National SCIENCE Textbook

Grade 4

Papua New Guinea
Department of Education

From
the People of Japan

JICA

QUIS-ME

Issued free to schools by the Department of Education

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Acknowledgements

The Grade 4 National Science Textbook was developed by the Curriculum Development Division in partnership with the Science specialists from Japan through the Project for Improving the Quality of Mathematics and Science Education also known as QUIS-ME Project.

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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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.

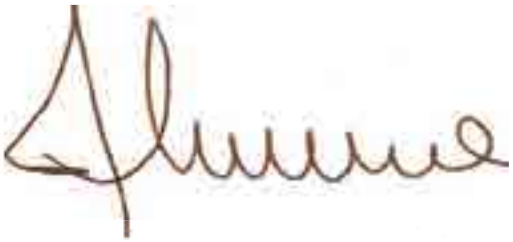
This Science Textbook was developed by our very own Curriculum Officers, Textbook Writers and pilot teachers who have worked together with the Japanese specialists for three years to complete this Textbook. I believe this is the best national textbook for Grade 4 students in PNG because it is comparable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

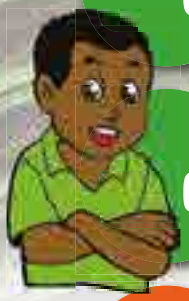
This Textbook provides you with a variety of science activities and ideas that are interactive. It allows you to learn with your teacher or on your own as an independent learner. The activities are designed in a way that a problem is given and you as the learner will have to solve the problem using the 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

Content



Chapter 1. Living Things in the Environment

1 .1. Relationship among Living Things 11

Chapter 2. Life Cycle of Plants 1

2 .1. Stages of Life Cycle of Plants 1 23

Chapter 3. Soil for Human Beings

3 .1. Soil and Human Beings 27

Chapter 4. Life Cycle of Plants 2

4 .1. Stages of Life Cycle of Plants 2 41

Chapter 5. Properties of Matter

5 .1. Characteristics of Air..... 45

Chapter 6. Observing Weather

6 .1. Weather Descriptions and Changes..... 59

Chapter 7. Life Cycle of Plants 3

7 .1. Stages of Life Cycle of Plants 3 71

Chapter 8. Electricity 1

8 .1. Electricity in Our Life 75

8 .2. Function of Electricity..... 81

Chapter 9. Life Cycle of Plants 4

9 .1. Stages of Life Cycle of Plants 4 95

Chapter 10. Life Cycle of Animals

10 .1. Stages of Life Cycle of Animals 105

Chapter 11. Sound

11 .1. Properties of Sound 119

Chapter 12. Matter Change

12 .1. Physical and Chemical Changes in Matter 133

12 .2. States of Water 143

Chapter 13. Water on the Earth

13 .1. Water in Natural World 159

13 .2. Water and Human 169

Chapter 14. Structures and Movement of Human

14 .1. Bones and Muscles 181

Chapter 15. The Moon

15 .1. Moon in the Sky..... 197

Chapter 16. Force and Motion

16 .1. Describing and Measuring Motion..... 209

16 .2. Machine and Its Work 217

Strand

- 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

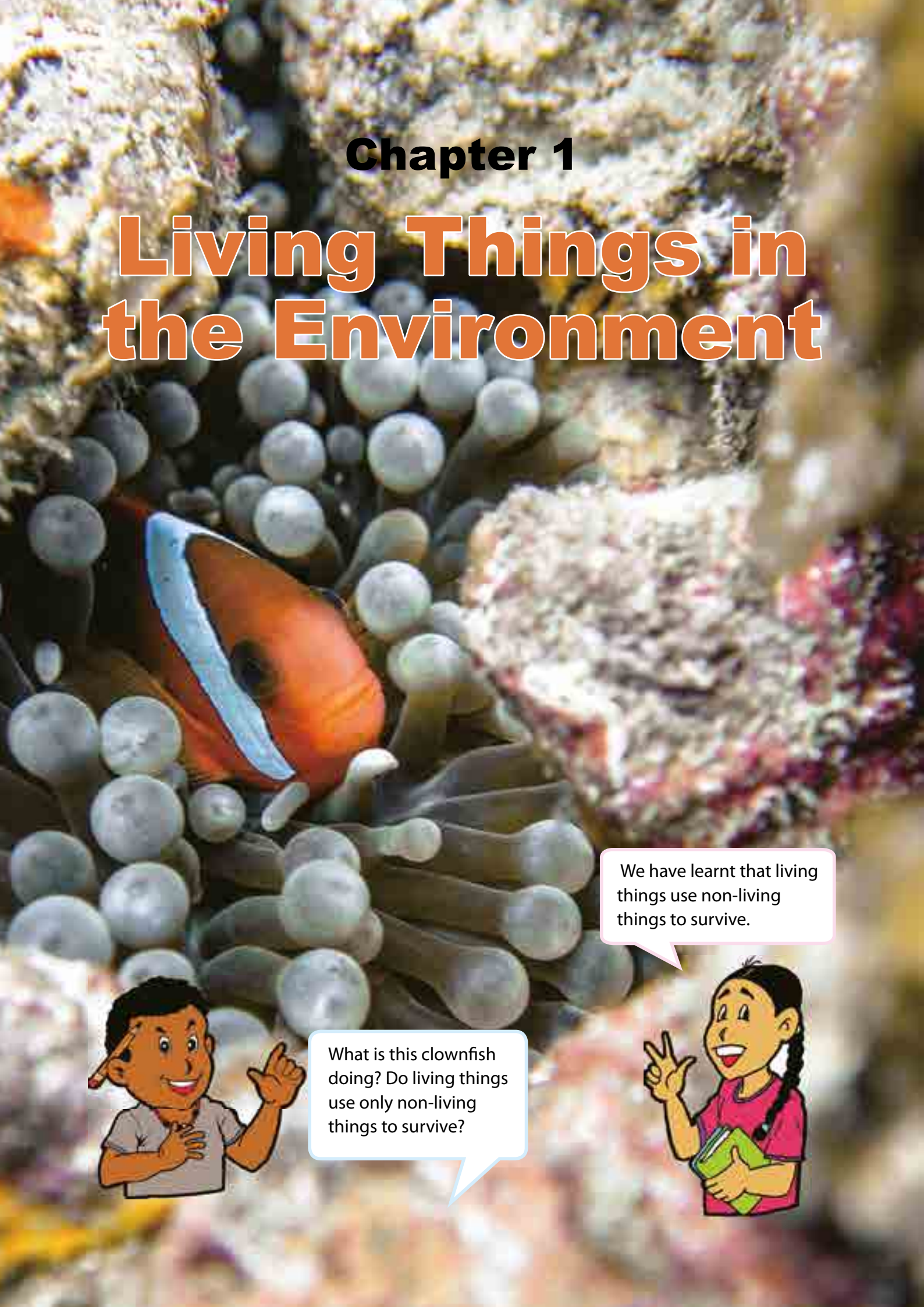
- Read the textbook and confirm what you learnt in the lesson.
- Summarise what you did in the lesson.
- Let's try to use things you learnt in your daily life.

Friends learning together with you

Friends learning together in this textbook

Chapter 1

Living Things in the Environment



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.

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.

A horse is eating leaves to get energy.

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.

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.

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

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.

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.

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.

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 <u>not</u> 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 <u>not</u> 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?

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: _____

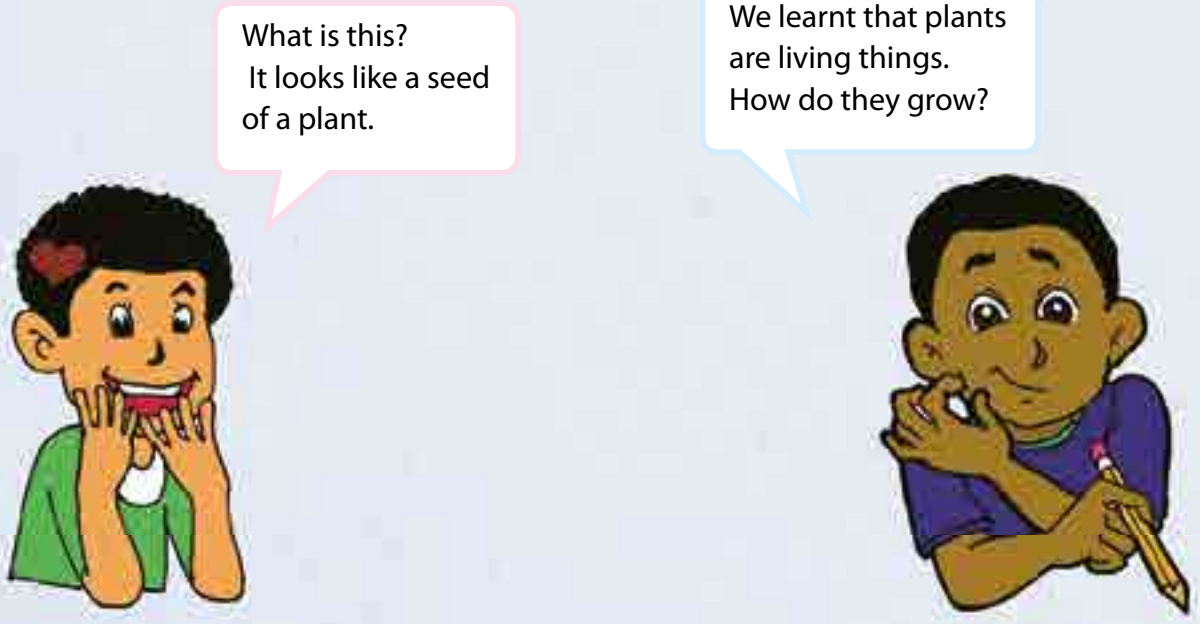
(2) If there are no other living things in the world, what problems will people face?

_____

_____

Chapter 2

Life Cycle of Plants 1



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?

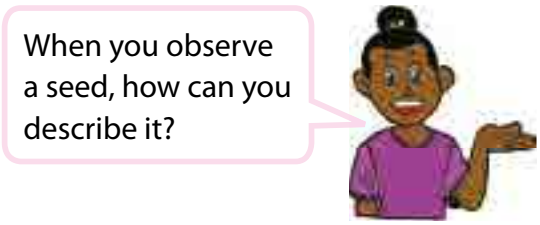
Activity : Observing seeds

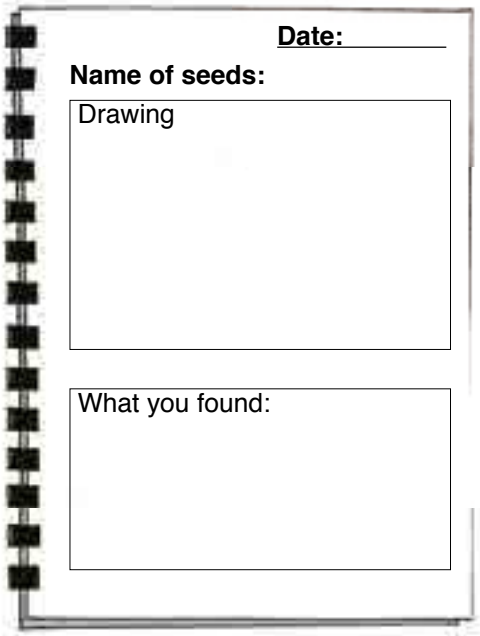
What We Need:

- 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.





