can be found |
|---|
| Drinking cup |
| Kitchen sink |
| refrigerator |
| Pot on the stove |
| On the floor |

Discussion
Q: What forms of water can be found around us?
water, ice, steam, water vapour
Q: What forms of water can be found in a freezer?
Ice
Q: What forms of water can be found on the table or near the sink? Liquid water
Q: What forms of water can be found in the pan on the stove? Liquid water, steam
Q: What is the relationship between the forms of water and the temperature of the place where water can be found?
In the places at higher temperature, water is in the form of steam. In the places at lower temperature, water is in the form of ice.

Summary
Water can be seen in three different forms; Ice, Water and Steam
- At cold places:
  ➤ Water can be in the form of ice.
- At higher temperature places:
  ➤ Water can be in the form of steam.
- At many places:
  ➤ Water can be in the form of water.

| Unit | Chapter : **12. Matter Change** | Total lesson No: 57 / 97 |
|---|---|---|
| **Matter** | Topic : **12.2. States of Water** | Textbook page: 145 - 146 |

**Lesson** 7 / 12

**Lesson Title**

# Heating Water

**Preparation**

- water, thermometer, small size-pan, stove (improvise when needed), watch (clock, mobile phone)

## Lesson Flow

**1 Introduction (5 min.)**

- Review the previous lesson by asking:

Q:In which forms does water exist?

- Encourage students to think about the changes in forms of water by asking:

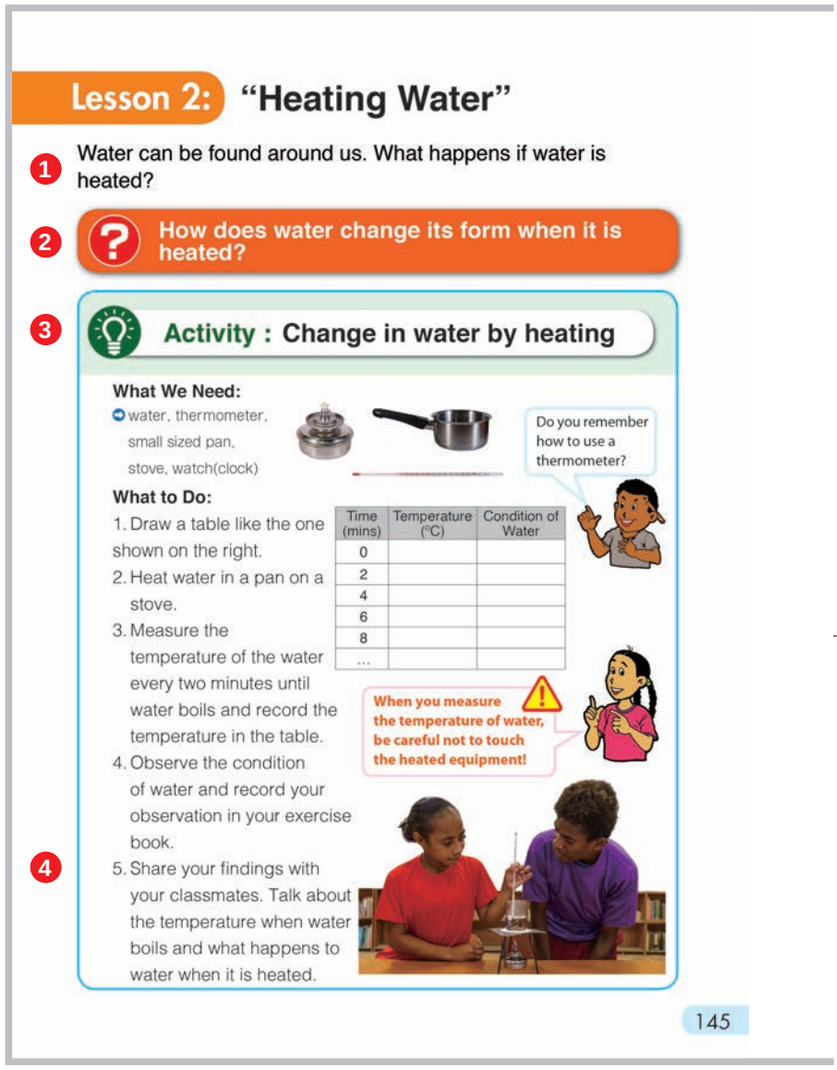
Q: How does the three forms of water change?

**2 Introduce the key question**

How does water change its form when it is heated?

**3 Activity (25 min.)**

- Review how to use a thermometer. (Refer to 'Science Toolbox: Thermometer' in the textbook)
- Explain the steps of the activity.
- Ask students to predict how temperature rises. Teachers can give guiding question "What degree Celsius will the temperature go up?"
- Ask students to gather around the place where apparatuses are set. (Not a group work, but for safety purpose)
- Emphasise on important safety rules:
  - Do not touch the heated equipment.
  - Do not bring your face closer to the boiling water when observing.
- Teacher put on fire and ask students to read and record the temperature readings in the table.
- Teacher measures the time and tells students when every 2 minutes is up.
- Encourage students to take note of how the steam rises and the bubbles forming.



Lesson 2: "Heating Water"

1 Water can be found around us. What happens if water is heated?

2 How does water change its form when it is heated?

3 Activity : Change in water by heating

What We Need:

water, thermometer, small sized pan, stove, watch(clock)

Do you remember how to use a thermometer?

What to Do:

1. Draw a table like the one shown on the right.
2. Heat water in a pan on a stove.
3. Measure the temperature of the water every two minutes until water boils and record the temperature in the table.
4. Observe the condition of water and record your observation in your exercise book.
5. Share your findings with your classmates. Talk about the temperature when water boils and what happens to water when it is heated.

| Time (mins) | Temperature (°C) | Condition of Water |
|---|---|---|
| 0 | | |
| 2 | | |
| 4 | | |
| 6 | | |
| 8 | | |
| ... | | |

When you measure the temperature of water, be careful not to touch the heated equipment!

4

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## Teacher's Notes

Important Notice:

- The thermometer may NOT indicate 100 degree Celsius in this experiment exactly. It usually about 98~99 degree Celsius in classroom condition. Because the water you can use is usually impure (impurity changes boiling point). Instrument errors (e.g. accuracy of thermometer) and operator errors (e.g. inappropriate readings) are other major factors of inaccuracy. Teachers should carefully explain that the boiling point of water is theoretically 100 degree Celsius although students' result may not be 100.

