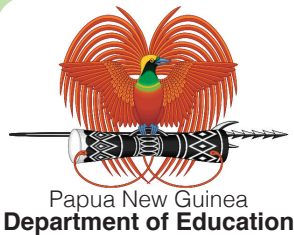


National **SCIENCE** Textbook



Grade 4



Issued free to schools by the Department of Education

First Edition

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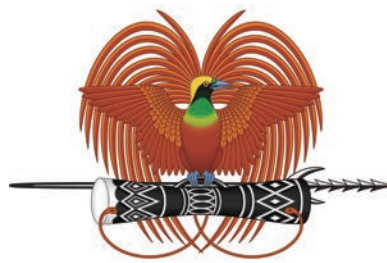
The Science curriculum officers, textbook writers, pilot teachers from NCD and Central Provinces and the Subject Curriculum Group (SCG) are acknowledged for their contribution in writing, piloting and validating this textbook.

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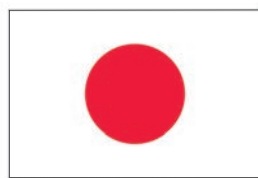
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National Science Textbook

Grade 4



Papua New Guinea
Department of Education



**From
the People of Japan**





Minister's Message

Dear Grade 4 Students,

I am honoured to give you my message in this National Science Textbook. The Government of Papua New Guinea through the Department of Education has been giving priority to improve students' learning in the area of Science for many years. I would like to thank the Government of Japan for its support in improving the quality of learning and education for our children in PNG.

This Science Textbook was developed by our very own Curriculum Officers, Textbook Writers and pilot teachers who have worked together with the Japanese specialists for three years to complete this Textbook. I believe this is the best national textbook for Grade 4 students in PNG because it is comparable with international standards.

I am excited about this Textbook because it contains a lot of exciting student centered topics and activities for science recommended for learning in Grade 4. You will find many photographs, illustrations, charts and diagrams that are based on PNG context and are interesting and exciting for learning. I hope this textbook will motivate you to explore more because Science is about learning what, why and how things work in everyday life.

Students, Science is a very important subject because it allows you to make your own predictions, carry out experiments to test your predictions and find solutions for your predictions. This will then challenge you to find ways of improving your learning using the Science as Inquiry approach. Science is about everything – everywhere and by using the inquiry approach you will enjoy learning many things that happen around you every day. You will learn about why things move, how plants grow, why we have days and nights and many more interesting things that happen. In addition, Science processes will help you become an independent learner and empower you to become a scientist in the future to solve problems relating to life in PNG and anywhere else in the world.

I encourage you to be committed and to enjoy and love Science, because one day in the future you will be a very resourceful person, participating in developing and looking after this very beautiful country of ours and improving the quality of living.

I wish you a happy and fun learning experience with this Grade 4 Science Textbook.



Hon. Nick Kuman, B.ApSci.UWSyd, MP
Minister of Education





Message from the Ambassador of Japan

Greetings to Grade 4 Students of Papua New Guinea!

It is a great pleasure that the Department of Education of Papua New Guinea and the Government of Japan worked together to publish national textbooks on science for the first time.

The officers of the Curriculum Development Division of the Department of Education made full efforts to publish this textbook with Japanese science experts. To be good at science, you need to keep studying with this textbook. In this textbook, you will learn many things about science with a lot of fun and interest, and you will find it useful in your daily life. This textbook is made not only for you but also for the future students.

You will be able to think much better and smarter if you gain more knowledge on numbers and diagrams through learning science. I hope that this textbook will enable you to enjoy learning science and enrich your life from now on. Papua New Guinea has a big national land with plenty of natural resources, and a great chance for a better life and progress. I hope that each of you will make full use of knowledge you obtained and play an important role in realizing such potential.

I am honoured that, through the publication of this textbook, Japan helped your country develop science education and improve your ability, which is essential for the future of Papua New Guinea. I sincerely hope that, through the teamwork between your country and Japan, our friendship will last forever.



Satoshi Nakajima

Ambassador of Japan to Papua New Guinea



SCIENCE...

It's exciting...

It's amazing...

It's fun...



It's Science





Secretary's Message

Dear students,



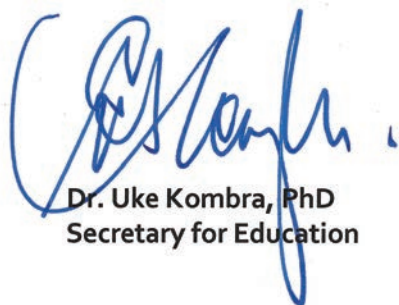
This is your Science Textbook that you will use in Grade 4. It contains a lot of very interesting and enjoyable activities that you will be learning in your daily Science lessons.

In our everyday lives, we come across many situations such as lifting heavy coffee bags onto a vehicle, travelling long distances to fetch water and trying our best to make our food plants grow during dry seasons. These situations are real and they contribute to the way we live. By learning Science through this textbook, it will help you address real-life problems.

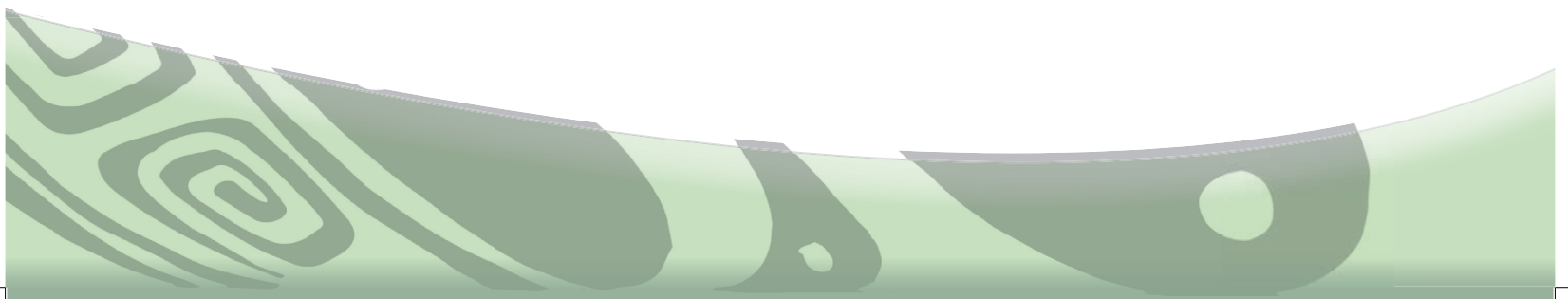
This Textbook provides you with a variety of science activities and ideas that are interactive. It allows you to learn with your teacher or on your own as an independent learner. The activities are designed in a way that a problem is given and you as the learner will have to solve the problem using the different scientific skills such as making predictions, measuring, recording data and communicating results. These are important tools needed to understand the concepts given in each chapter or topic and are applied in solving science problems. In addition, science process skills will help you to make decisions that will benefit you, your family, your community, province and the country to improve the standard of living in PNG in the 21st Century and beyond.

I encourage you to enjoy learning Science and think like a young Scientist who is competent to solve problems and issues that are happening in the community, country and the world today.

I wish you all the best in studying Science using this Textbook.



Dr. Uke Kombra, PhD
Secretary for Education



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Life



Physical Science



Earth and Space



How to learn SCIENCE

1 Wonder or Question

- Look carefully at things in nature around you and things in your daily life.
- Realise things that you wonder about.
- Identify the **key question** in the lesson.









2 Research

- Guess what will happen at the end of the activity.
- Understand the steps of the activity.
- Observe or conduct experiments in the activity.
- Record the result in your exercise book.
- Check if the result is the same with your guess.
- What do you find from the observation or experiment?



Symbols of this textbook

Each symbol gives you an attention about:

-  : Key question in the lesson.
-   : Activity that you will try.
-  : Discussion question with your friends.
-  : Caution and warning.
-  : Try it!

with this Textbook

Learn about nature, learn from nature

3 Findings

- Present and share your findings to your friends.
- Discuss with your friends to make sure if your findings are correct.
- Make conclusion to the key question.



4 Summary

- Read the textbook and confirm what you learnt in the lesson.
- Summarise what you did in the lesson.
- Let's try to use things you learnt in your daily life.