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

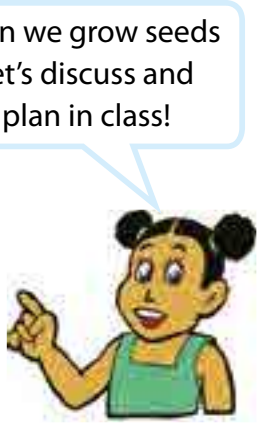
Apple

Different types of seeds

Try it!

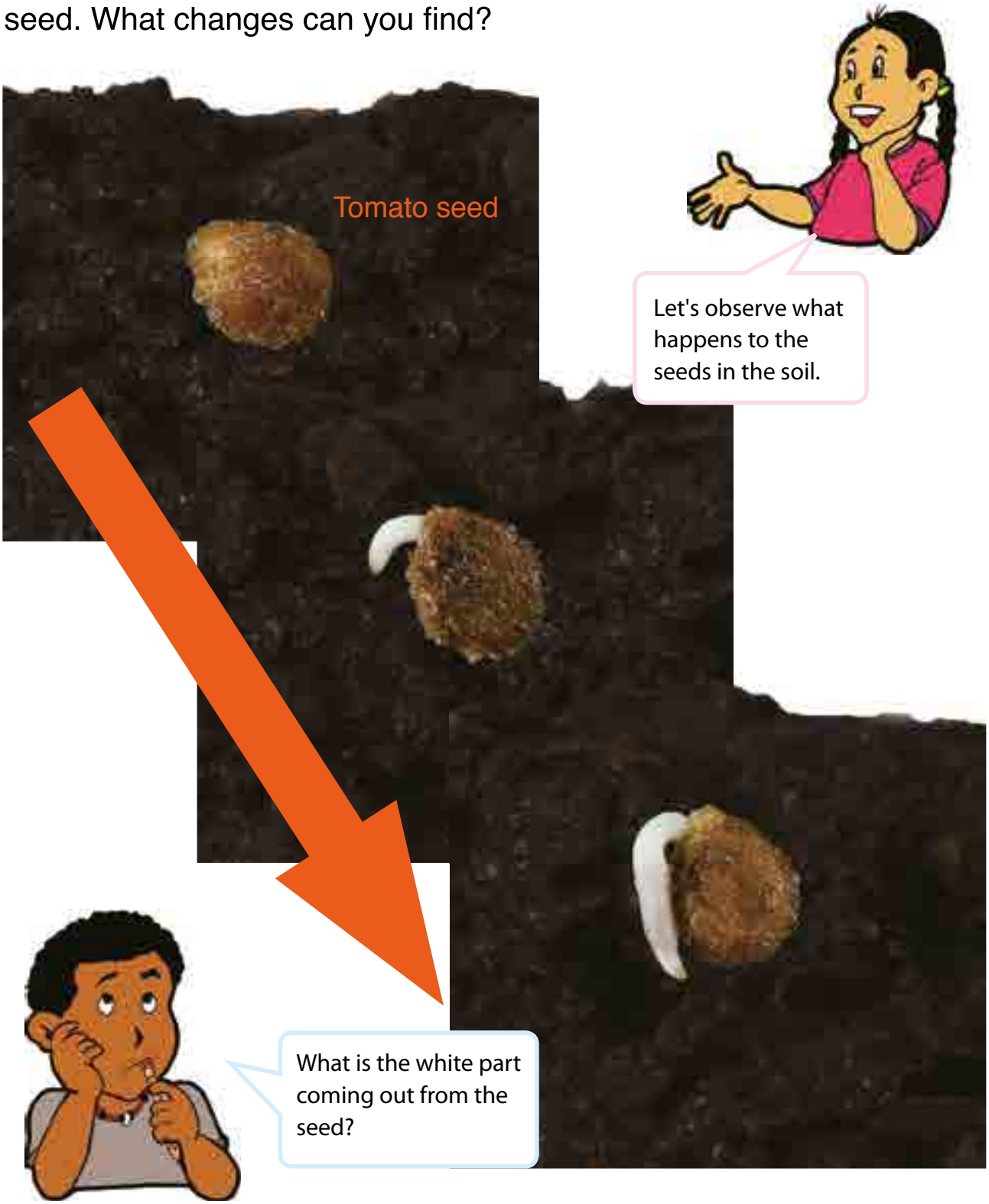
Let's plant tomato seeds!

- 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.



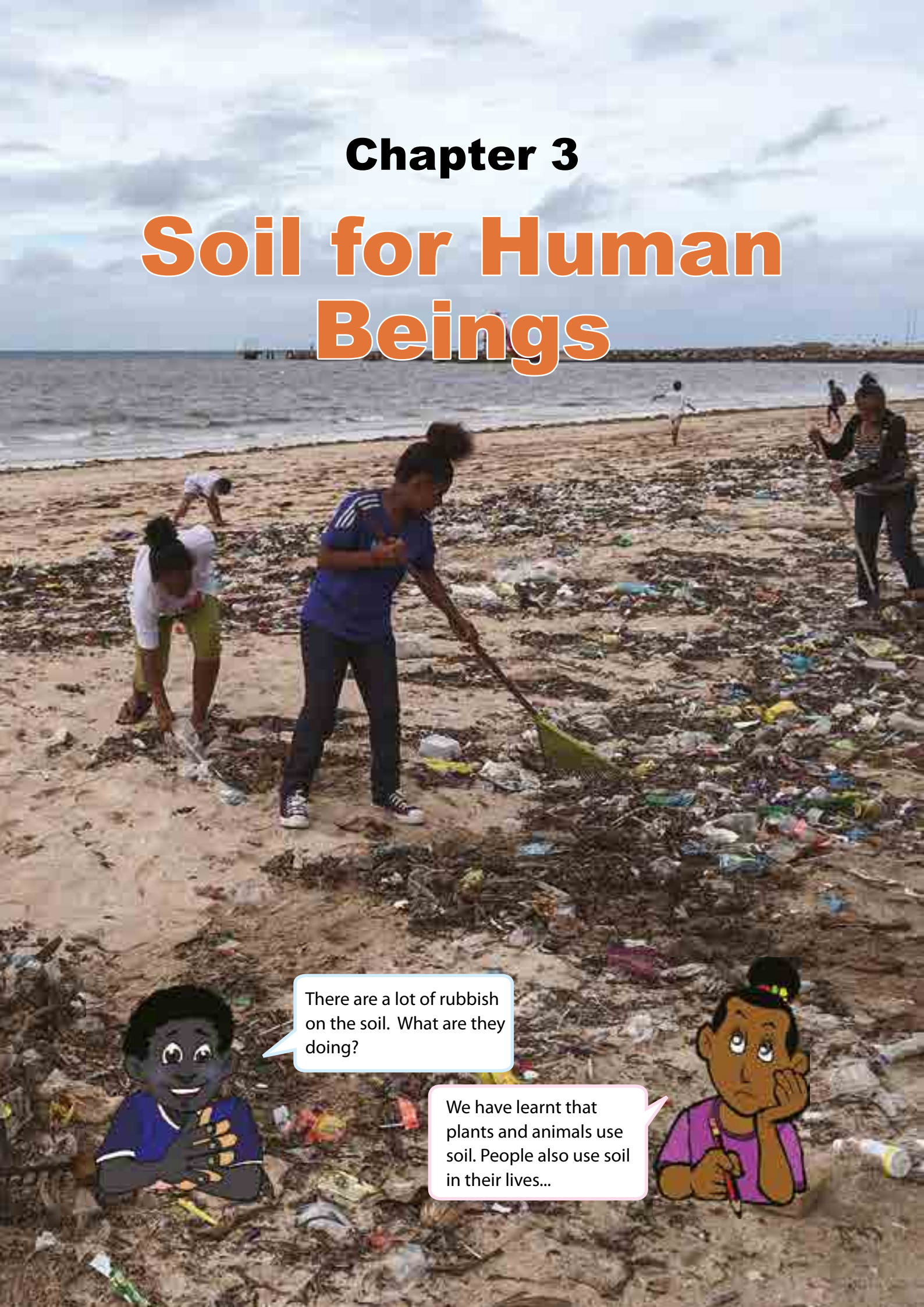
A growing seed under the ground

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?



Chapter 3

Soil for Human Beings



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.

People use soil for agriculture.

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.

People use soil for making artworks.

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 to bury garbage.

Lesson 2: "Soil Pollution"

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

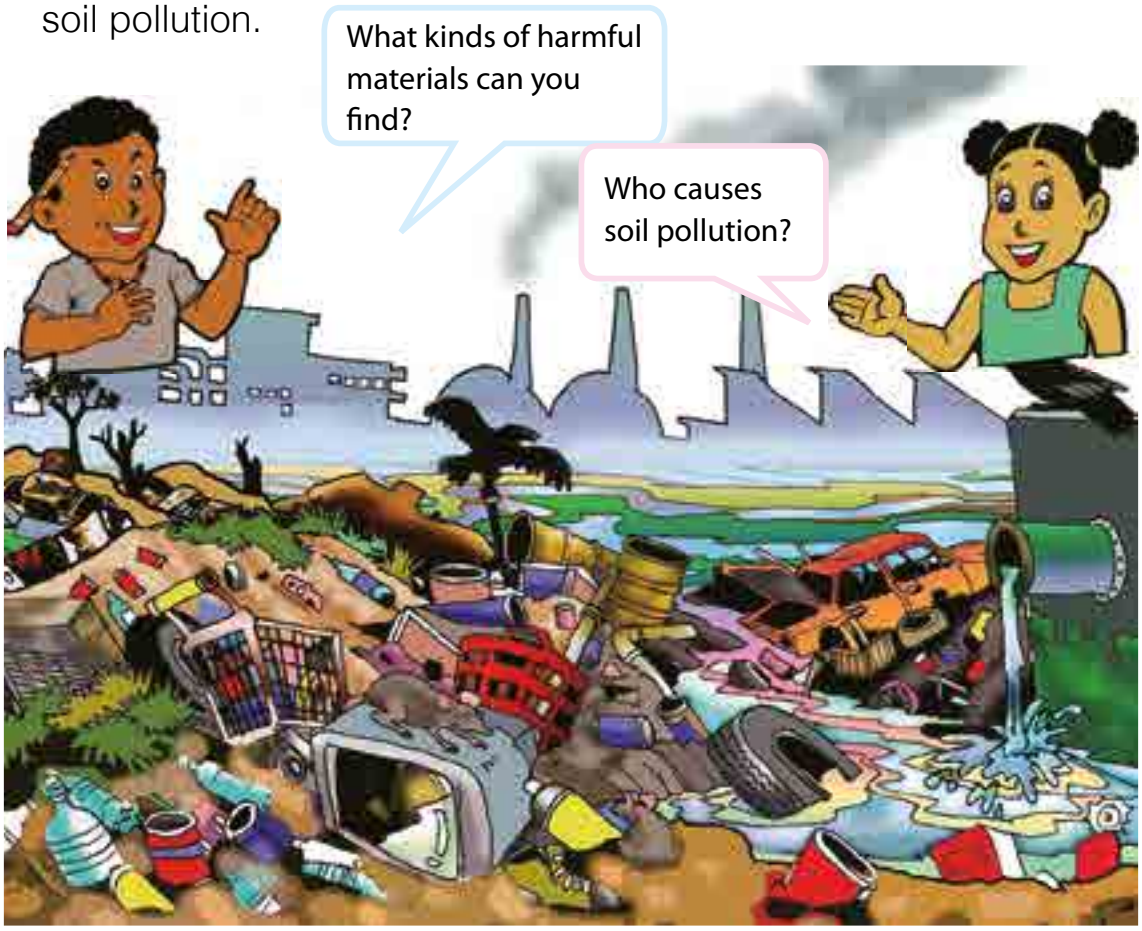
What causes soil pollution?