Safety Rules and experiment tips

- Do not over fill the pot or pan. It must be filled half way so that can allow it to boil quickly.
- Review how to use a thermometer (Refer to 'How to Use a Thermometer' on page 237 in the textbook). Handle the thermometer with proper care. Keep the bulb of the thermometer at the middle of the water. If the bulb touches the bottom of the pan, the thermometer can be broken as it is too close to the heat source which has very high temperature.
- This activity should be experimented together as a whole class due to safety reasons. In addition, teacher should boil the water in a way that allows everyone to observe.
- Results provided on the textbook and blackboard plan are only examples. The lesson should be conducted based on the actual results, however, if you fail the experiment, use the examples in the textbook.
- Do not touch the equipment during and even after turning or putting off the stove or fire.

## Lesson Objectives

Students will be able to:
- Observe the changes in water when heated.
- Measure the temperature of water with a thermometer.
- State the boiling point of water based on the results.

## Assessment

Students are able to:
- Describe how water changes when it is heated.
- Use a thermometer properly to measure the temperature of water.
- Read the scale on the thermometer.
- Engage in their task in cooperation with classmates.

### Result

When water is heated, its temperature increases. Bubbles gradually come out from the bottom and the steam rises from the surface of the water. Then bigger bubbles are formed in the water actively when the temperature of water reaches 100 degrees Celsius (°C). The hot water keeps this temperature.

| Time (mins) | Temperature (°C) | Condition of Water |
|---|---|---|
| 0 | 22 | No change |
| 2 | 32 | No change |
| 4 | 50 | Small bubbles appeared |
| 6 | 68 | Many small bubbles appeared |
| 8 | 85 | Bigger bubbles appeared<br>Steam rose |
| 10 | 100 | Many big bubbles appeared |
| 12 | 100 | Many big bubbles appeared |
| 14 | 100 | Many big bubbles appeared |

### Summary

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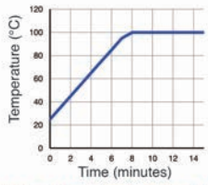
When water is heated, its temperature increases and the steam rises from the surface of the water. After that, large bubbles are formed in the water actively when the temperature of water reaches 100 degrees Celsius (°C). This is called the **boiling** of water.
The temperature of water does not exceed 100 degrees Celsius (°C) while water is boiling.
The temperature of 100°C at which water boils is called the **boiling point** of water.

When water boils, the temperature of the water is at 100 degrees Celsius (°C).


When water boils, bubbles and steam are formed.




The temperature of water does not exceed 100 degrees Celsius (°C) while water is boiling.

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### 4 Discussion for findings (20 min.)

- Ask students to present their results of their activity.
- Write down students' findings on the blackboard.
- Confirm students' results with students.
- **Based on their findings,** ask the questions as discussion point.

Q:What happened to the water when it was heated? (First, small bubbles form. Gradually steam began to rise from the surface of the water. After that large bubbles are formed in the water)

Q:What happened to the size of the bubbles in the water when the temperature of the water reaches at 100 °C? (The large bubbles were formed actively.)

Q:What happened to the temperature of the water after it reached 100 °C? (The temperature did not rise.)

- Conclude the discussion.

### 5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: What is the boiling point of water?
  Q: What happened to the temperature of the water after it reach 100 °C?
- Ask students to copy the notes on the blackboard into their exercise books.

## Sample Blackboard Plan

Title:
"Heating Water"

Key question Q: How does water change its form when it is heated?
Activity: Change in water by heating

| Time (min) | Temperature (°C) | Conditions of water |
|---|---|---|
| 0 | 20 | |
| 2 | 30 | Small bubbles |
| ... | ... | ... |

Refer to 'result' in the textbook copy.

Discussion
Q: What happened to the water when it was heated? First, small bubbles form. Gradually steam began to rise from the surface of the water. After that, large bubbles are formed in the water
Q: What happened to the size of the bubbles when the temperature of the water reaches at100 °C? The large bubbles were formed actively.
Q: What happened to the temperature of the water after it reaches at 100 °C? The temperature did not rise.

Summary
1. What is boiling?
➤ Large bubbles are formed in the water actively when the temperature of water reaches at 100 °C.
2. What is the boiling point of water?
➤ The temperature of 100 °C at which water boils
3. What happens to the temperature of water after reaching boiling point?
➤ The temperature of water does not exceed 100 °C while water is boiling.

| Unit | Chapter : **12. Matter Change** | Total lesson No: 58 /100 |
|---|---|---|
| **Matter** | Topic : **12.2. States of Water** | Textbook page: 147 - 148 |

**Lesson** 8 / 12

**Lesson Title**

# What is steam?

**Preparation**

- kettle, stove, spoon, water

## Lesson Flow

**1 Introduction (5 min.)**

- Review the previous lesson by asking:

Q:What happened to the water when it was heated?

- Encourage students to think about what steam is by asking:

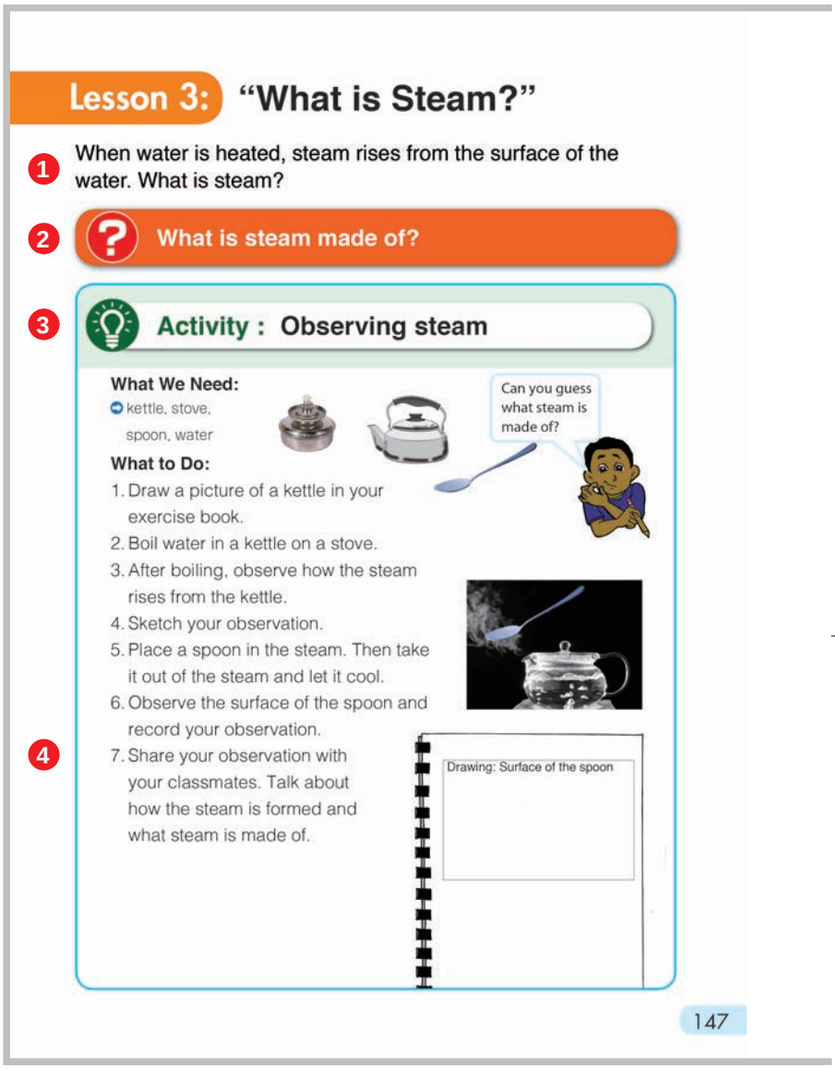
Q:What is steam?