Friends learning together with you

Friends learning together in this textbook



Mero



Naiko



Sare



Gawi



Kekeni



Ambai



Vavi



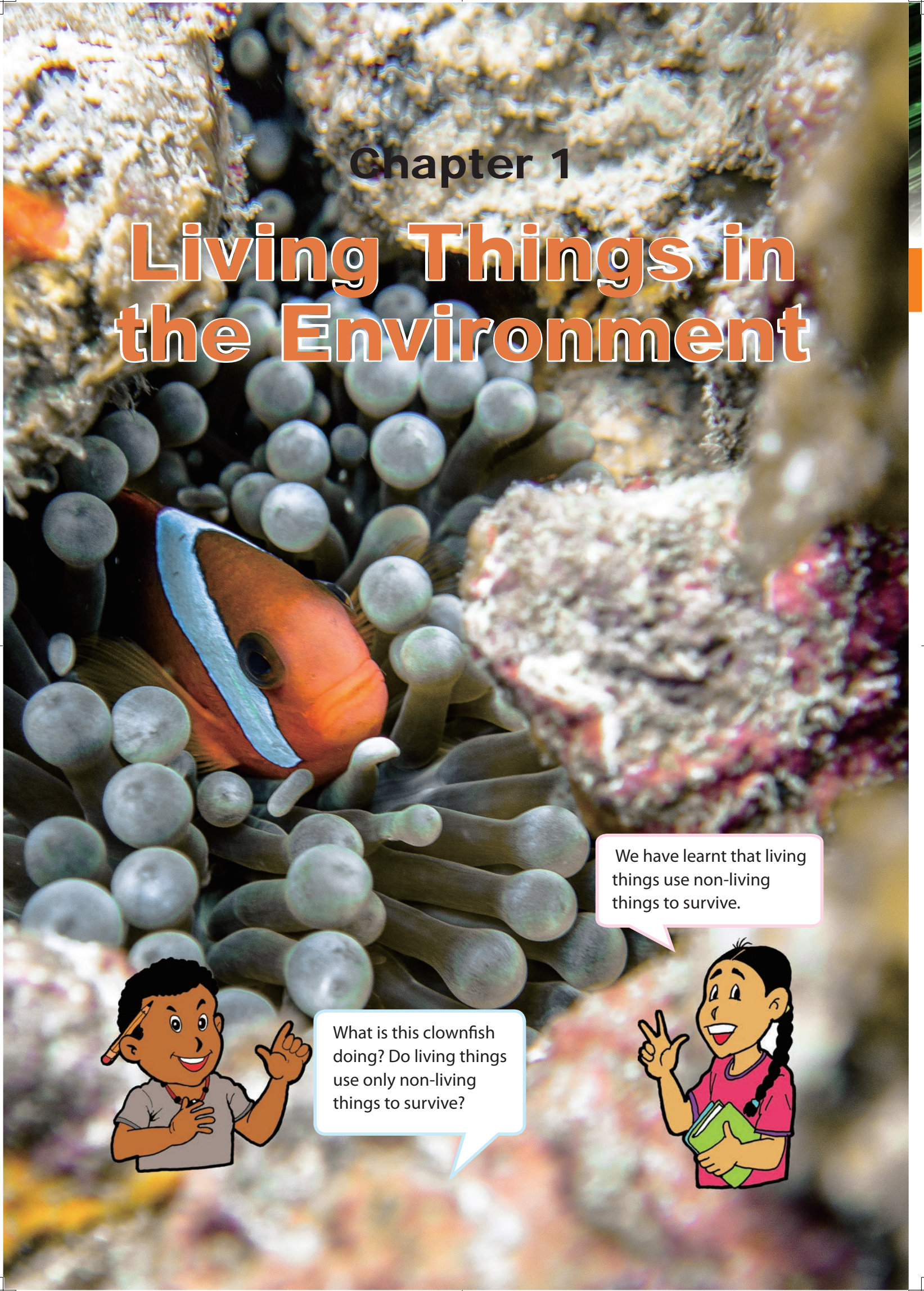
Yamo

Enjoy SCIENCE with us!!



Chapter 1

Living Things in the Environment

A vibrant clownfish with orange and white stripes is swimming within the protective tentacles of a grey sea anemone. The background is a blurred view of a colorful coral reef.

We have learnt that living things use non-living things to survive.



What is this clownfish doing? Do living things use only non-living things to survive?



1.1

Relationships among Living Things

Lesson 1:

“Animals and Plants in the Environment”

Animals and plants are living things. Living things survive and grow together in their environment in many ways.



How do animals depend on plants in the environment?



Activity : Animals depend on plants

What to Do:

1. Draw a table like the one shown below.

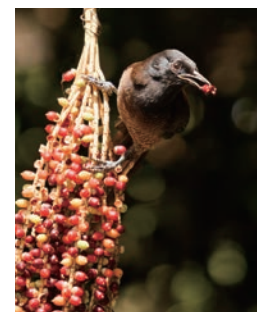
Ways animals depend on plants

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.



How do these animals use plants?

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



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 bird builds a nest on a tree.



A horse is eating leaves to get energy.



Some animals find shelter in holes of trees.

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.

Lesson 2:

“Animals in the Environment”

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



How do animals depend on other animals?



Activity : Animals depend on other animals

What to Do:

1. Draw a table like the one shown below.

Ways animals depend on other animals

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

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.



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



Summary

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.

Lesson 3: “People and Living Things”

Animals depend on plants and other animals to survive and grow in many ways. How about people? Do people depend on other living things?



How do people depend on other living things to survive?



Activity : People depend on living things

What to Do:

1. Draw a table like the one shown below.

Ways people depend on living things

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



Summary

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.


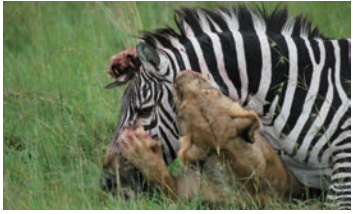
Animals and Plants in the Environment

- 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.

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?

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.

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.
 - C. Sharks get strength by eating small fish.
 - D. Small fish eat sea weeds in the sea.

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?

Chapter 2

Life Cycle of Plants 1



What is this?
It looks like a seed
of a plant.



We learnt that plants
are living things.
How do they grow?



2.1

Stages of Life Cycle of Plants 1

Look around us! We can find many different types of plants. Let's observe how plants grow.

Lesson 1: "Seeds"

We can find different kinds of seeds. But, what is a seed? Let's observe seeds!

? How do seeds look like?

🔍 Activity : Observing seeds

What We Need:

- ➔ different kinds of seeds



What to Do:

1. Observe different kinds of seeds and draw pictures of the seeds in your exercise book.
2. Write the properties of the seeds such as ; size, colour or shape in your exercise book.
3. Think about how the seeds grow and record your prediction in your exercise book.
4. Share your ideas with your classmates. Talk about the properties of the seeds and your predictions.

When you observe a seed, how can you describe it?



Date: _____	
Name of seeds:	Drawing
What you found:	

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!



Chapter 2
•Science Extras•

A growing seed under the ground

Plant seeds will grow and change little by little in the ground. After a few days, remove the soil above the seed gently and observe the seed. What changes can you find?



Let's observe what happens to the seeds in the soil.



What is the white part coming out from the seed?

Chapter 3

Soil for Human Beings



There are a lot of rubbish on the soil. What are they doing?

We have learnt that plants and animals use soil. People also use soil in their lives...



3.1

Soil and Human Beings

Lesson 1: “Uses of Soil for People”

Plants and animals depend on soil to grow and survive. How about people? How do we depend on soil in our lives?



How do we use soil in our lives?



Activity : Finding uses of soil

What to Do:

1. Draw a table like the one shown on the right.
2. Write down how people use soil in their daily lives in the table.
3. Share your ideas with your classmates. Talk about how people use and depend on soil.

Uses of soil



Plants and animals depend on soil for food, space and shelter! How about people?



Summary

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.

Lesson 2: “Soil Pollution”

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

? What causes soil pollution?

🔍 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



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.

Lesson 3: “Effects of Soil Pollution”

Living things depend on soil in many ways. How does soil pollution affect living things in the environment?