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

Waste and garbage cause soil pollution.

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 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?

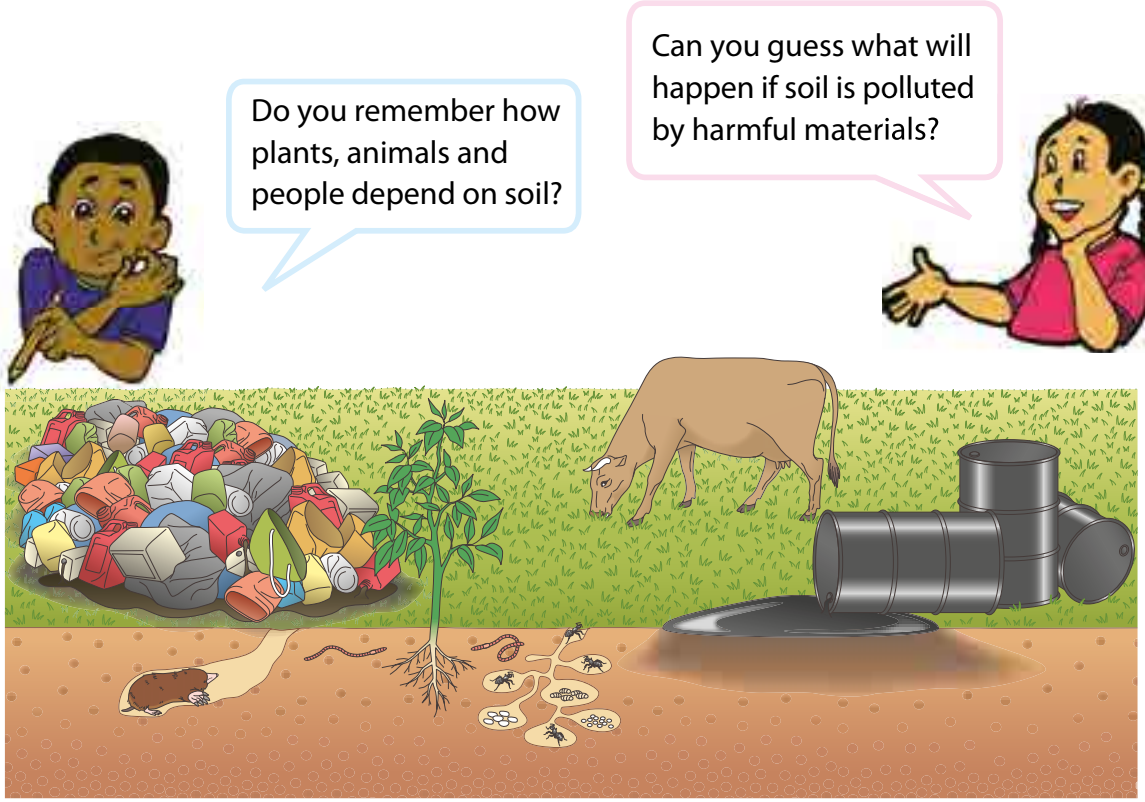
What are the effects of soil pollution on living things?

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.

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.

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

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.

We should put garbage in specific places.

1. Put garbage in correct places

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

Newspaper can be turned into new paper.

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.

Pick up rubbish and keep our environment clean

3. Pick up rubbish

When we find rubbish on the ground, we must pick it up and always 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.

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.

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.

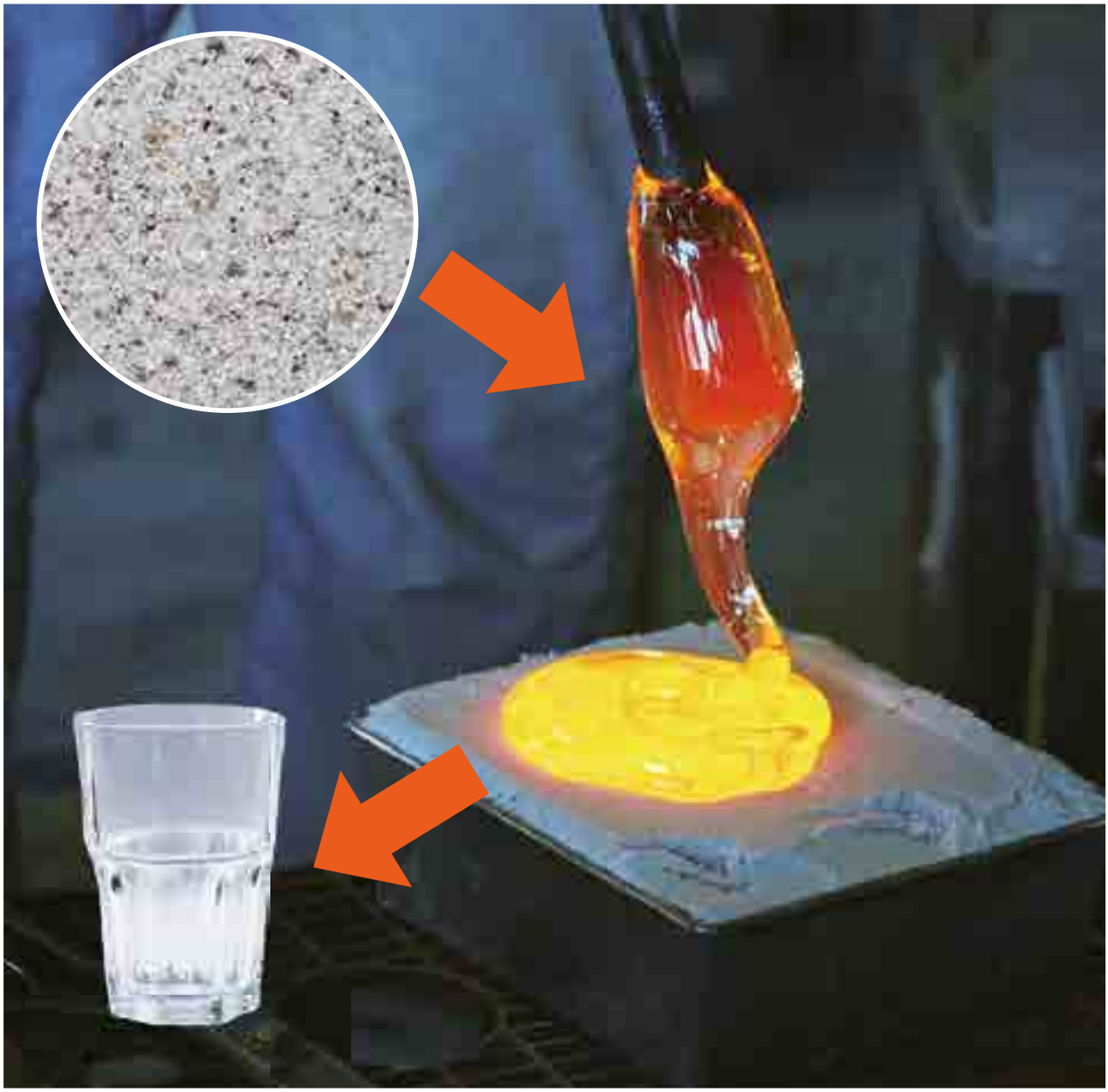
(1) Give two examples of the importance of soil for human beings.

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

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

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.

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 <u>not</u> 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 <u>not</u> 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?

_____

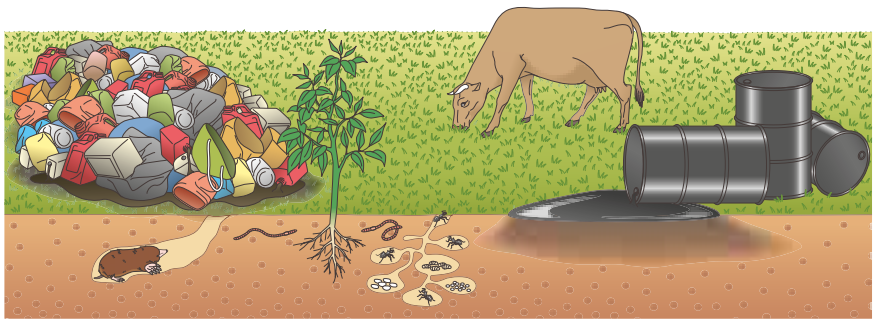
(2) While driving, Mike throws an empty plastic bottle out the window of his car. Explain what wise decision he should make to help prevent soil pollution.

_____

_____

Q4

Refer to the picture below and answer the two questions.



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

_____

_____

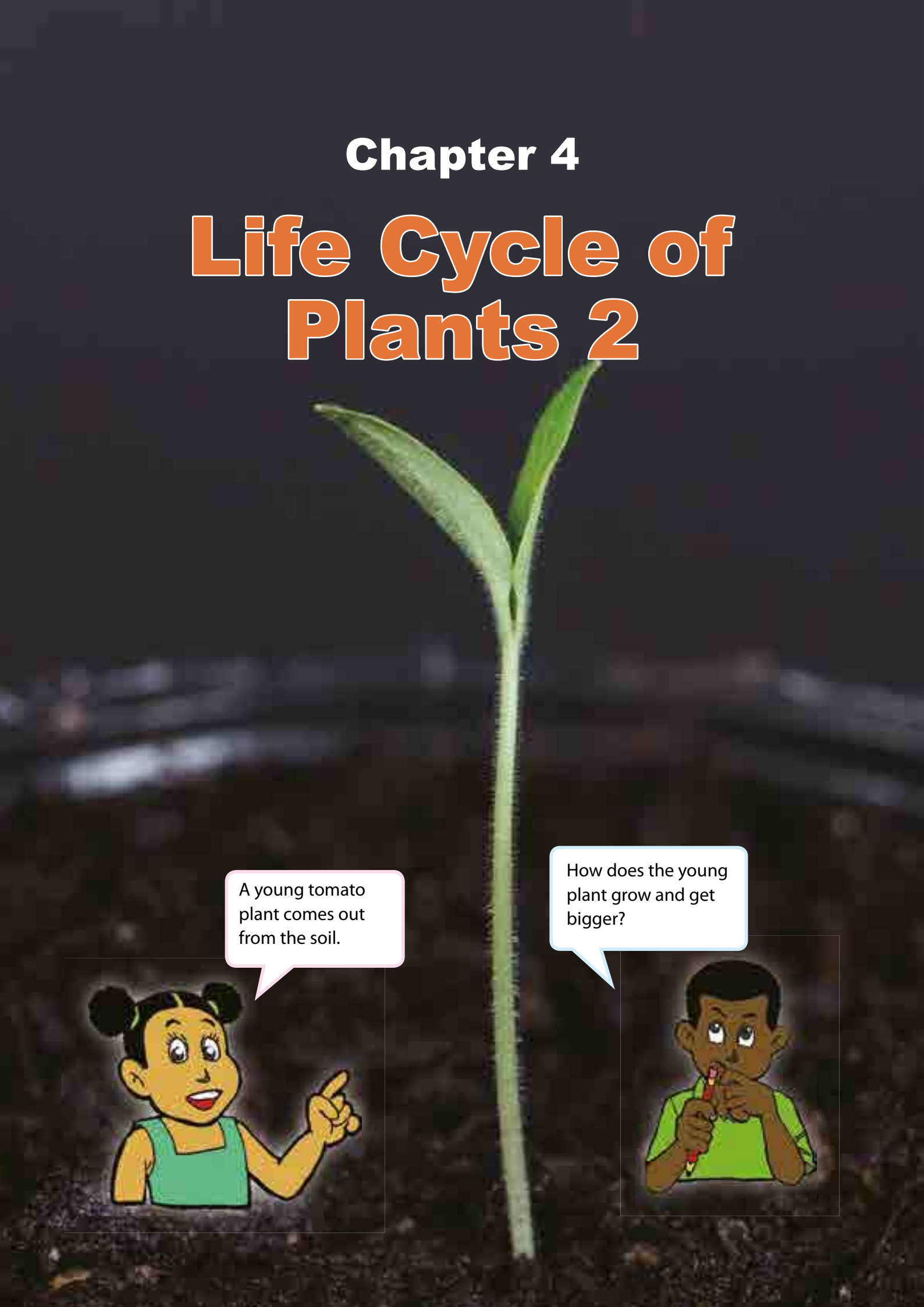
(2) What happens to plants that grow in polluted soil?