**2 Introduce the key question**

What is steam made of?

**3 Activity (25 min.)**

- Organise students into groups.
- Explain the steps of the activity.
- Emphasise on important safety rules:
  - Do not touch the heated equipment.
  - Do not bring your hand closer to the steam when the spoon is placed in the steam.
- Assist students to set up the experiment.
- Have students do the activity and ask them to record their findings.
- For step 4, make them observe the steam near the mouth of a kettle and around it.
- For step 5, ask students to place the spoon in different parts, e.g. the spout (mouth of), around the lid.
- Give enough time for students to explore new ideas by themselves.



Lesson 3: "What is Steam?"

1 When water is heated, steam rises from the surface of the water. What is steam?

2 What is steam made of?

3 Activity : Observing steam

What We Need:
kettle, stove, spoon, water

Can you guess what steam is made of?

What to Do:
1. Draw a picture of a kettle in your exercise book.
2. Boil water in a kettle on a stove.
3. After boiling, observe how the steam rises from the kettle.
4. Sketch your observation.
5. Place a spoon in the steam. Then take it out of the steam and let it cool.
6. Observe the surface of the spoon and record your observation.

4 7. Share your observation with your classmates. Talk about how the steam is formed and what steam is made of.

Drawing: Surface of the spoon

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## Teacher's Notes

Comparison chart between Steam and Water Vapour:

- Many people don't distinguish 'steam' and 'water vapour' in daily life. Even some science books don't differentiate them. But there is a slight difference. Water vapour occurs when water evaporates. If you place your clothes to air dry, the water from the clothes evaporates and becomes water vapour. You can not see the water vapour coming out from the clothes. The evaporation occurs in any temperature. Steam is fine liquid water droplets of condensed water vapour is produced by a boiling kettle, for example. It is like white clouds and visible. The differences are summarised in the table on the right.

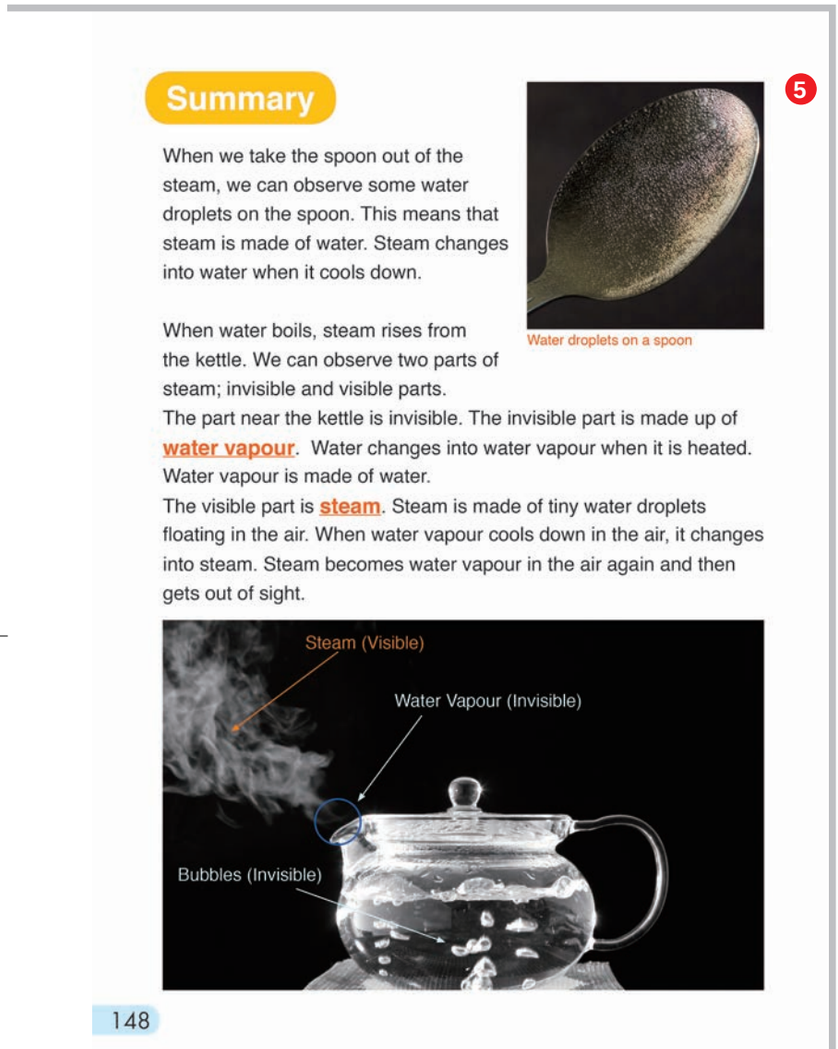
| | **Water vapour** | **Steam** |
|---|---|---|
| **Description** | Water molecules in air | Tiny water droplets |
| **Scientific Description** | Gaseous state of water | Liquid state of water as tiny water droplets |
| **Visibility** | Invisible | Visible |
| **Temperature** | Any temperature | Around boiling point (100 °C) |
| **Example** | Bubbles in boiling water | White mist form |

## Lesson Objectives

Students will be able to:
- Explain what makes up steam.
- State what water vapour is.
- Relate the change in state of water to the temperature.
- State that visible part of steam is water vapour.