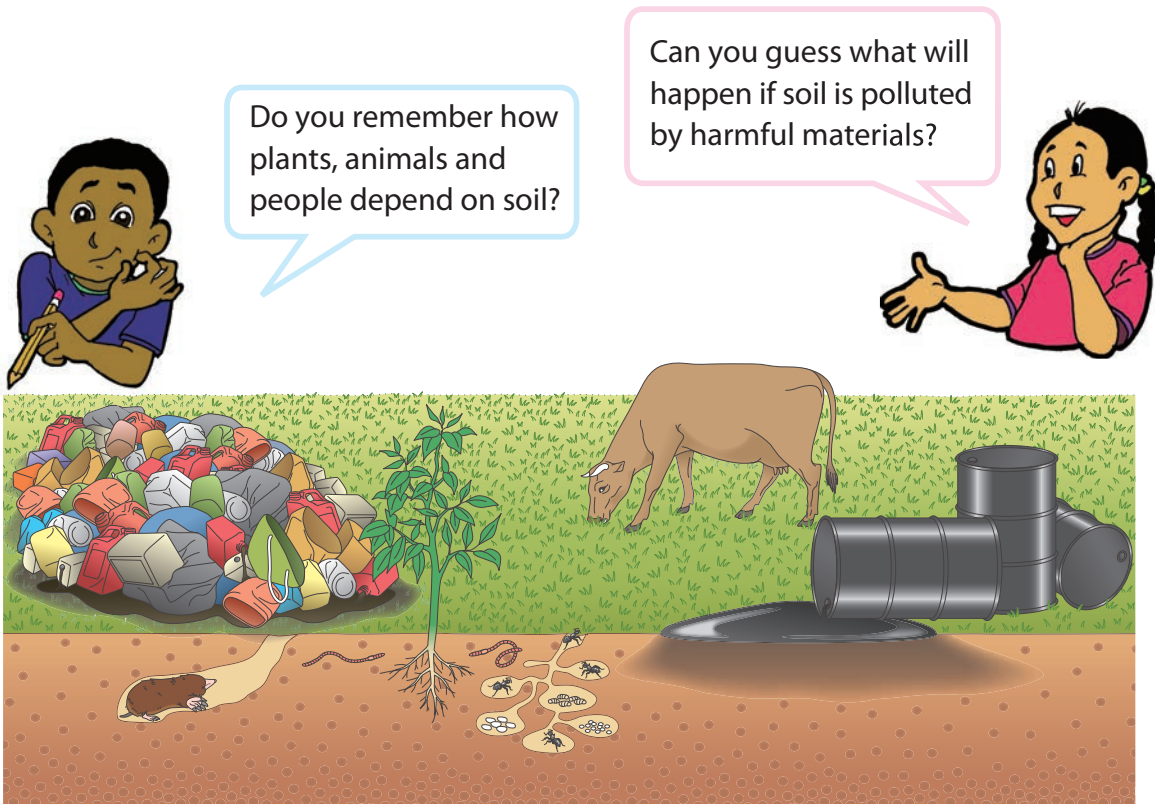
? What are the effects of soil pollution on living things?

🔍 Activity : Effects of soil pollution

What to Do:

1. Draw a table like the one shown on the right.
2. Write down your ideas on how soil pollution affects living things in the table.
3. Share your ideas with your classmates. Talk about the effects of soil pollution on living things.

Effects of soil pollution on living things



Summary

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.

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.

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.



Plants cannot grow in polluted soil.



Soil pollution causes animals to get sick.



Landfills cause bad smell.

Lesson 4: “Preventing Soil Pollution”

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

? How can we help prevent soil pollution?

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.

Ways to prevent soil pollution



Do you remember what causes soil pollution?



How can we prevent the causes of soil pollution?



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

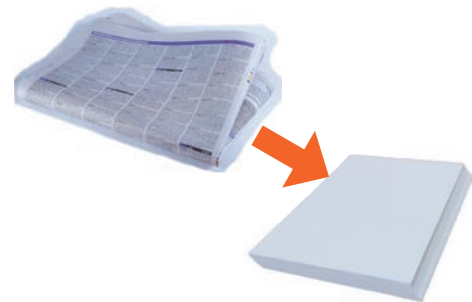
Do not throw garbage or rubbish on the ground. We should put garbage in correct places.



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**; “**R**educe wastes”, “**R**euse wastes” and “**R**ecycle 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.

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, overusing 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.

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?



- (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.

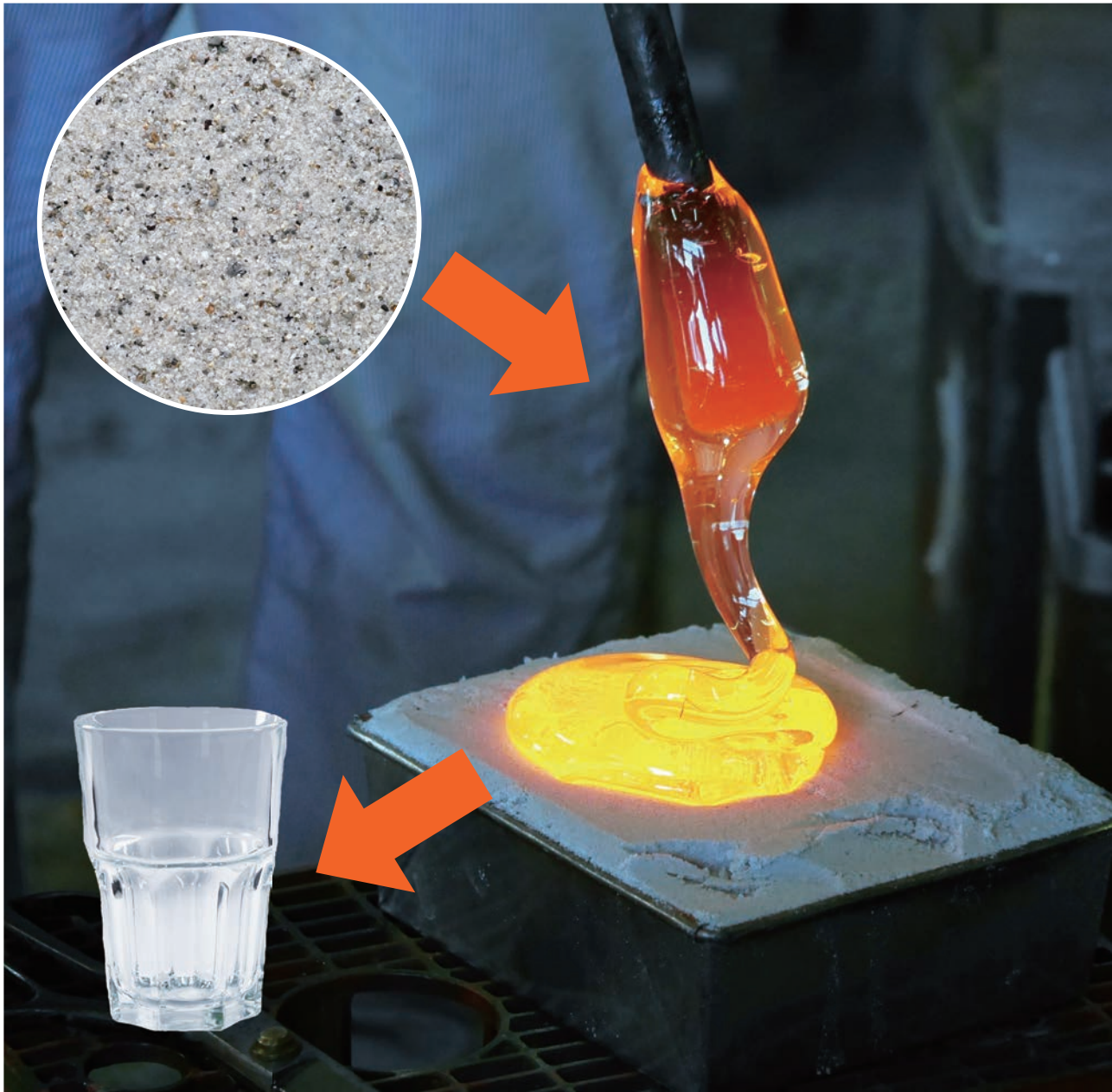
Q4. How can we help prevent soil pollution? Write down two ways.