_____

_____

Chapter 4

Life Cycle of Plants 2



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?

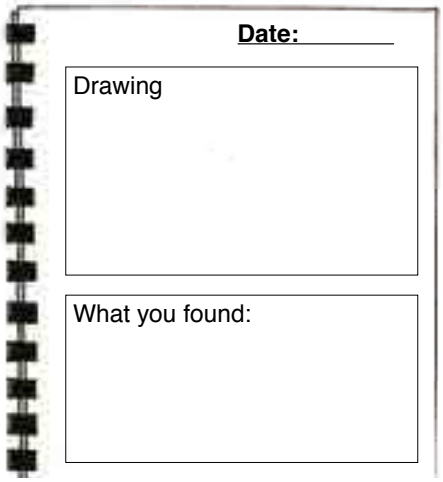
Activity : Observing young plants

What We Need:

- young plants, ruler

What to Do:

1. Draw a chart like the one shown below.



How can we observe a young plant grow?

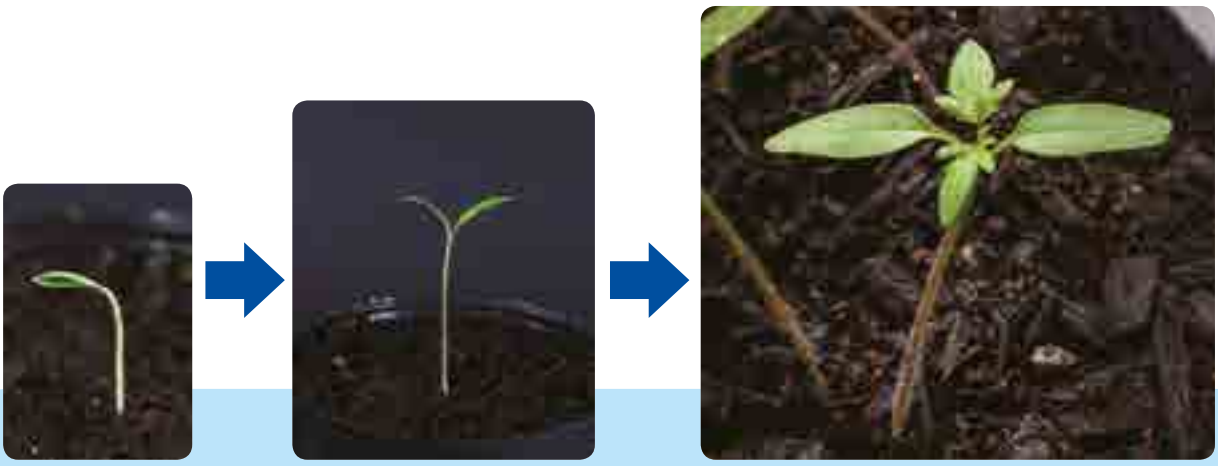
We can observe the number of leaves, colour, size, shape, height, etc.

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

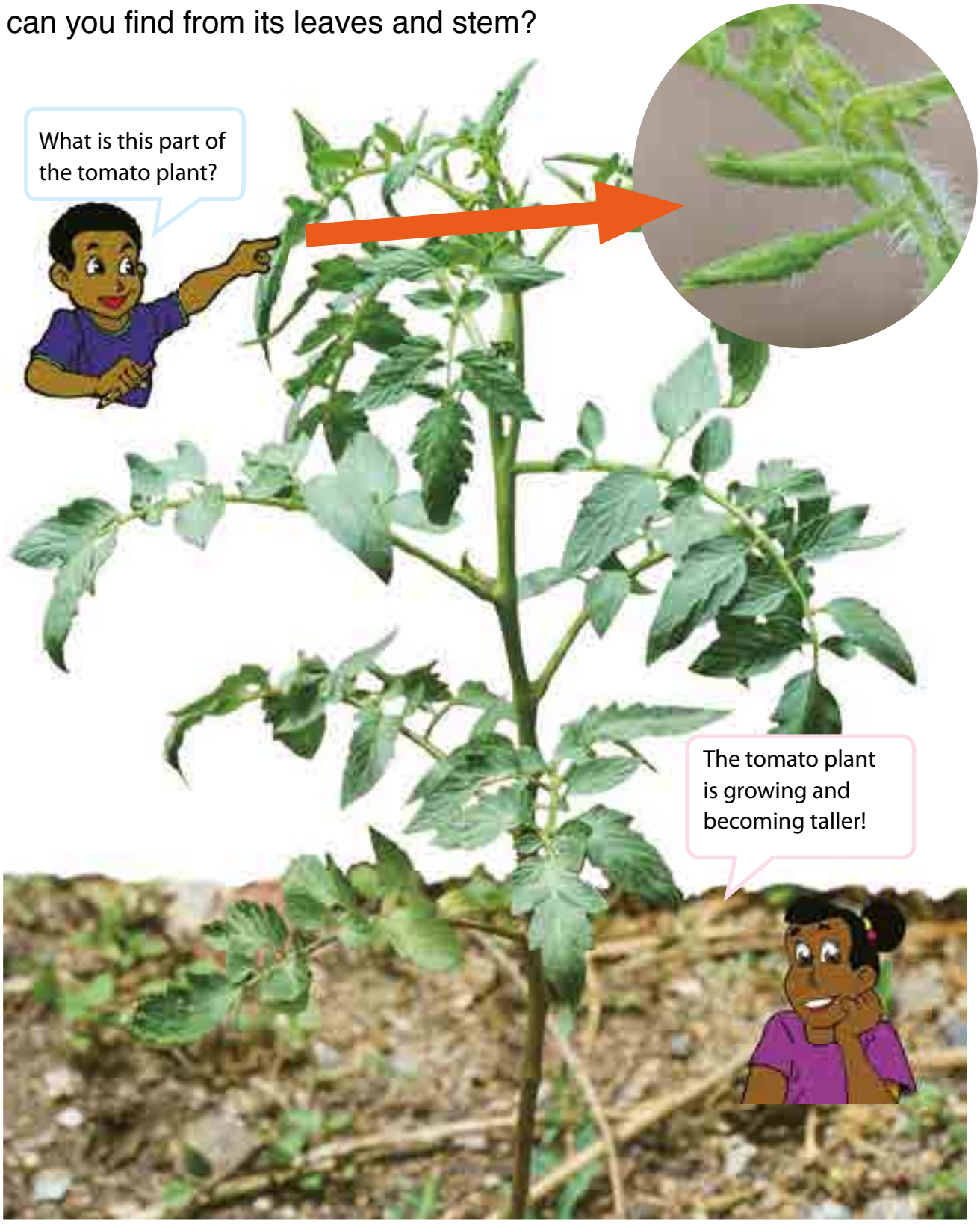
Try it!

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.

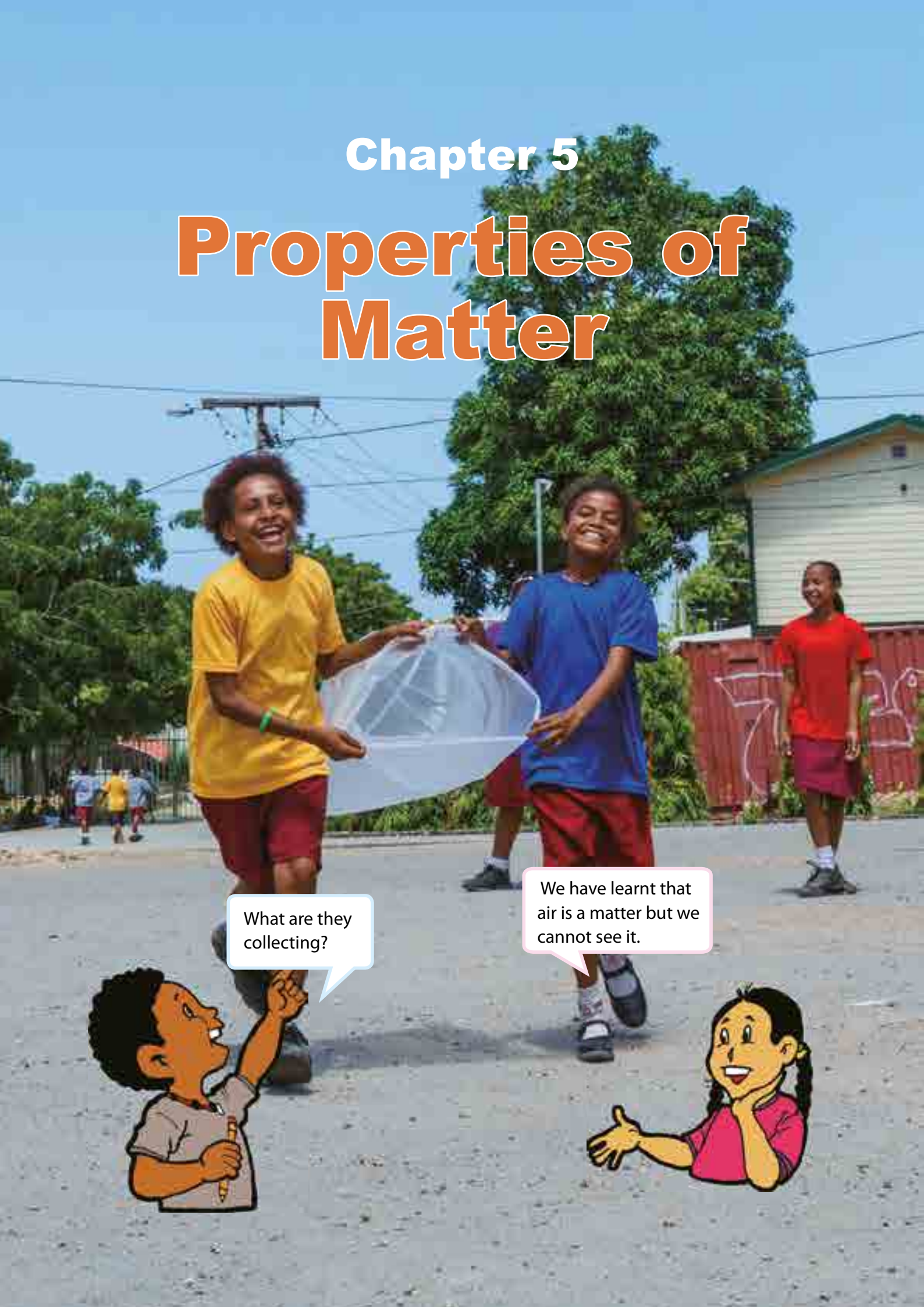
Growing a plant from a seedling

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



Chapter 5

Properties of Matter



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:

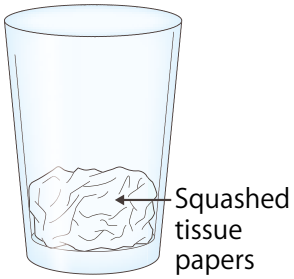
- tissue papers, glass cup,water, clear water container

What to Do:

1. Draw a table like the one shown below.

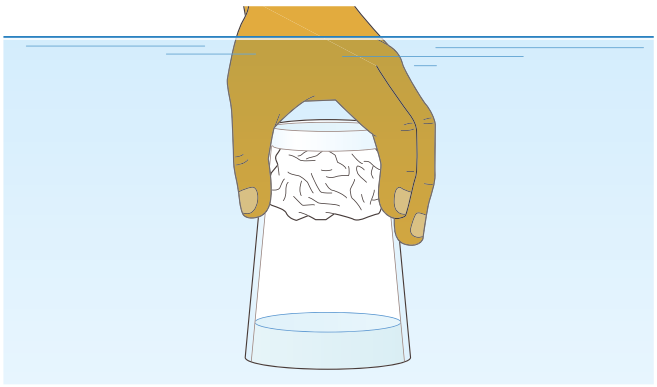
	Wet or Dry	Reason
Your Prediction		
Result		

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.