## Assessment

Students are able to:
- Describe how water changes its state from liquid to steam and vice versa.
- Infer that the steam is made of water by observing the water droplets on a spoon.
- Sketch how the steam rises from the mouth of a kettle.
- Show cautiousness when observing steam in boiling water.



Summary

When we take the spoon out of the steam, we can observe some water droplets on the spoon. This means that steam is made of water. Steam changes into water when it cools down.



Water droplets on a spoon

When water boils, steam rises from the kettle. We can observe two parts of steam; invisible and visible parts.
The part near the kettle is invisible. The invisible part is made up of **water vapour**. Water changes into water vapour when it is heated. Water vapour is made of water.
The visible part is **steam**. Steam is made of tiny water droplets floating in the air. When water vapour cools down in the air, it changes into steam. Steam becomes water vapour in the air again and then gets out of sight.

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### 4 Discussion for findings (20 min.)

- Ask students to present their findings from their activity.
- Write down students' findings on the blackboard.
- Confirm the findings with students.
- **Based on their findings,** ask the questions as discussion point.

Q:What did you observe near and around the mouth of a kettle when it was heated? (We found white and invisible parts of steam. The steam near the kettle is transparent.)
Q:What did you observe at the surface of the spoon after taking it out of the steam? (Water droplets)
Q:Why did the steam change into water droplets? (Because the steam cooled down)
Q:What is steam made of? (Water)

- Conclude the discussion.

### 5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: Which part is steam, visible or invisible part?
  Q: Why did the steam change into water droplets?
  Q: What is steam made of?
- Ask students to copy the notes on the blackboard into their exercise books.

## Sample Blackboard Plan

Title:
"What is Steam?"
Key question
What is steam made of?
Activity
Observing Steam

(Drawing of a spoon with water droplets)

Discussion
Q: What did you observe near and around the mouth of a kettle when it was heated?
There are white and invisible parts. The steam near the kettle is transparent.
Q: What did you observe at the surface of the spoon after taking it out of the steam?
Water droplets
Q: Why did the steam change into water droplets? Because the steam cooled down
Q: What is the steam made of? Water

Summary
1. What is steam?
   ➤ Steam is made of water.
   ➤ When steam cools down, it changes into water.
2. What are visible and invisible parts rises from a kettle?
   ➤ The invisible part is made of water vapour.
   ➤ The visible part is steam. Steam is tiny water droplets in the air.

| Unit | Chapter : **12. Matter Change** | Total lesson No: 59 / 97 |
|---|---|---|
| **Matter** | Topic : **12.2. States of Water** | Textbook page: 149 - 150 |

**Lesson** 9 / 12

**Lesson Title**

# Melting Ice

**Preparation**

- ice cube, thermometer, glass cup, watch (clock, mobile phone)

## Lesson Flow

**1 Introduction (5 min.)**

- Review previous lesson by asking:

Q:How does water change its form when it is heated?

Q:What happened when steam cooled down?

Q:What is steam made up of?

**2 Introduce the key question**

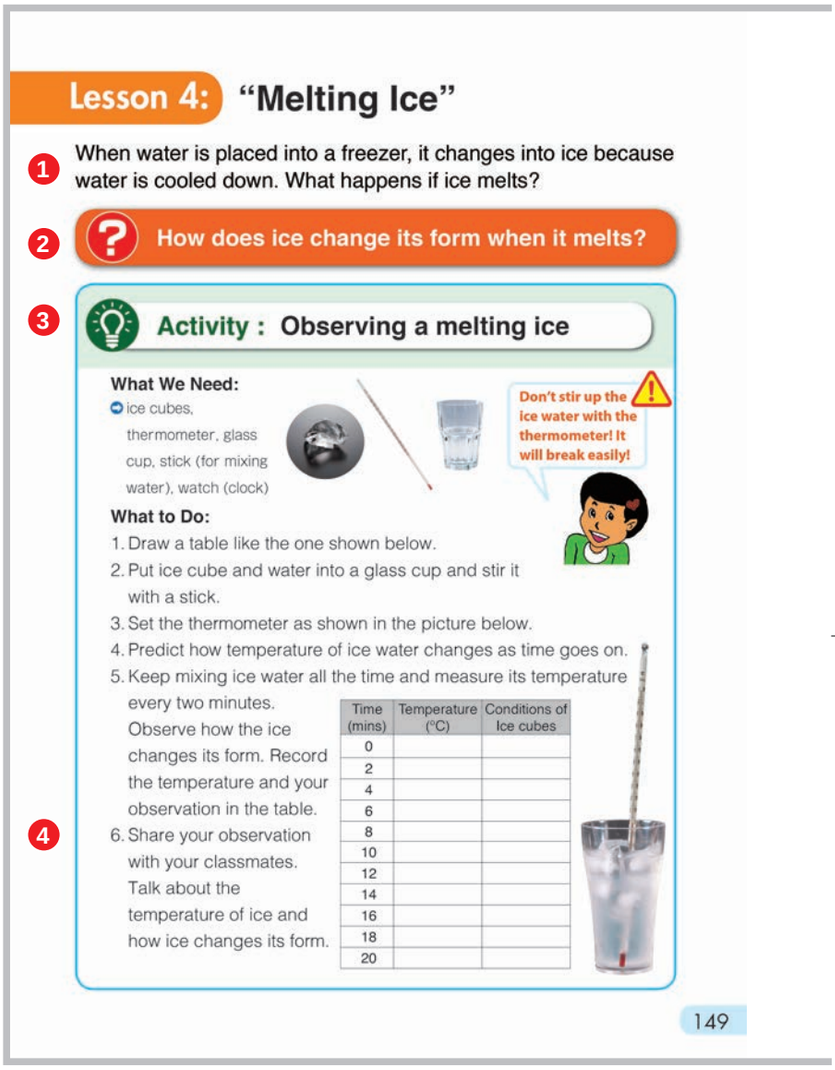
How does ice change its form when it melts?

**3 Activity (25 min.)**

- Organise students into groups.
- Explain the steps of the activity.
- Assist students to draw the table and to set up the experiment.
- Ask students to predict how temperature changes during the experiment. Teachers can give the following choices to guide students for their prediction effectively; 1) no change, 2) gradually increase, 3) gradually decrease.
- Have students do the activity and ask them to record their findings in the table.
- During observation, teacher measures the time every 2 minutes and students record the temperature.
- Give enough time for students to think about new ideas based on their results by themselves.