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 lives 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.

Chapter Test

3. Soil for Human Beings

Q1

Complete each sentence with the correct word.

- (1) Soil _____ occurs when harmful materials remain in the soil.
- (2) Soil pollution affects plants, _____ and human beings in many ways.
- (3) _____ 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

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.

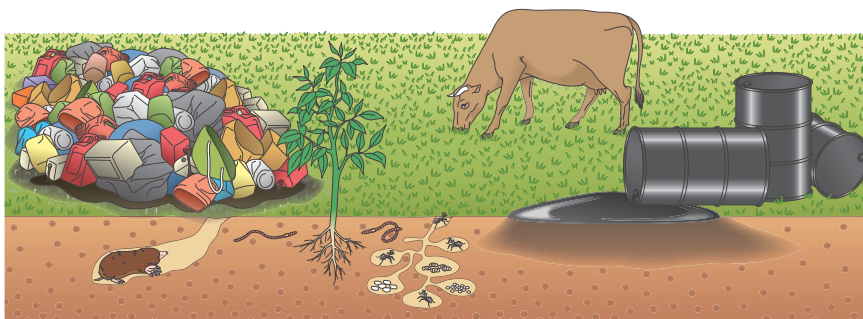
The table above shows the items they collected.

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

(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.

Q4

Refer to the picture below and answer the two questions.

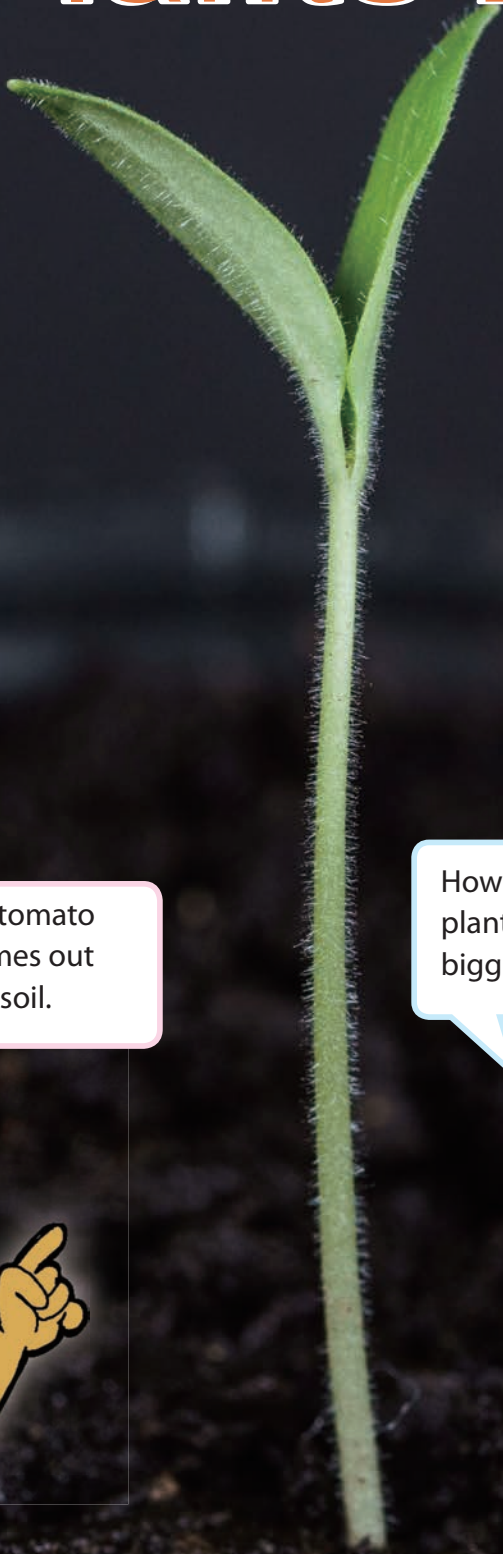


(1) What happens to animals that live in polluted soil?

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

Chapter 4

Life Cycle of Plants 2



A young tomato plant comes out from the soil.



How does the young plant grow and get bigger?



4.1

Stages of Life Cycle of Plants 2

Lesson 1: “Sprouting”

After a few weeks, a young plant comes out from a seed.

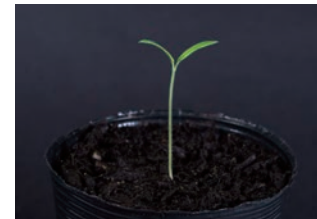
? How do young plants grow and change?



Activity : Observing young plants

What We Need:

➔ young plants, ruler



What to Do:

1. Draw a chart like the one shown below.

	Date: _____
	Drawing
	What you found:



How can we observe a young plant grow?

We can observe the number of leaves, colour, size, shape, height, etc.



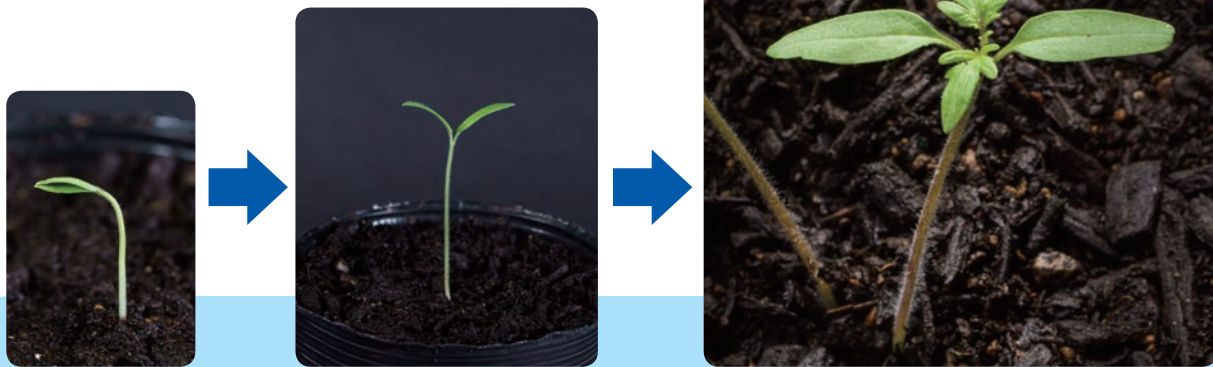
2. Draw the picture of the young plant on the chart.
3. Measure the height and size of the young plant with a ruler.
4. Observe the young plant and record what you found on the chart.
5. Repeat Steps 2, 3 and 4 twice a week for a month.
6. Share your ideas with your classmates. Talk about how a young plant grows and changes.

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



A seedling grows and changes



Try it!