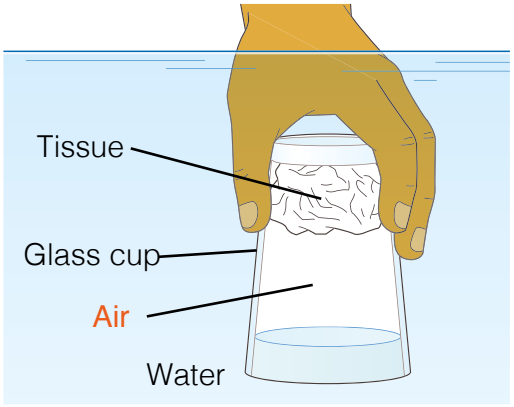
Discussion

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.



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.

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:

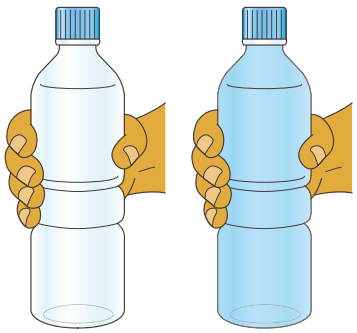
- empty plastic bottles with cap, water

What to Do:

1. Draw a table like the one shown below.

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

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

Result

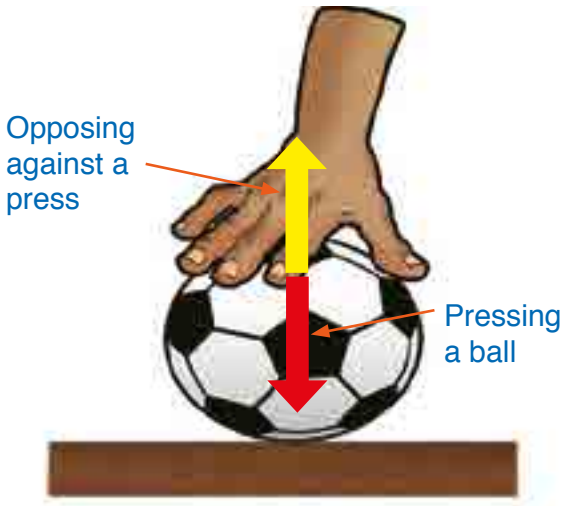
When we press the bottle filled with air, we can press the bottle easily. However, we cannot press the bottle very much at all when the bottle is filled with water. This means that we can compress the air inside the bottle but we cannot compress the water inside it.

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"

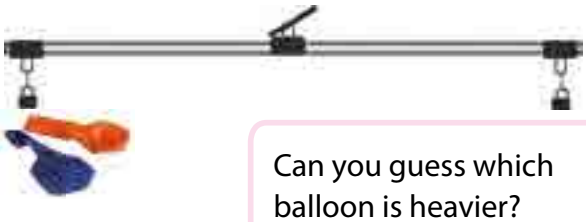
When we hold a stone or a book with our hand, we feel their weight. How about air? Have you ever felt the weight of air?

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	

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.

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.

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 <u>not</u> 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.

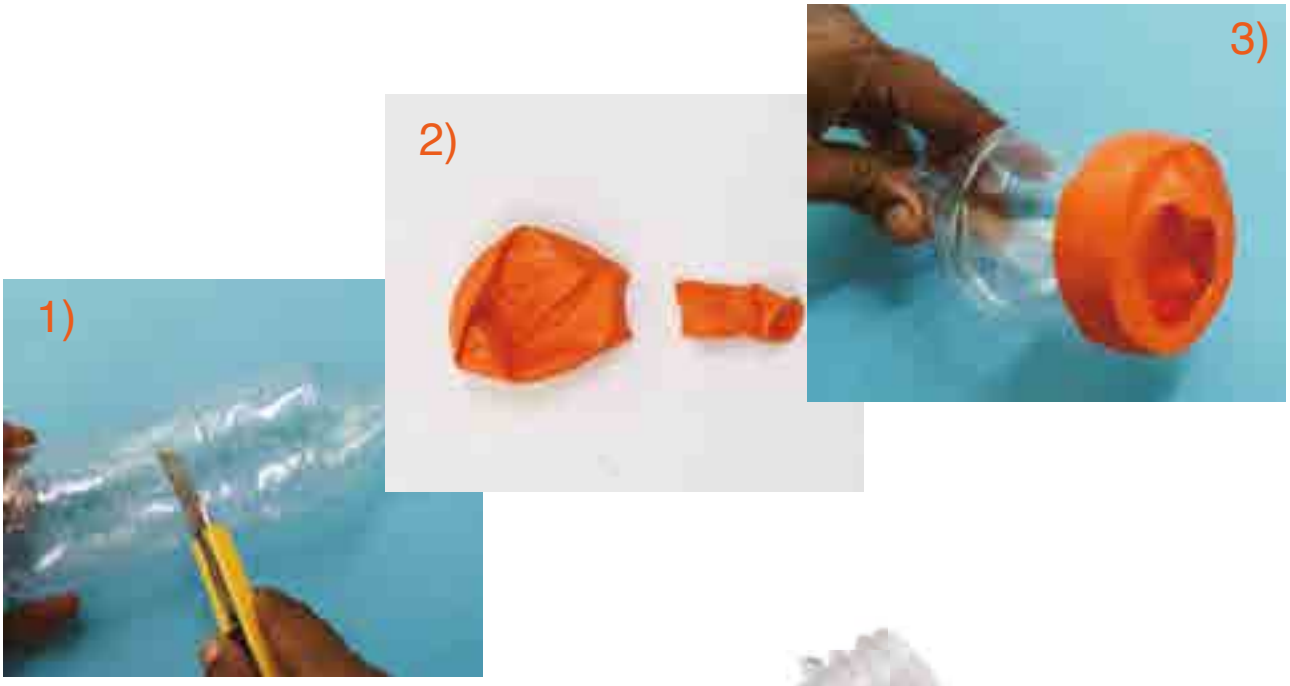
D. The tissue will float in the bowl of water.

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?

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?

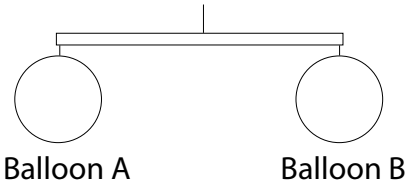
A. It expands its size.
B. It changes its colour.
C. It shrinks its size.
D. It disappears.

(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

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?

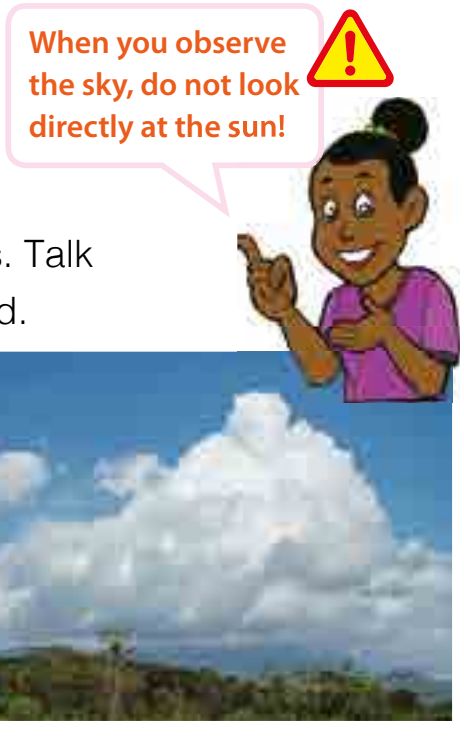
Activity : Observing the sky conditions

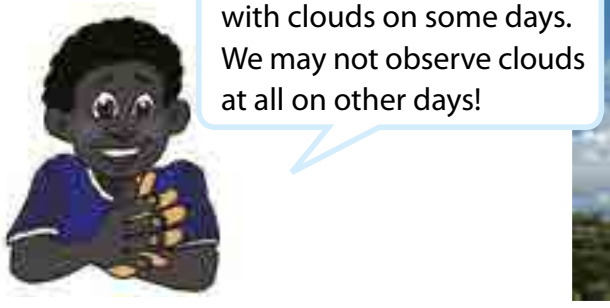
What to Do:

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.





Summary

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

Windy

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.

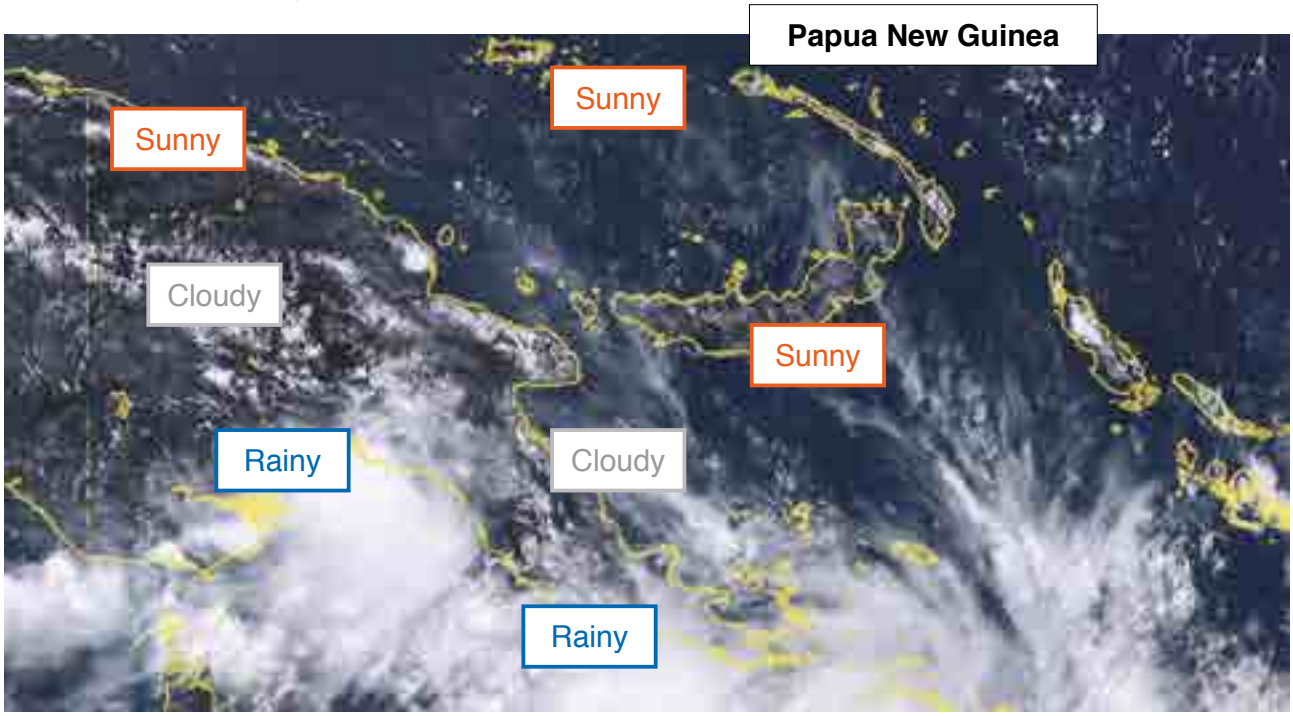
Sunny

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

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.