**4 Discussion for findings (20 min.)**

- Ask students to present their results of their activity. **(Continue)**



Lesson 4: "Melting Ice"

1 When water is placed into a freezer, it changes into ice because water is cooled down. What happens if ice melts?

2 How does ice change its form when it melts?

3 Activity : Observing a melting ice

What We Need:

ice cubes, thermometer, glass cup, stick (for mixing water), watch (clock)

Don't stir up the ice water with the thermometer! It will break easily!

What to Do:

1. Draw a table like the one shown below.
2. Put ice cube and water into a glass cup and stir it with a stick.
3. Set the thermometer as shown in the picture below.
4. Predict how temperature of ice water changes as time goes on.
5. Keep mixing ice water all the time and measure its temperature every two minutes. Observe how the ice changes its form. Record the temperature and your observation in the table.
6. Share your observation with your classmates. Talk about the temperature of ice and how ice changes its form.

4

| Time (mins) | Temperature (°C) | Conditions of Ice cubes |
|---|---|---|
| 0 | | |
| 2 | | |
| 4 | | |
| 6 | | |
| 8 | | |
| 10 | | |
| 12 | | |
| 14 | | |
| 16 | | |
| 18 | | |
| 20 | | |

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## Teacher's Notes

Important Notice: The thermometer may NOT indicate 0 degree Celsius in this experiment exactly. It usually about 1~2 degree Celsius in classroom condition. The reason is described in teacher's note for 'Heating Water' on page 144. Teachers should carefully explain that the melting point of water is theoretically 0 degree Celsius although students' result may not be 0.

Safety Rules and experiment tips:

- Results provided on the textbook and blackboard plan are only examples. The lesson should be conducted based on the actual results, however, if students fail the experiment, use the examples.
- Large ice cubes or block takes time to melt, use crushed ice to control the duration of the experiment.
- Use of polystyrene cup (white disposable cup) is recommended as it is a good heat insulation capacity. It prevents unexpected temperature change caused by premature operation of students.
- It is difficult to measure the temperature of ice as the bulb of the thermometer is hardly covered by ice all the time. Instead, we use 'melted ice (water)' to completely cover the bulb. Please be sure the bulb should always be kept in the water.
- The temperature of 'melted ice' can be considered equivalent to ice. Do not add normal water of room temperature. You may have some water melted in ice container. Use that water and keep stirring it up to completely mix newly melted ice and water.
- A thermometer can be broken easily. Do not use it for mixing ice water and instead use a stick for stirring up the ice water.
- Use 'stop watch' in a mobile phone to control timing if you don't have wall clocks in your classroom.

## Lesson Objectives

Students will be able to:
- Explain the meaning of melting.
- Relate the change in state of water to the temperature.
- Observe how ice melts in room temperature.
- Measure the temperature of a melting ice with a thermometer.

## Assessment

Students are able to:
- State what melting is.
- Explain what melting point of water is.
- Read the temperature of the melting ice on the scale.
- Record the change in temperature of melting ice in the table.
- Show cautiousness when observing steam in boiling water.

### Result

Ice changed its form during the experiment. It got smaller and finally disappeared. The temperature of ice water remained at 0 degrees Celsius (°C) while ice was there in water.

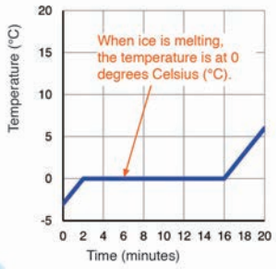
| Time (mins) | Temperature (°C) | Condition of Ice cubes |
|---|---|---|
| 2 | 0 | Ice and water mixed |
| 4 | 0 | Ice is getting smaller |
| 6 | 0 | Some ice disappeared |
| ... | ... | ... |
| 12 | 0 | Some ice disappeared |
| 14 | 0 | Most ice disappeared |
| 16 | 0 | Ice completely melted |
| 18 | 3 | No ice in water |
| 20 | 6 | No ice in water |

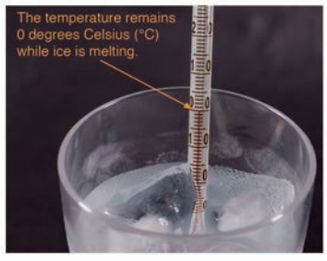

### Summary

When ice is heated, it starts to melt. Then ice becomes water. This is called melting. **Melting** is the process of solid changing into liquid.


Change in form of ice

Even if ice water is put in a warm place, the temperature remains at 0 degrees Celsius (°C) while ice is melting. The temperature of 0°C at which ice changes to water is called the **melting point** of water.

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- Write down students' findings on the blackboard.
- Confirm results with students.
- **Based on their observation,** ask these questions:

Q:What happened to the ice in the glass over time? (The ice melts gradually. The size of the ice became smaller. Finally it became water)

Q:What happened to the temperature when ice melted? (First, temperature increased. During ice melting, temperature was kept at 0°C. After all ice melted, temperature increased again.)

Q:Why did the ice melt when it was kept in the room? (Because ice was warmed by warm air)

Q:What is ice made of? (Water)

- Conclude the discussion.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: What is the meaning of "Melting"?
  Q: What is the melting point of water?
  Q: What happened to the temperature while ice is melting?
  Q: What causes ice to melt?
  Q: What is ice made of?
- Ask students to copy the notes on the blackboard into their exercise books.

## Sample Blackboard Plan

Title:
"Melting Ice"
Key question Q: How does ice change its form when it melts?
Activity: Observing a melting ice

| Time (min) | Temperature (°C) | Conditions |
|---|---|---|
| 2 | 0 | Ice and water mixed |
| 4 | 0 | Ice is getting smaller |
| Refer to "result" in the textbook copy. | | |

Discussion
Q: What hppened to the ice in the glass over time?
The ice melts gradually. The size of the ice became smaller. Finally it became water.
Q: What happened to the temperature when ice melted?
First, temperature increased. During ice melting, temperature was kept at 0°C. After all ices melting, temperature increased again.
Q: Why did the ice melt when it was kept in a room?
Because ice was warmed by warm air

Summary
1. What is melting?
- Solid begins to change into liquid when its temperature reaches melting point.