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

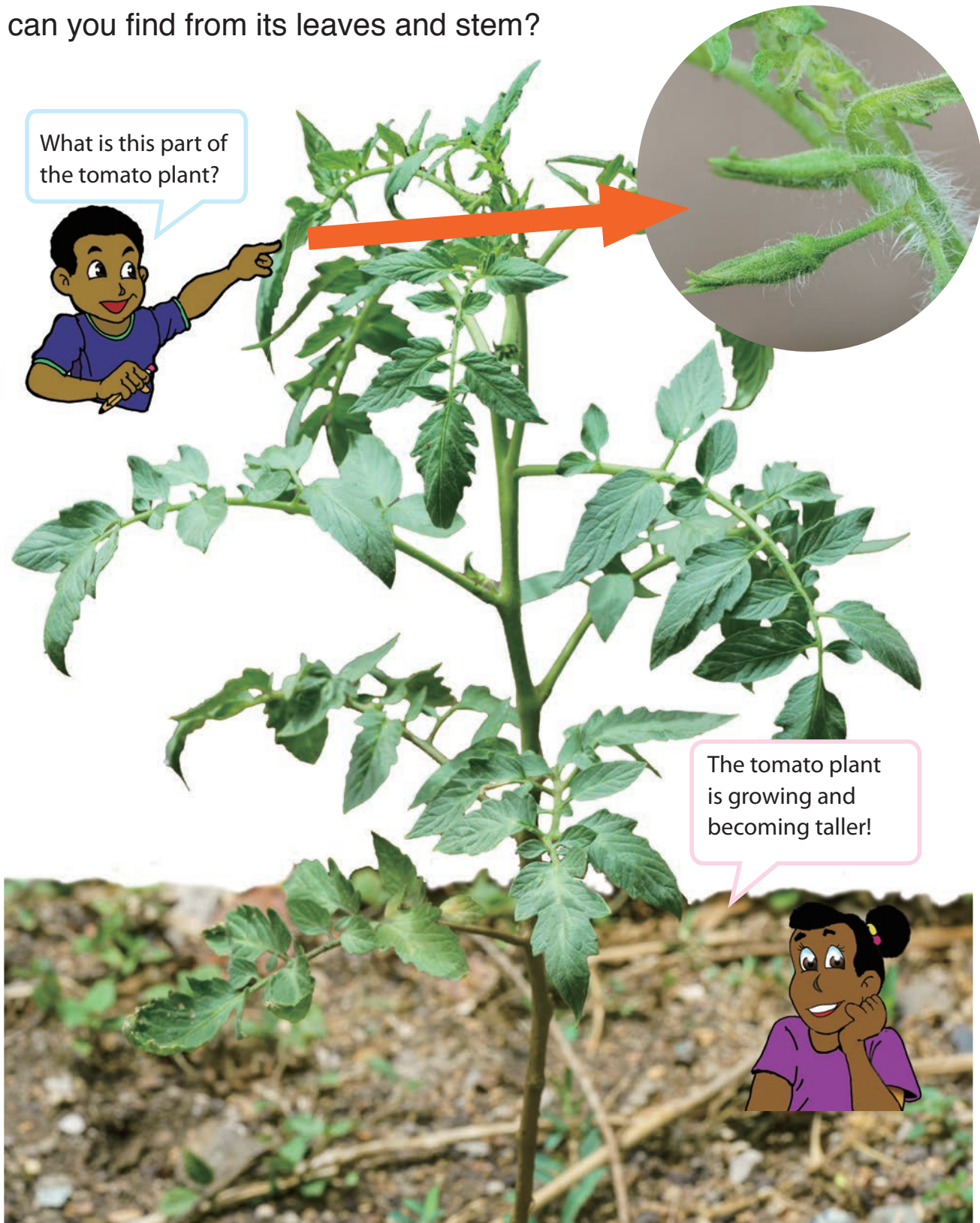
- Dig a hole in the ground just enough to hold the plant's roots.
- Carefully remove the plant from the pot so that the plant and soil slide out together.
- Observe the roots of the plant.
- Place the roots in the ground then carefully fill in the soil around the roots until the hole is filled.
- Water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



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

Growing a plant from a seedling

For several weeks, the tomato plant keeps growing. What changes can you find from its leaves and stem?



Chapter 5

Properties of Matter



What are they collecting?

We have learnt that air is a matter but we cannot see it.



5.1

Characteristics of Air

Lesson 1: “Air around Us”

Air is around us but we cannot see it with our eyes.



How can we tell that air is around us?



Activity 1 : Feeling air

What We Need:

- ➔ plastic bag



What to Do:

1. Catch air with a plastic bag and tie the top of the bag tightly.
2. Toss, push, hit, move the bag and describe what you feel.



Activity 2 : Finding air

What We Need:

- ➔ plastic bottle, water, clear water container

What to Do:

1. Fill clear water container with water.
2. Tighten the cap of the empty bottle and place it under water.
3. Open the bottle cap and observe.
4. Record what you see.



Summary

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?



Lesson 2: “Properties of Air 1”

Matter takes up space. How about air?

? Does air take up space?



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.

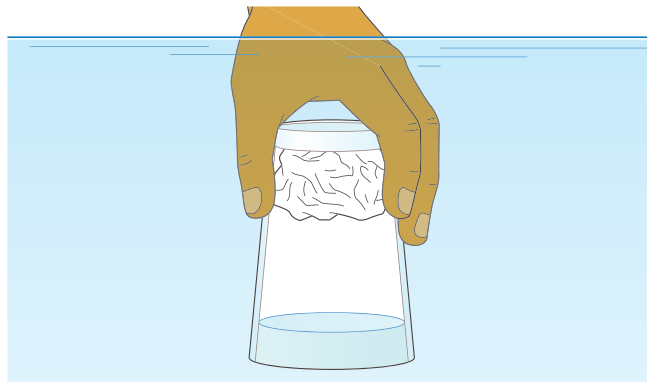
4. Push the cup upside-down completely into the water and observe what happens to the tissue in the cup. Record your observation in the table.

5. Share your ideas with your classmates. Talk about your prediction and your observation.



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

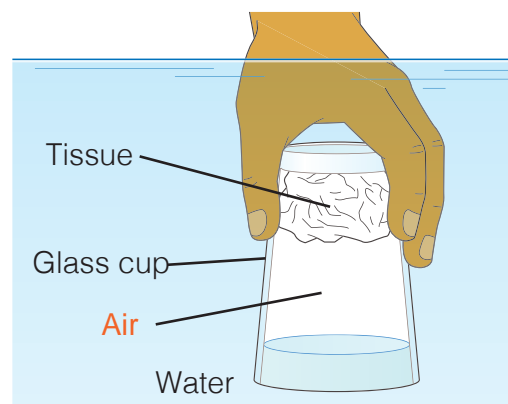
Think about the following question;

- 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.

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.



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

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



Lesson 3: “Properties of Air 2”

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



What happens if we press air?



Activity : Pressing air and water

What We Need:

→ empty plastic bottles with cap, water

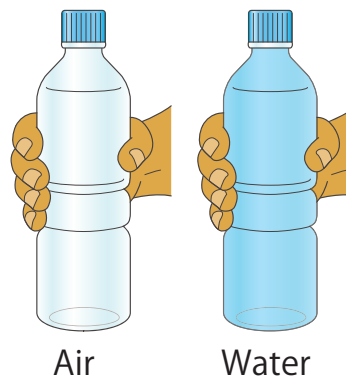


What to Do:

1. Draw a table like the one shown below.

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

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



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



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

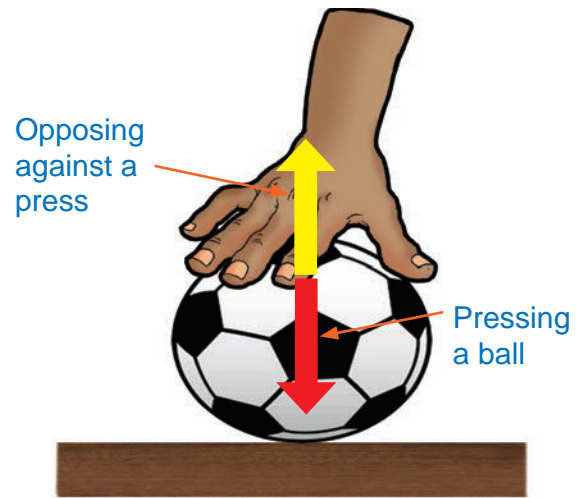


A bottle filled with water

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.



Lesson 4: “Properties of Air 3”

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?



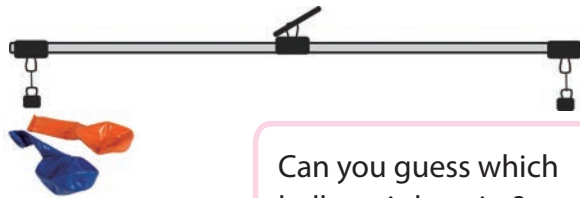
Does air have weight?



Activity : Which balloon is heavier?

What We Need:

- hand-made balance,
- two same sized balloons



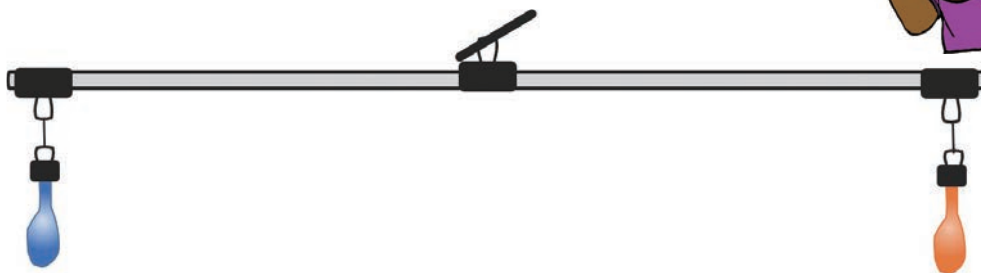
What to Do:

1. Draw a table like the one shown below.

	What happened to the balance?
Your Prediction	
Your Findings	

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

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.