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?

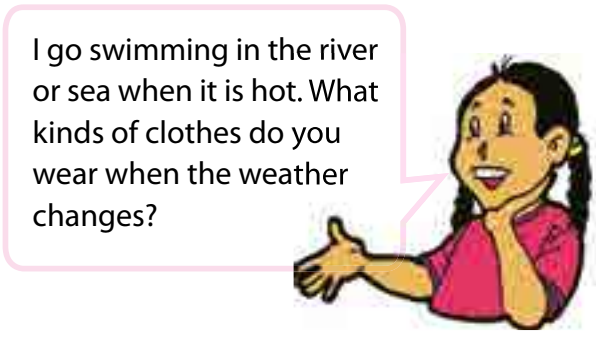
Activity : Weather affects people

What to Do:

1. Draw a table like the one shown below.

Weather	What do you do?
Hot	
Cool	
Sunny	
Rainy	

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.



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.

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.

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 <u>not</u> 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.

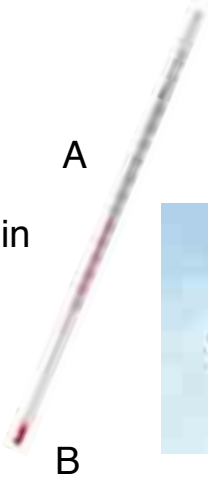
Look at picture A and B on the right.

(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?

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 <u>not</u> 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?

_____

_____

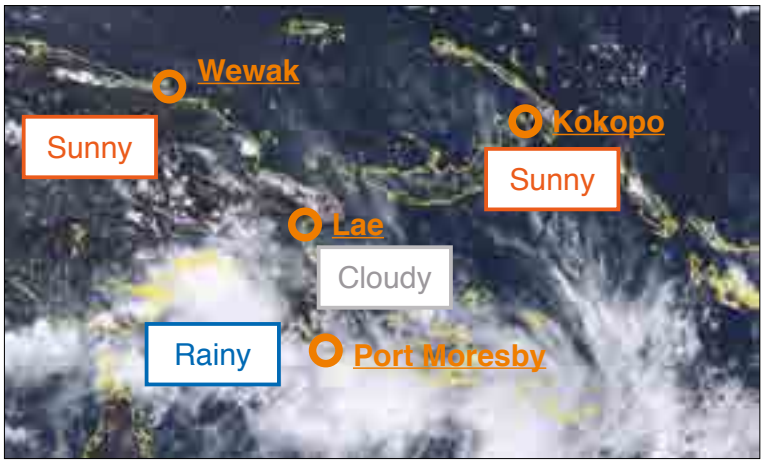
_____

_____

_____

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.

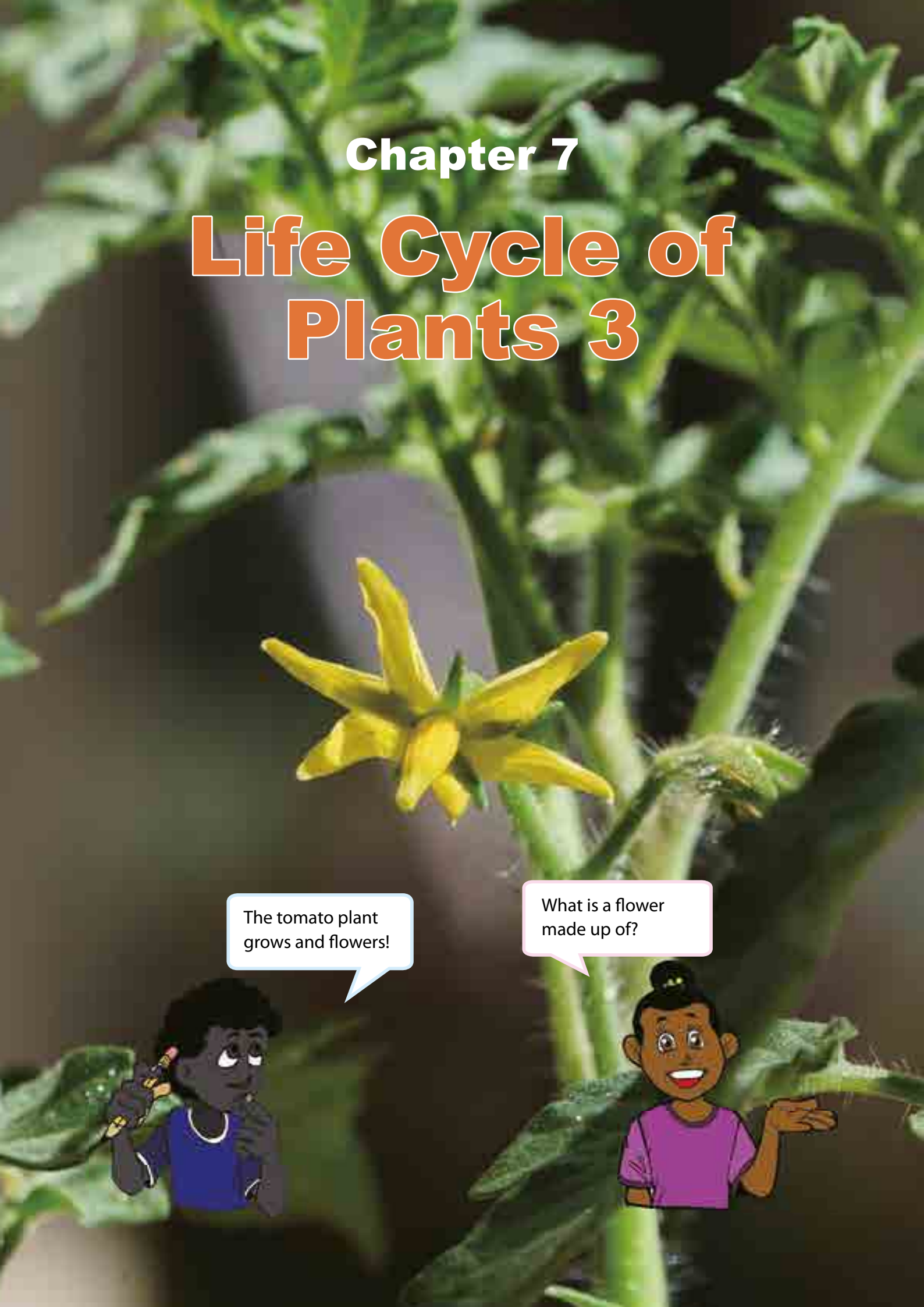
_____

(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



7.1 Stages of Life Cycle of Plants 3

Lesson 1: "Flowering"

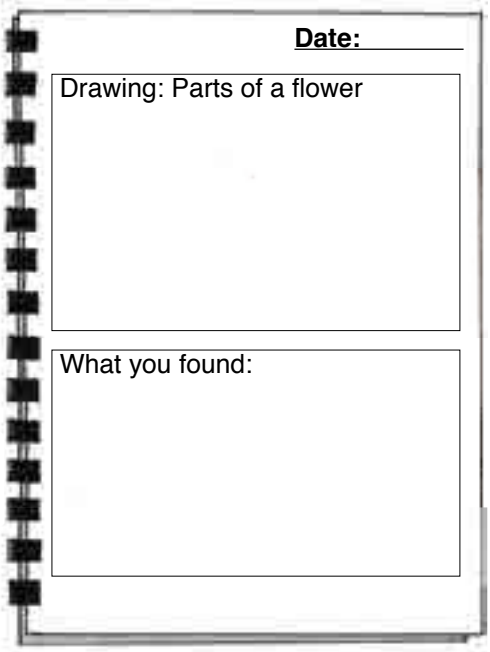
A seedling changes to an adult plant as it grows. The adult plant makes flowers. Let's observe a tomato flower.

What is a flower made up of?

Activity : Observing flowers

What to Do:

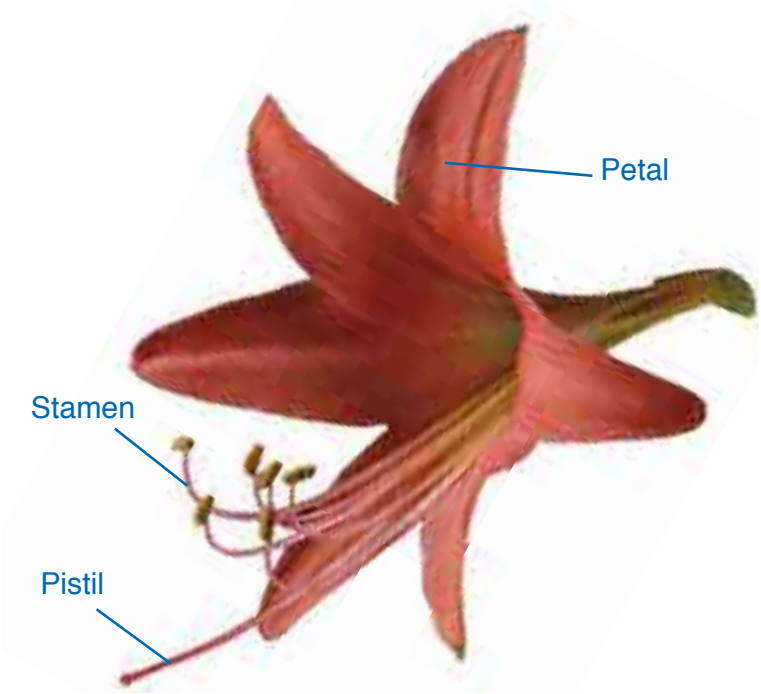
1. Draw a chart like the one shown below.
2. Go out of the classroom and bring a flower.
3. Carefully remove each part of the flower and draw the picture of each part on the chart.
4. Observe each part of the flower and record what you find.
5. Share your ideas with your classmates. Talk about what a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



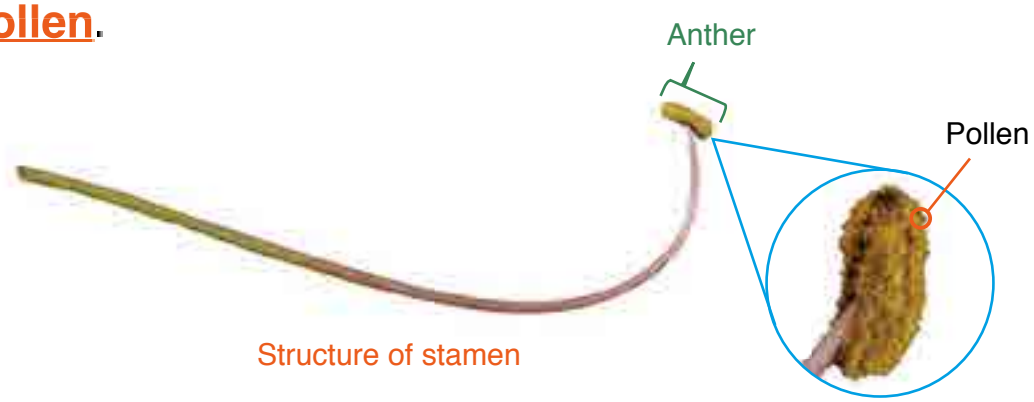
Summary

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**.