2. What is the melting point of water?
- The temperature of 0°C at which ice changes into water

3. What happens to the temperature during and after reaching melting point?
Before: Temperature increase.
During: Temperature keeps 0°C.
After: Temperature increase.

| Unit | Chapter : **12. Matter Change** | Total lesson No: 60 / 97 |
|---|---|---|
| **Matter** | Topic : **12.2. States of Water** | Textbook page: 151 - 152 |

**Lesson** 10 / 12

**Lesson Title**

# Changes in States of Water

**Preparation**

- NIL

## Lesson Flow

**1 Introduction (5 min.)**

- Revise the lesson on 'Water around us' by asking:

Q:What forms of water can be found around us?

Q:State the relationship between the forms of water and the temperature of the place where water can be found.

- Encourage students to think about changes in states of water by asking:

**2 Introduce the key question**

How does water change in its form?

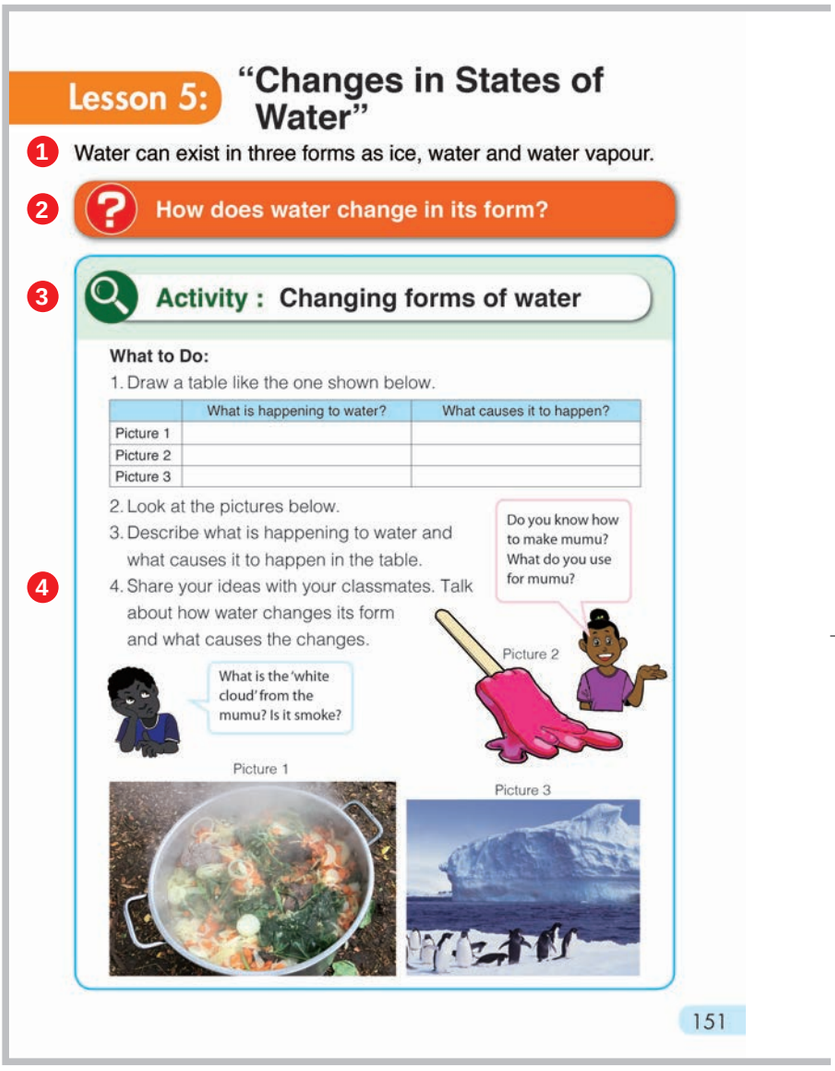
**3 Activity (20 min.)**

- Organise students into some groups.
- Explain the steps of the activity.
- Refer students to the three different pictures in the textbook.
- Encourage students to think of the causes of the change in forms of water in each picture.
- Provide enough time for students to explore new ideas of changing forms of water amongst themselves.

**4 Discussion for findings (25 min.)**

- Ask students to present the results of their activity.
- Write down students' findings on the blackboard.

**(Continue)**



Lesson 5: "Changes in States of Water"

1 Water can exist in three forms as ice, water and water vapour.

2 How does water change in its form?

3 Activity : Changing forms of water

What to Do:

1. Draw a table like the one shown below.

| | What is happening to water? | What causes it to happen? |
|---|---|---|
| Picture 1 | | |
| Picture 2 | | |
| Picture 3 | | |

2. Look at the pictures below.
3. Describe what is happening to water and what causes it to happen in the table.
4. Share your ideas with your classmates. Talk about how water changes its form and what causes the changes.

Do you know how to make mumu? What do you use for mumu?

What is the 'white cloud' from the mumu? Is it smoke?

Picture 2

Picture 1

Picture 3

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## Teacher's Notes

Water comes in three different forms. It can be solid (ice), liquid (water) or gas (water vapour or steam). To change the water from one state to another you need to add or take away heat.

### Adding Heat to Water

When enough heat is added to water, it will turn into a gas. That gas is known as the water vapour or steam.

When heat is added to water in its solid form (ice), it will turn into water (liquid).

If an ice cube is heated, it will change into water (liquid) and if it is continuously heated it will change into a gas (steam)

### Removing heat away from water

When heat is removed from water, it changes its state from one state to another. If heat is removed from a liquid, it will change into a solid. And if heat is removed from a gas it will change into a liquid.