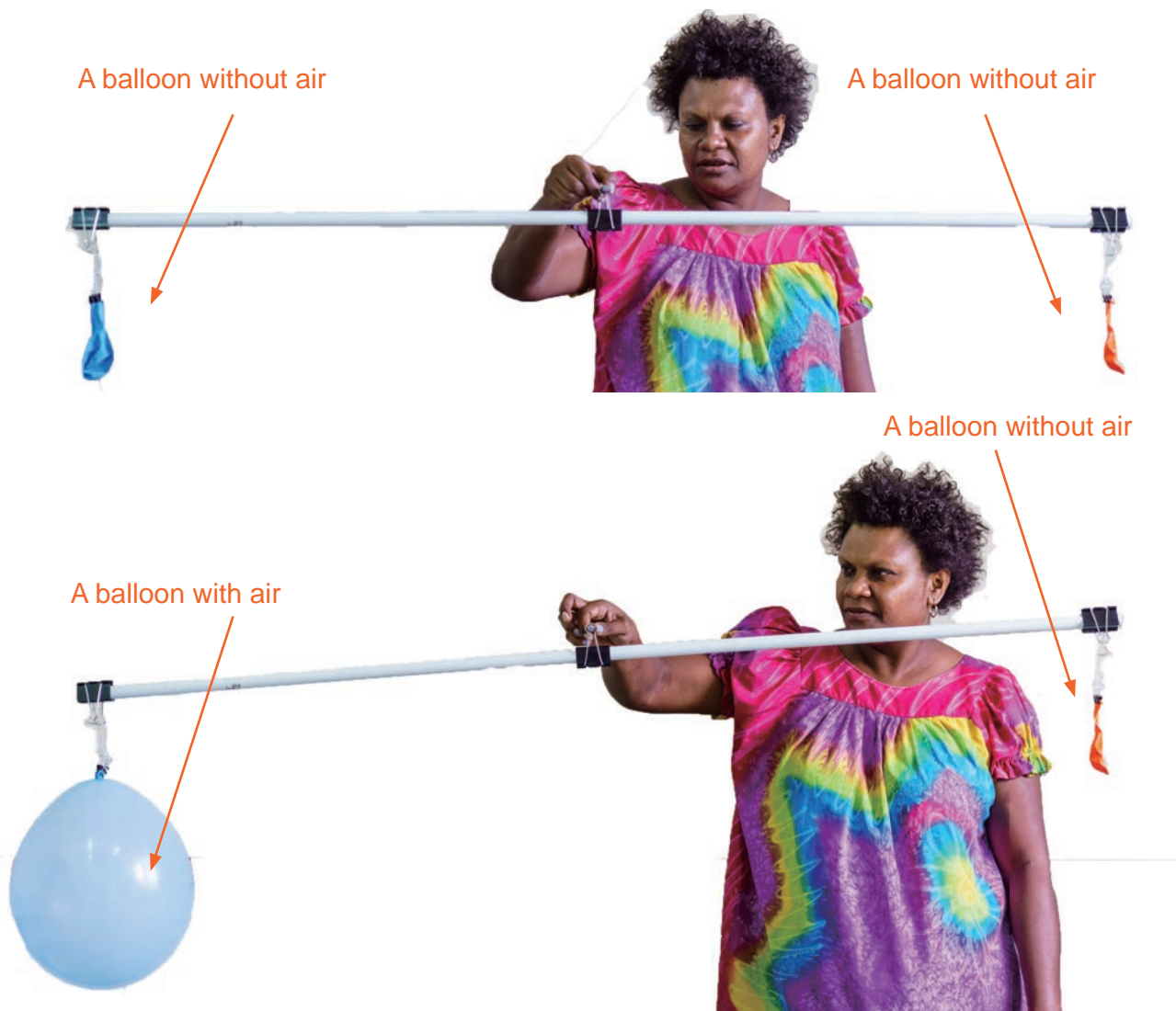
Discussion

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




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.

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.

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 be used in daily life.

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

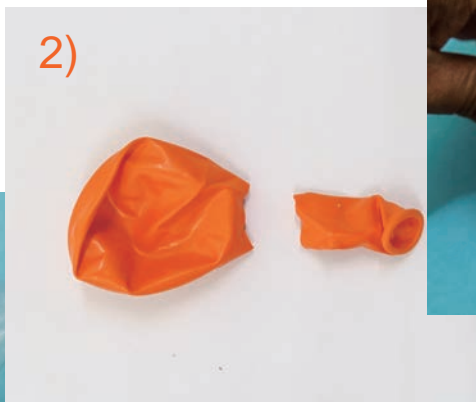
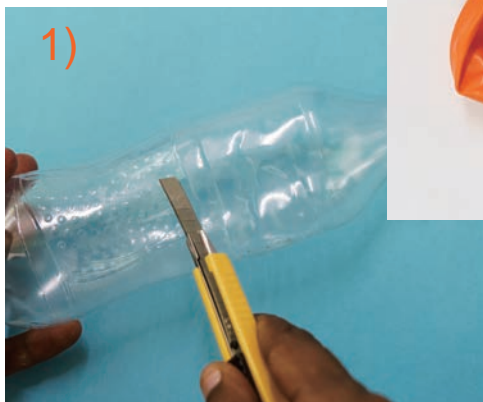


Chapter 5

•Science Extras•

Let's make an air cannon!

- 1) Cut off the bottom part of the plastic bottle.
- 2) Cut off the balloon as shown in diagram 2.
- 3) Cover the bottom of the plastic bottle with the balloon.
- 4) Tape the balloon to the plastic bottle.
- 5) Pull the balloon with your hand and let go. The air will burst out!



Target a mark by shooting with the air cannon!

Chapter Test

5. Properties of Matter

Q1

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

- (1) We _____ see air around us. But we _____ feel air.
- (2) When air takes up space, other objects _____ take up the same space at the same time.
- (3) We _____ press the bottle filled with air. However, we _____ 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.

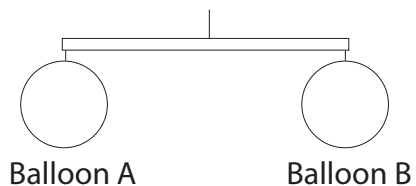
(4) What is moving air in nature called?

- A. Wave
- B. Wind
- C. Sunlight
- D. Rain

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?



(2) Explain the reason for the above answer.

Q4

How can we find air around us?

(1) Suggest ways of how to feel air.

(2) Suggest ways of how to find air.

Chapter 6

Observing Weather

Look at the sky. The clouds are covering the school.



Does the cloud stay here after some hours?



6.1

Weather Descriptions and Changes

Lesson 1: “Change in the Sky”

Look at the daytime sky. We may observe the Sun and clouds on some days. We may not observe them on other days.

? How does the sky change from day to day?

Activity : Observing the sky conditions

What to Do:

1. Draw a table like the one shown below.

Date / Time					
Sky conditions					

2. Go outside and observe the sky.
3. Write the date, time and the sky condition in the table.
4. Repeat the observation for five days.
5. Share your ideas with your classmates. Talk about the sky conditions you observed.

! When you observe the sky, do not look directly at the sun!



The sky may be covered with clouds on some days. We may not observe clouds at all on other days!



Summary

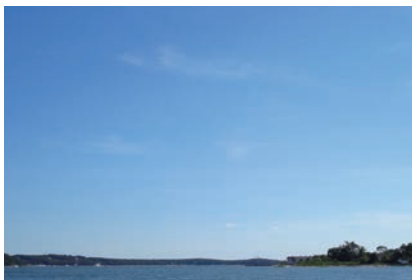
Weather is the condition of the air and the sky at a particular time and place.