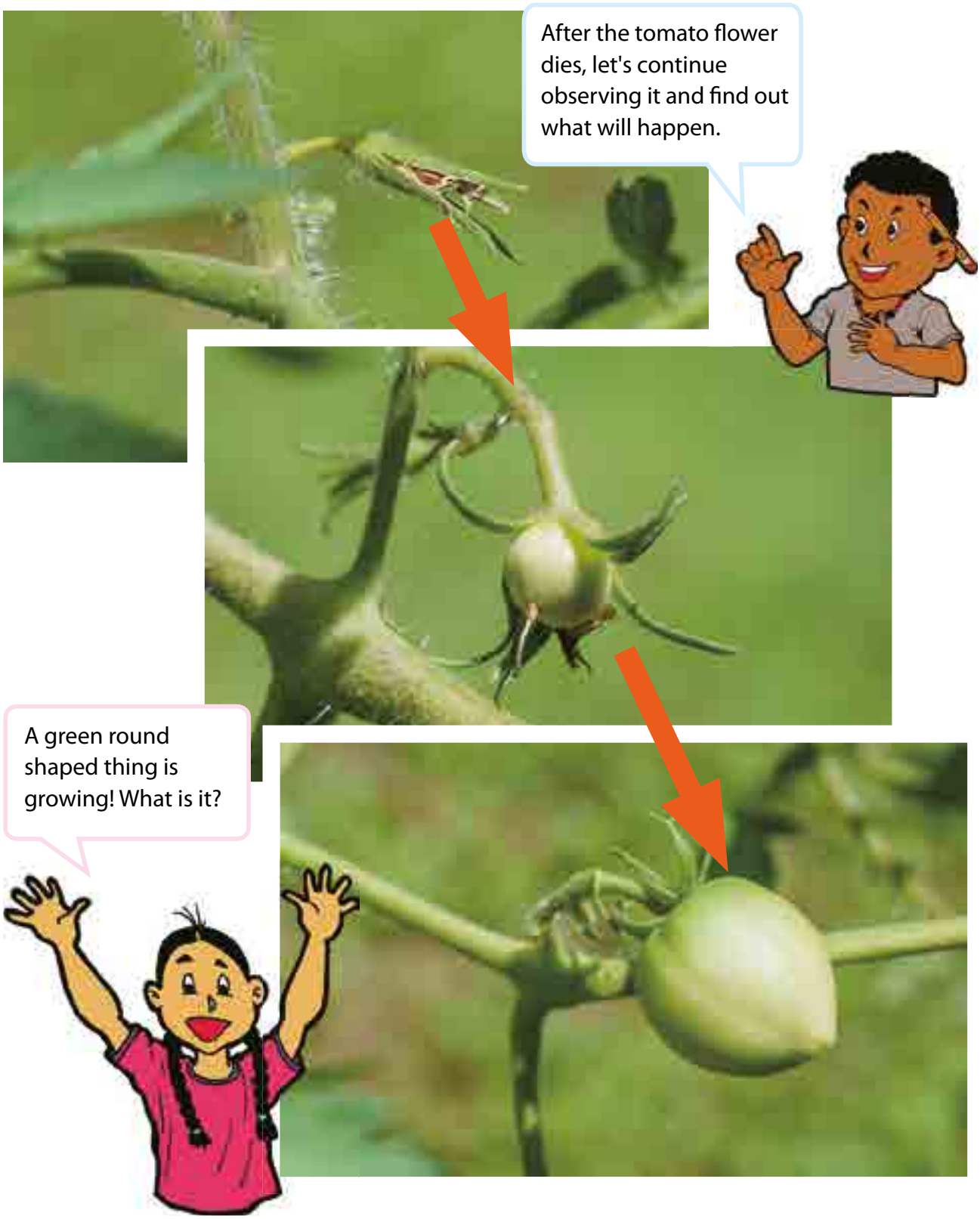
Structure of pistil

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

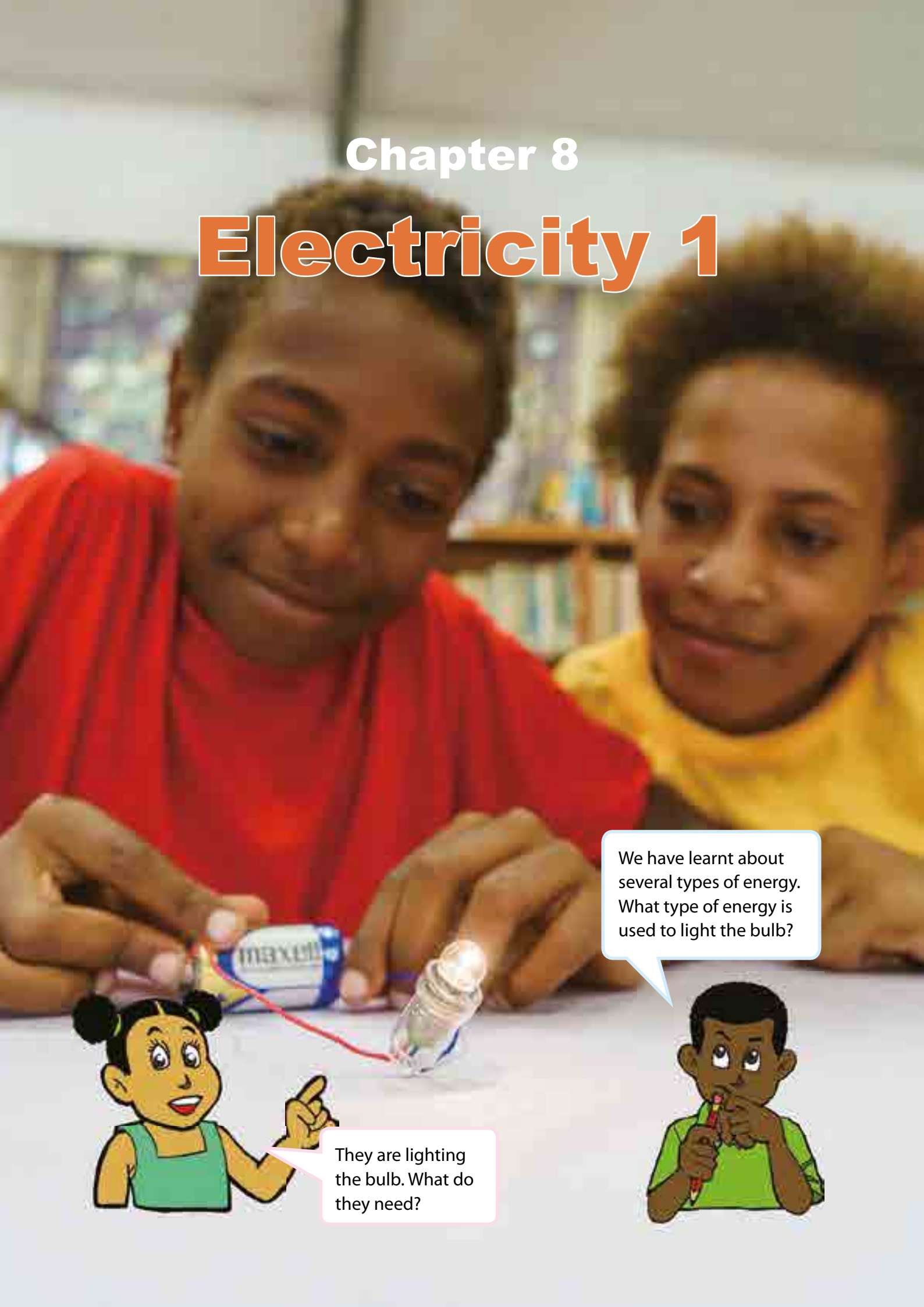
Changes after flowers dry and die

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



Chapter 8

Electricity 1



8.1 Electricity in Our Life

Lesson 1: "Electricity around Us"

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.

What is electricity?

Activity : Finding electricity around us

What to Do:

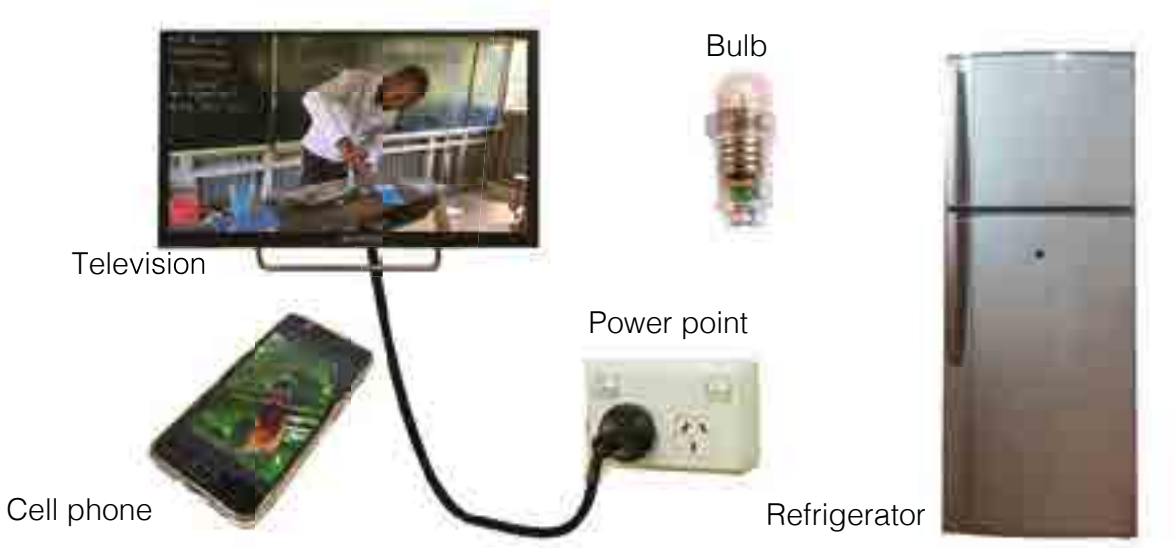
1. Draw a table like the one shown below.

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.

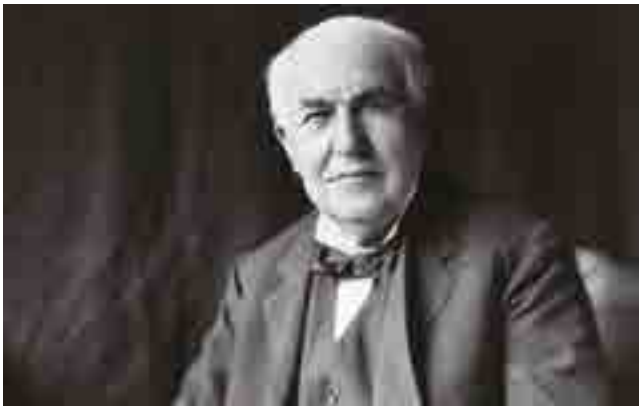
Summary

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

Lesson 2: "Getting Electricity"

When we use electrical appliances, we need electricity to make them work. Where can we get electricity from?

Where does electricity come from?