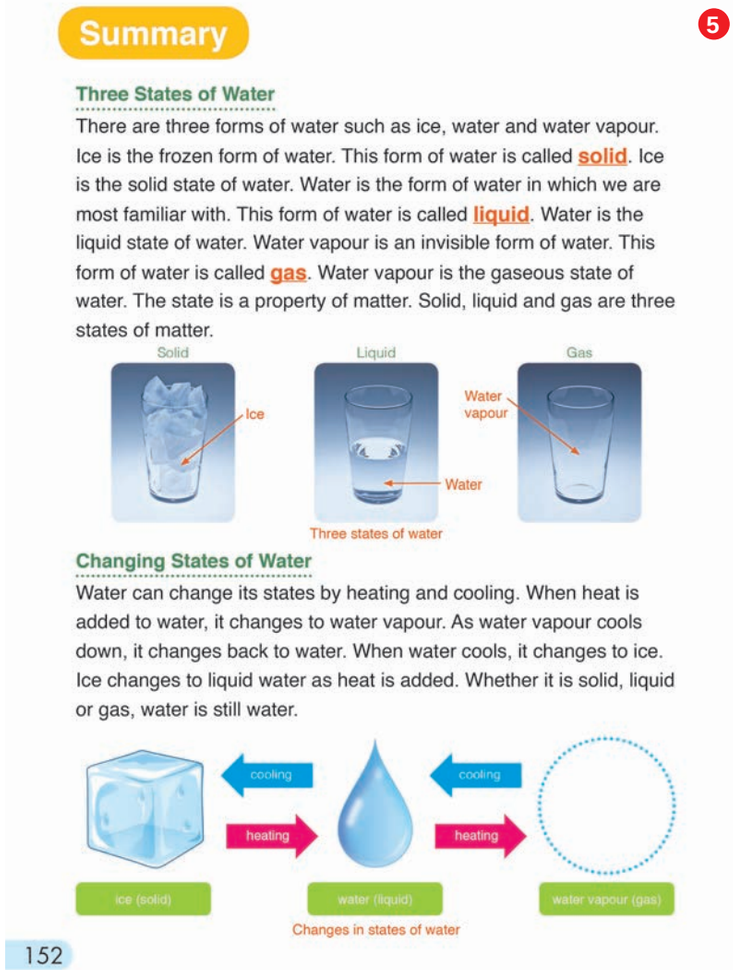
Water changes from solid to liquid to gas and back again. It can change from one state to another by adding or removing heat. These changes are reversible. If you can make a change and then change it back again to the way it was, the change is reversible.

## Lesson Objectives

Students will be able to:
- Identify three states of water.
- Describe changes in the states of water in relation to temperature.

## Assessment

Students are able to:
- State that water can change its state from solid to liquid and liquid to gas when heat is added or removed.
- List three states of water and its causes.
- Relate the changes in states of water to temperature.
- Investigate three states of water with interest.



Summary

Three States of Water

There are three forms of water such as ice, water and water vapour. Ice is the frozen form of water. This form of water is called **solid**. Ice is the solid state of water. Water is the form of water in which we are most familiar with. This form of water is called **liquid**. Water is the liquid state of water. Water vapour is an invisible form of water. This form of water is called **gas**. Water vapour is the gaseous state of water. The state is a property of matter. Solid, liquid and gas are three states of matter.



Three states of water

Changing States of Water

Water can change its states by heating and cooling. When heat is added to water, it changes to water vapour. As water vapour cools down, it changes back to water. When water cools, it changes to ice. Ice changes to liquid water as heat is added. Whether it is solid, liquid or gas, water is still water.



Changes in states of water

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- Confirm students' results with students.
- **Based on their findings,** ask these questions:

Q:What is happening to water in the picture 3? (It freezes. It becomes ice.)
Q:Why does water freeze? (It is cooled.)
Q:What is happening to water in the picture 1? (It becomes steam or it becomes water vapour, etc.)
Q:Why does water become steam (evaporate)? (It is heated.)
Q:What is happening to water in picture 2? (Ice is melting or ice becomes water, etc.)
Q:Why is ice melting? (It is warmed by warm air.)
Q:How can water change its form? (By heating and cooling)
Q:What causes the change in the form of water? (Temperature or heating and cooling, etc)

- Conclude the discussion.

**5 Summary (10 min.)**

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: How can water change its form?
  Q: What causes the change in the form of water?
- Ask students to copy the notes on the blackboard into their exercise books.

## Sample Black board Plan

Title:

"Changes in States of Water"

Key questionQ: How does water change in its form?

Activity: Changing forms of water

| | What is happening to water | What causes it to happen? |
|---|---|---|
| Pic. 1 | It freezes. It becomes ice. | Cooling down, Heat is removed |
| Pic. 2 | Water is being changed into steam or Water vapour | Heat is added. Heating |
| Pic. 3 | Ice is melting. Ices become water | Heat is added. Warming |

Discussion

Q: What is happening to water in the picture 3? It freezes. It becomes ice.
Q: Why does water freeze? It is cooled.
Q: What is happening to water in the picture 1? It becomes steam or it becomes water vapour
Q: Why does water become steam (evaporate)? It is heated.
Q: What is happening to water in picture 2? Ice is melting or ice become water
Q: Why are ices melting? They are warmed by warm air.
Q: How can water change its form? Ice, water, and water vapour by heating and cooling
Q: What causes the change in the form of water? Temperature or heating and cooling

Summary

- Three states of water: ice (solid), water (liquid) and water vapour (gas)
- Water changes its state by heating and cooling.

| Unit | Chapter : **12. Matter Change** | Total lesson No: 61 / 97 |
|---|---|---|
| **Matter** | Topic : **12.2. States of Water** | Textbook page: 153 - 155 |

**Lesson**
**11 / 12**

**Lesson Title**

# Summary and Exercise

**Tips of lesson**

## 1 Summary (20 min.)

- Begin the summary and try ask the question;

Q:What is the common word covered in this topic? (Water)

- Explain to the students that in all the lessons covered we discussed about states of water. (How water changes from a state to another)
- Lead students to the summary page in the student textbook and explain lesson by lesson main learning content.
- Based on the main learning contents, ask students some questions and verify their understanding against the summary points.

Q:What will happen if an ice cube is removed from the freezer and placed in a glass cup? (It will slowly melt.)

Q:In which state of water will the ice cube change to? (Liquid)

- Explain and correct learning contents again if they still have misconception
- Have students copy the summary into their note books

## 2 Exercise & Explanation (30 min.)

- Go through the exercises with students.
  Question 1: Filling in Blanks.
  Question 2: Multiple Choices.
  Question 3: Short Answer items.
  Question 4: Comprehension items.
- Allow students to try answer the questions individually with enough time in response to their understanding.
- After the exercise, provide the answers of the questions to the students and explain how to solve using their scientific understanding and ideas.

1

Summary and Exercise

**Summary** 12.2 States of Water

**Water around Us**

- Water can exist in different forms such as ice, water and steam.
- Different forms of water can be found in different places. For example, in cold places, rivers and ocean and in places at higher temperature.

**Heating Water**

- Large bubbles are formed in the water actively when the temperature of water reaches 100 degree Celsius (°C).
- The boiling point of water is 100 degrees Celsius (°C).
- The temperature does not exceed 100 degrees Celsius (°C) when water is boiling.

**What is Steam?**

- Steam rises from the surface of water when water is heated.
- Steam is visible and made up of tiny water droplets floating in the air.
- Water vapour is invisible and is made of water.