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



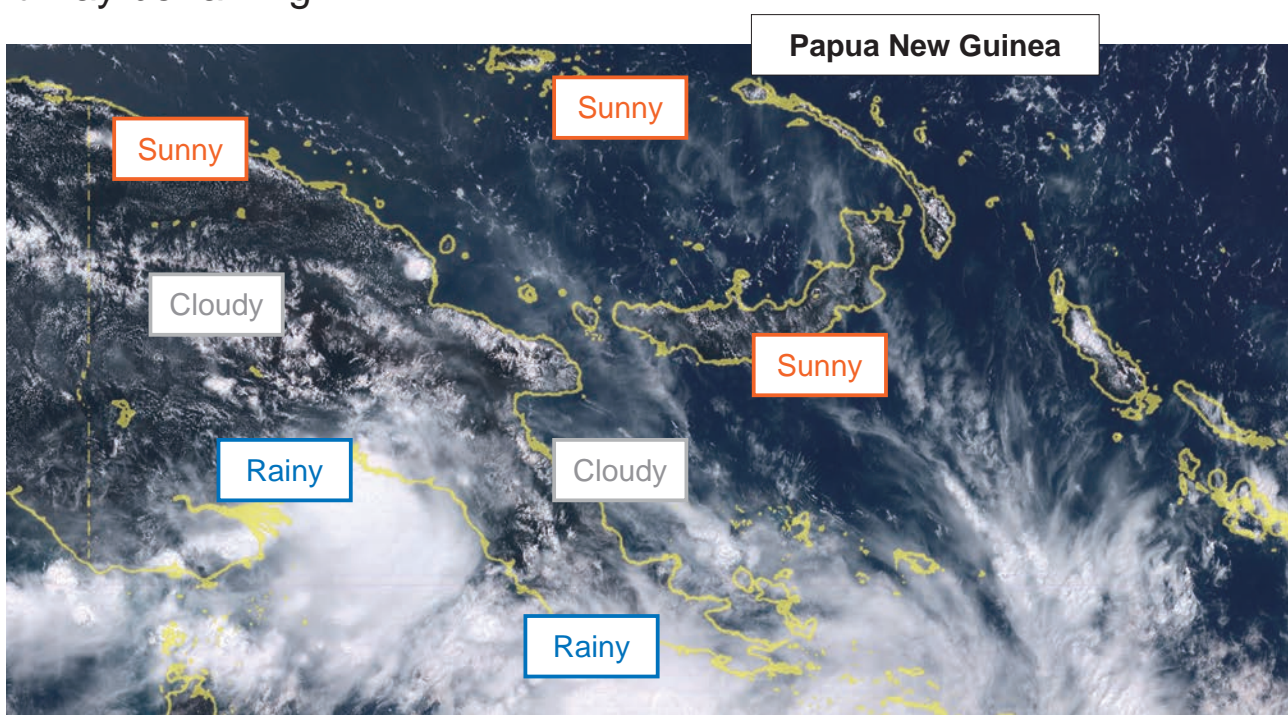
Cloudy



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.

Lesson 2: “Measuring Weather”

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

How can we measure weather?

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?



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.

Lesson 3: “Weather and People”

Weather can change from day to day. One day the weather may be hot and sunny. The next day it may be cool and rainy.



How do people change with weather in their daily lives?



Activity : Weather affects people

What to Do:

1. Draw a table like the one shown below.

Weather	What do you do?
Hot	
Cool	
Sunny	
Rainy	

Do you remember the kinds of weather?



2. Write what you do when the weather is hot, cool, sunny, or rainy in the table.

3. Share your ideas with your classmates. Talk about how people change with weather.



I go swimming in the river or sea when it is hot. What kinds of clothes do you wear when the weather changes?



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.



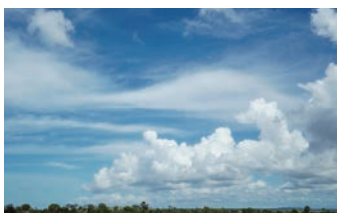

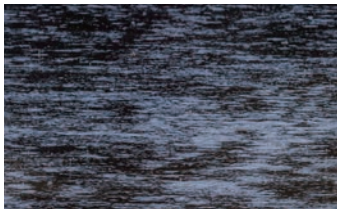

People hang clothes outside on a sunny day.

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.

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.

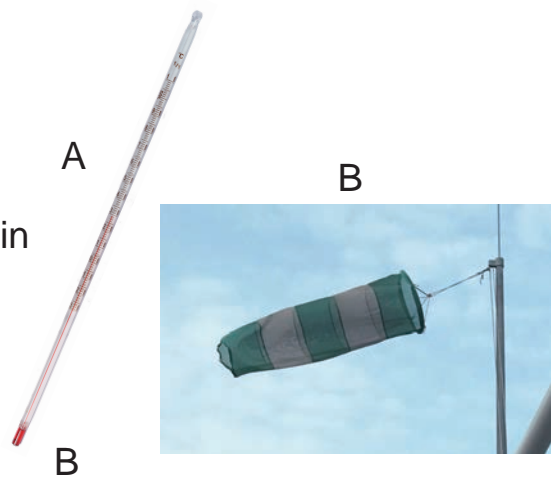
Q2. Choose the letter with the correct answer.

- (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 B used for?



Q4. What do you do on a sunny, rainy or cold day in your daily life?

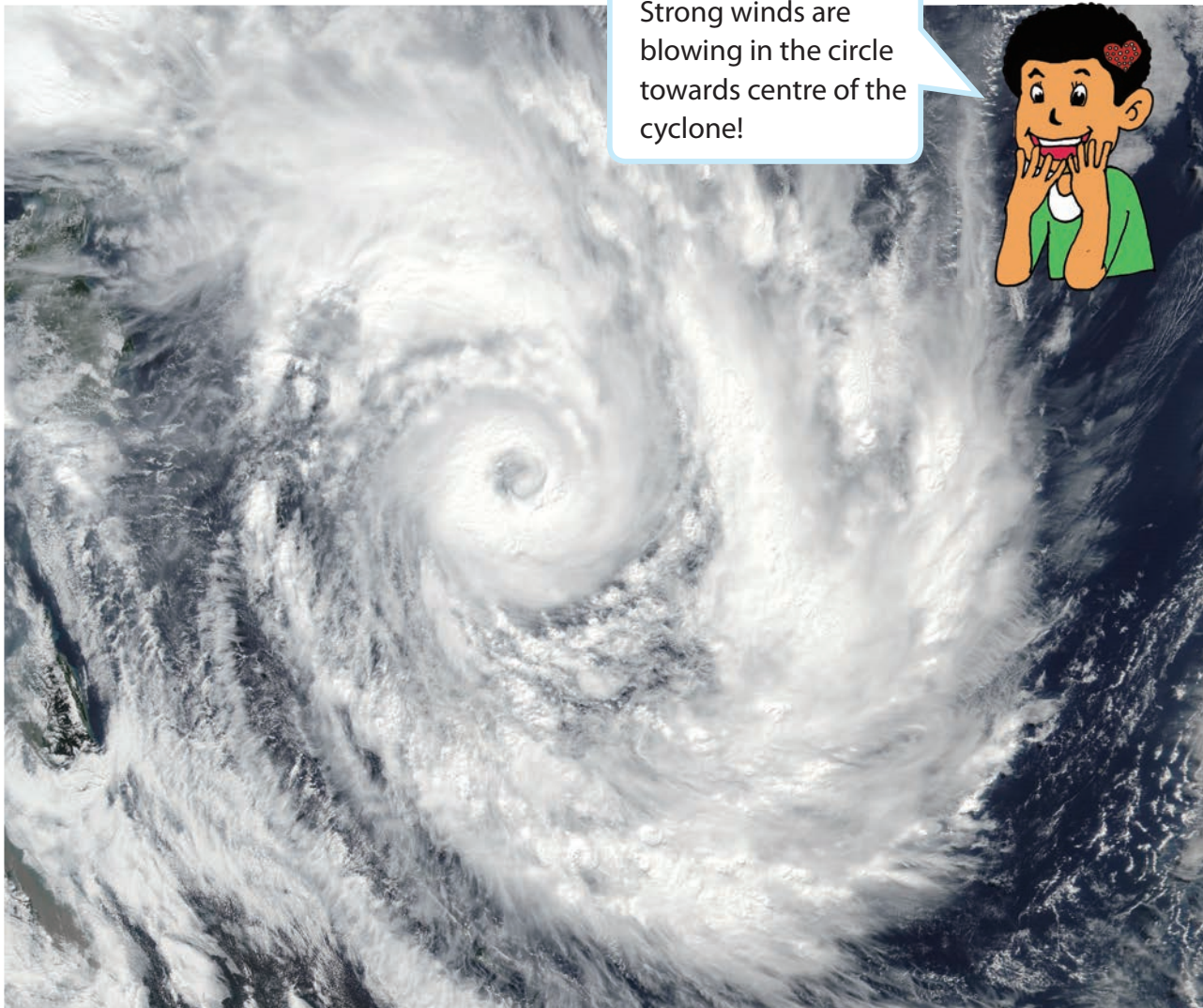
Chapter 6

•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

Chapter Test

6. Observing Weather

Q1

Complete each sentence with the correct word.