**Melting Ice**

- Ice starts to melt when its temperature reaches 0 degrees Celsius (°C).
- The melting point of water is 0 degrees Celsius (°C).
- Temperature remains at 0 degrees Celsius (°C) when ice is melting.

**Changes in States of Water**

- Water can exist in three different states such as Solid (ice), Liquid (water) and Gas (water vapour).
- Water can change its states by heating and cooling.

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2

Summary and Exercise

**Exercise** 12.2 States of Water

Q1. Complete each sentence with the correct word.
(1) Water can change its _____ such as solid, liquid and gas by heating and cooling.
(2) The_____ point of water is at 0 degrees Celsius (°C).
(3) _____ _____ is the invisible part of water in the gas state of water.

Q2. Choose the letter with the correct answer.
(1) The melting point of ice _____ the boiling point of water.
A. is lower than C. is equal to
B. is higher than D. is the result of

(2) Look at the diagram shown below. Which form of water is marked letter A?
A. water C. steam
B. Ice D. liquid

A B C

Q3. What is the boiling point of water in degree Celsius (°C)?

Q4. Jenny placed a mirror over the spout of a kettle of boiling water as shown below. What would she observe on the mirror after a few seconds?

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## Exercise answers

Q1.
(1) **states**
(2) **Melting**
Melting is the process by which a solid becomes a liquid. Different solids melt at different temperatures. Ice melts at 0 degrees (°C).

(3) **Water vapour**
Water changes into water vapour when it is heated and cannot be seen because it is in its gaseous state of water. However, when it cools down in the air it changes back to liquid state again.

Q2.
(1) **A**
(2) **B**

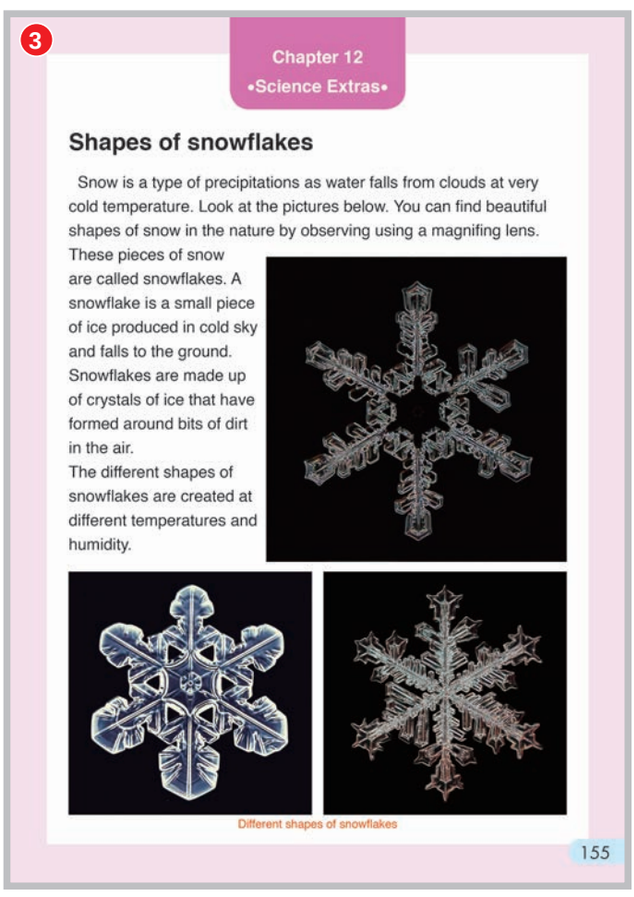
Q3. **100 °C**

Q4
**Tiny water droplets would be formed on the surface of the mirror.**

### Explanation of Science Extras

**3 Science Extras (10 min.)**

- Give students opportunities to closely observe the nature and its phenomena in the world.
- Allow students to ask questions that demonstrate curiosity about the content in the science extra.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Chapter 12
•Science Extras•

**Shapes of snowflakes**

Snow is a type of precipitations as water falls from clouds at very cold temperature. Look at the pictures below. You can find beautiful shapes of snow in the nature by observing using a magnifing lens.

These pieces of snow are called snowflakes. A snowflake is a small piece of ice produced in cold sky and falls to the ground. Snowflakes are made up of crystals of ice that have formed around bits of dirt in the air.

The different shapes of snowflakes are created at different temperatures and humidity.

Different shapes of snowflakes

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**Lesson**
12 / 12

**Lesson Title**

# Chapter Test

**Answer of the Chapter Test**

*Chapter Test*

## 12. Matter Change

**Q1** Complete each sentence with the correct word.

(1) A change in colour, size, shape and texture of matter is called physical change.

(2) In a chemical change, the original matter and the new matter have different properties.

(3) The process which liquid water becomes solid is called freezing.

**Q2** Choose the letter with the correct answer.

(1) Which of the following is not an example of a chemical change?

A. Exploding fireworks
B. Cutting paper
C. Burning match
D. Rusting iron

(2) Baking is a chemical change. What is the reason?

A. It is because it changes a material of matter.
B. It is because it changes a shape of matter.
C. It is because it changes a size of matter.
D. It is because it changes a taste of matter.

(3) Water can exist in three states; solid, liquid and gas. Which is a solid form of water?

A. Bubbles
B. Ice
C. Steam
D. Water

(4) To change water to water vapour, which of the followings would be added for the change?

A. Cool
B. Freeze
C. Heat
D. Melt

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**Q3** (a) A beaker with water is being heated. When it reaches a temperature at 100 degrees Celsius (°C), it starts to boil. What is the name of the temperature at which water boils?

The boiling point

(b) What happens if the beaker is continuously heated?

As the water is continuously heated it will boil and boil and eventually all the water evaporates into the air.

**Q4** Compare the two pictures on the right. Which one of these is a physical change? Explain the reason why you choose it.

Crushed can

Rusting nail

A crushed can is a physical change.

As the can was crushed its physical property (appearance) only changed but the can still remains as the can.

**Q5** (a) When water is heated and boiled in a kettle, steam rises from the kettle. Explain the process steam rises from the kettle, using the following three words. [bubbles, water vapour, steam]

When water is heated water bubbles starts to form causing the water to boil and steam rising from the pot or kettle. Steam rising from the pot or kettle came in two parts, one part is visible and is called the steam and the other part is invisible which is called the water vapor.

(b) Describe a physical change that you observe every day. Explain how this physical change is useful.

Change in state of water.

When washing clothes and drying it out in the sunshine, the wet clothes dries up and evaporates into the air leaving the clothes dry behind and we are able to wear the clothes again as part of our everyday life routine.