- (1) Weather is the condition of the _____ and the _____ at a particular time and place.
- (2) Weather conditions can be described by clouds, _____, precipitation and wind.
- (3) When the weather is _____, people wear less clothes. When the weather is _____, people wear more clothes.

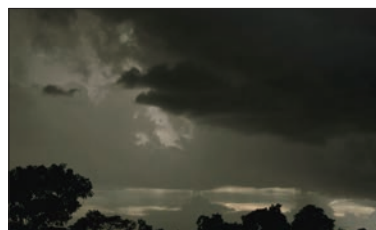
Q2

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

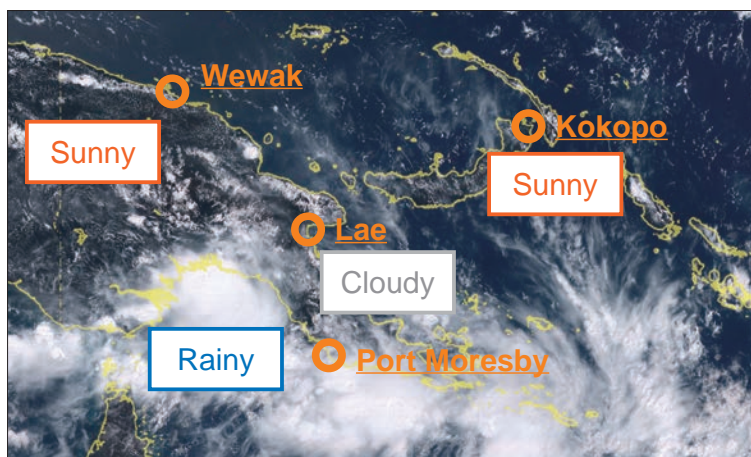
Q3

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?



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.

(2) In which city or town would people most likely need an umbrella? Choose the city or town from the map.

Chapter 7

Life Cycle of Plants 3

The tomato plant grows and flowers!



What is a flower made up of?



7.1

Stages of Life Cycle of Plants 3

Lesson 1: "Flowering"

A seedling changes to an adult plant as it grows. The adult plant makes flowers. Let's observe a tomato flower.



What is a flower made up of?



Activity : Observing flowers

What to Do:

1. Draw a chart like the one shown below.
2. Go out of the classroom and bring a flower.
3. Carefully remove each part of the flower and draw the picture of each part on the chart.
4. Observe each part of the flower and record what you find.
5. Share your ideas with your classmates. Talk about what a flower is made up of.

How many parts of a flower can you find?
What characteristic does each part have?



Date:

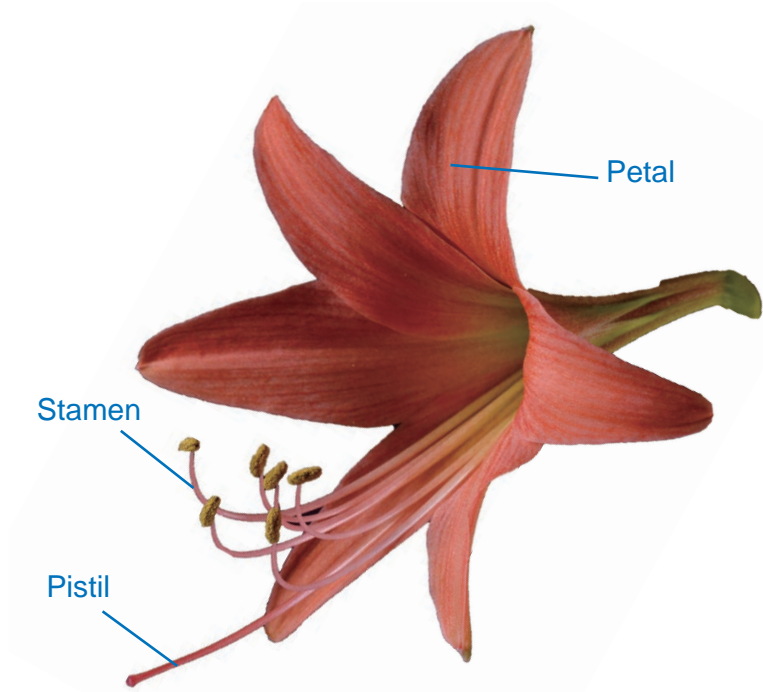
Drawing: Parts of a flower

What you found:

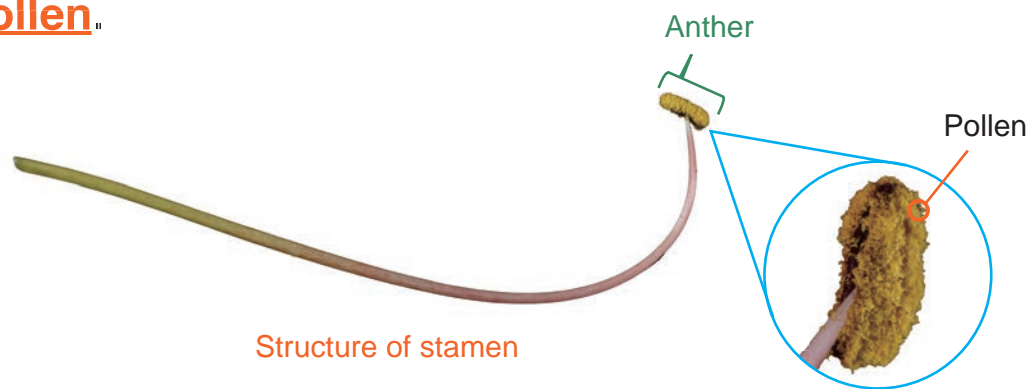
Summary

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**.



Structure of a flower



Structure of stamen

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

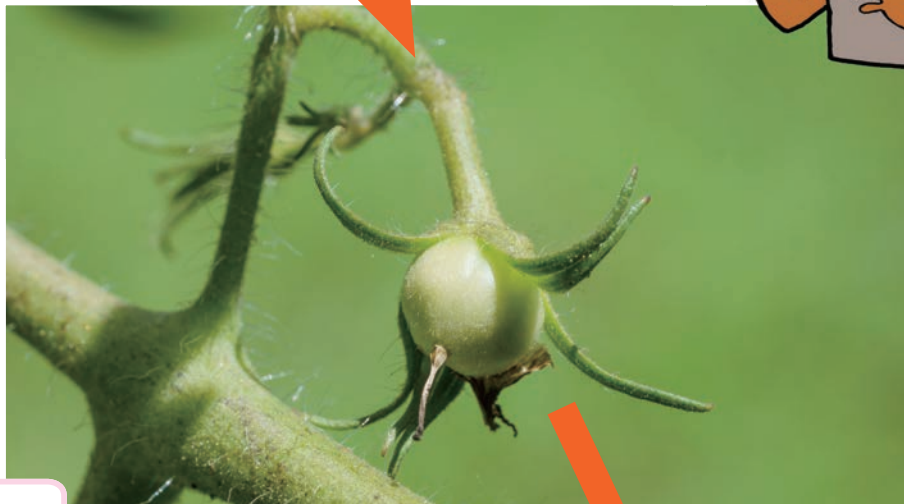
Chapter 7
•Science Extras•

Changes after flowers dry and die

After a few days of blooming, the tomato flower will dry up and die. What changes can you find after the flower dies?



After the tomato flower dies, let's continue observing it and find out what will happen.



A green round shaped thing is growing! What is it?