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	

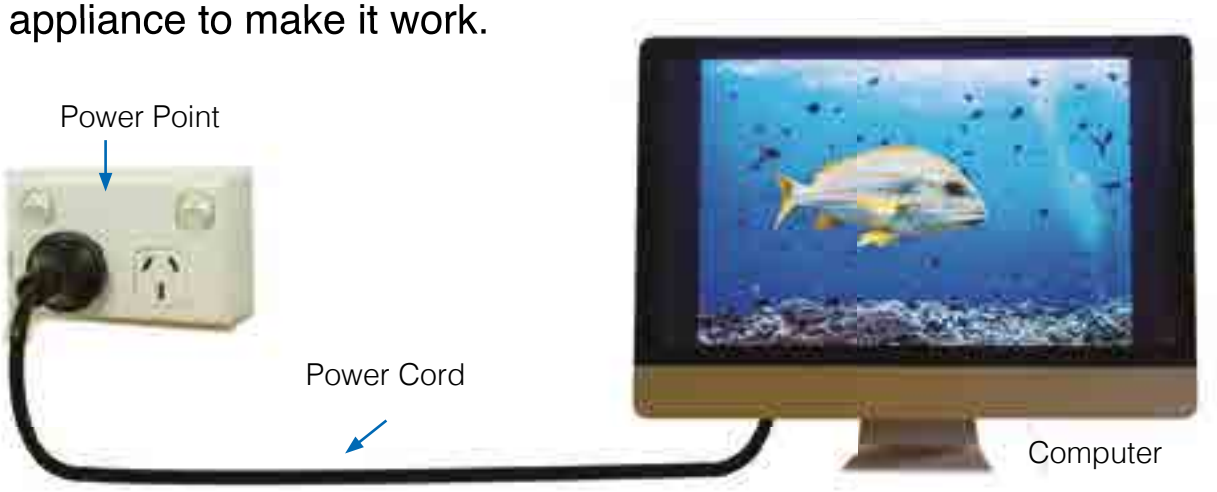
2. Look at the pictures of appliances below and make a list of where you will get electricity to run each of them.
3. Share your ideas with classmates. Talk about where we can get electricity from.

TV has a power cord, but a remote controller does not have a cord. Why?

When you want to watch TV, what do you do?

Summary

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.


Used in Cars


Used in Watches


Used in Toys


Used in Laptop Computer


Used in Remote Controller and others

Types of batteries

Summary and Exercise

Summary 8.1 Electricity in Our Life

Electricity around us

- Electricity is a form of energy.

  Electricity has an ability to do things.

- Electricity can run electrical appliances and other machines.
- Electricity 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.

Getting Electricity

- Electrical appliances use electricity to work.
- We can get electricity from power points and batteries to run the appliances.

Summary and Exercise

Exercise 8.1 Electricity in Our Life

Q1. Complete each sentence with the correct word.

(1) In 1752, Benjamin Franklin proved that lightning was _____ when he flew a kite during a thunderstorm.

(2) _____ is the person who produced a long-lasting electric light bulb in his laboratory in 1879.

(3) _____ can run electrical appliances and other machines.

(4) In the house, electricity can be obtained from a _____.

(5) A _____ is a device that makes it easy to carry electricity anywhere.

Q2. Choose the letter with the correct answer.

(1) Which of the following batteries can be used in a car?

A. ①
B. ②
C. ③
D. ④

(2) Which of the following is <u>not</u> something electricity can do?

A. Light up the light bulbs in homes.
B. Blow air in our homes.
C. Run electrical appliances in homes.
D. Power our television.

Q3. Answer the questions below.

(1) When you want to watch TV, what do you do to get electricity?

(2) TV has a power cord, but a remote controller does not have a cord. Why?

Q4. John took a new flashlight to go fishing. He switched the flashlight on but it did not light up. What do you think is the reason why the flashlight did not light?

8.2 Function of Electricity

Lesson 1: "Lighting a Bulb"

We use electricity in many ways. Light bulb is used everywhere in daily life. One of the popular sources of electricity is the battery or dry cell.

How can we light a bulb with a dry cell?

Activity : Making a bulb light

What We Need:

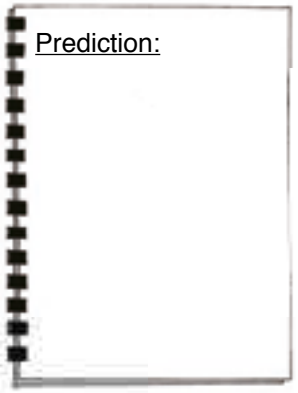
- a bulb, a bulb socket with wires, a dry cell

What to Do:

1. Draw a table like the one shown below.

When a bulb lights	When a bulb does not light

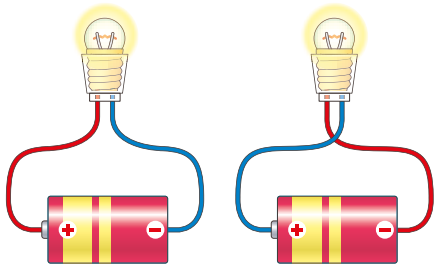
2. Guess how you can light a bulb using a dry cell and two wires in different ways. Record your prediction in your exercise book.
3. Try to light the bulb based on your prediction. Draw diagrams of the ways that you tried to light the bulb in the table.
4. Share your ideas with your classmates.



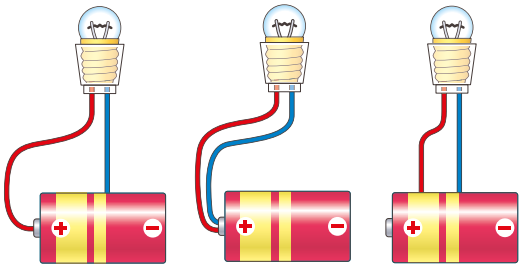
Result

The following shows some examples of the ways that a bulb can light or not.

The ways that a bulb light



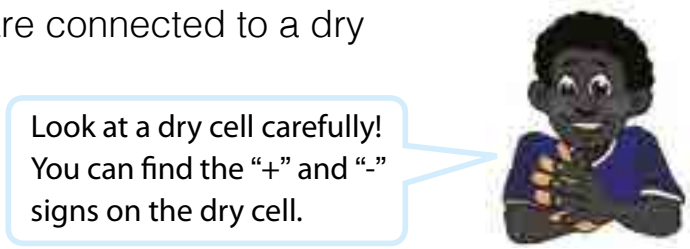
The ways that a bulb does not light



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

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

Lesson 2: "Flow of Electricity"

A bulb lights when two wires are connected to the "+" and "-" of a dry cell. Electricity can flow through an electric circuit.

How does electricity flow through an electric circuit?

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:

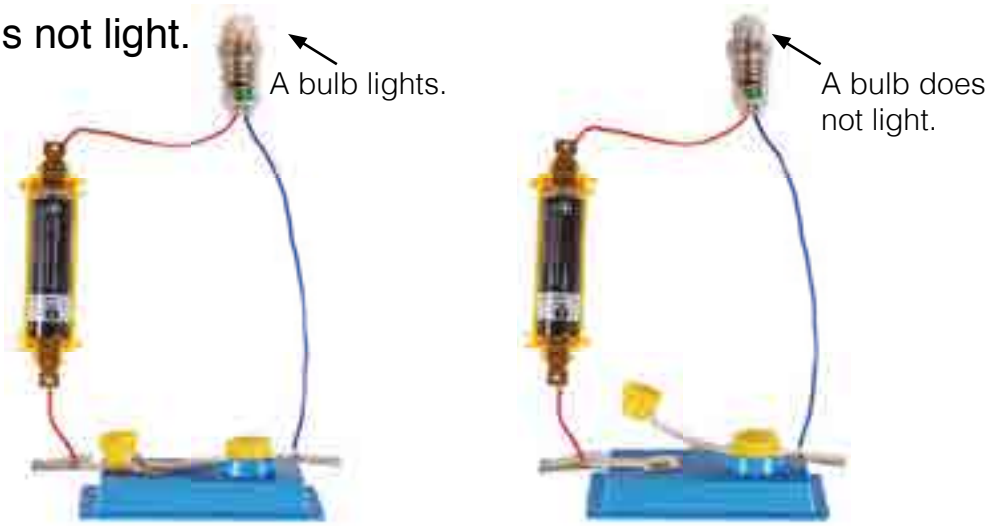
1. Draw a table like the one shown below.

	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.

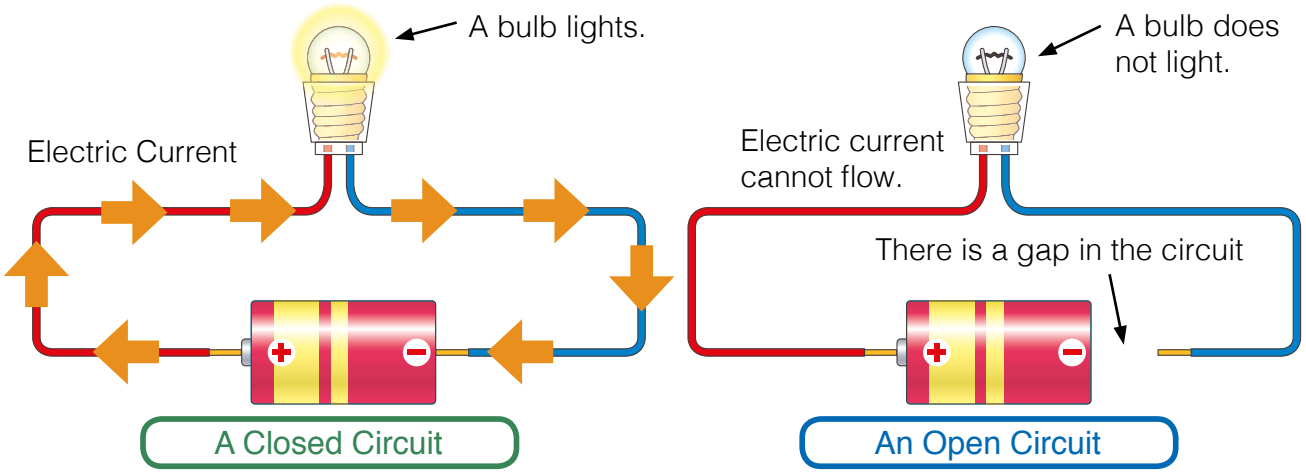
Result

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.



Lesson 3: "Conductors and Insulators"

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?

Which materials can electricity flow through?

Activity : Connecting objects into an electric circuit

What We Need:

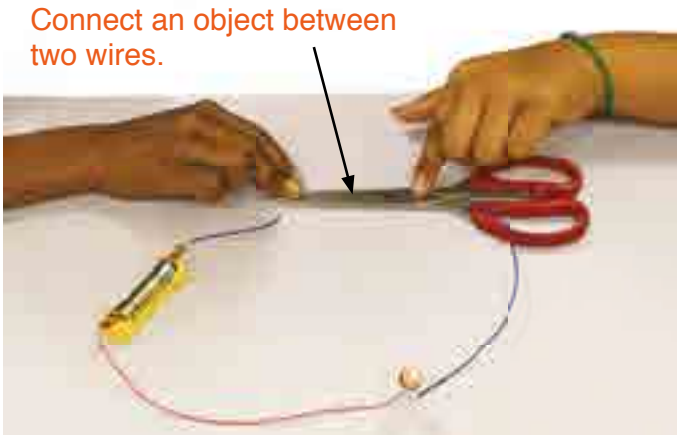
- a bulb, a bulb socket with wires, a dry cell, battery holder, paper clips, paper, aluminium can, glass, nail, plastic bottle, wood, any others

What to Do:

1. Draw a table like the one shown below.

Objects	Your Prediction	Result
paper clips		
paper		
aluminium can		
.....		

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.



Result

Electric current can flow through paper clips, nail and aluminium can. Papers, plastic bottles, glasses and wood do not allow electric current to flow through.

Objects that electricity can pass through


Clip


Nail

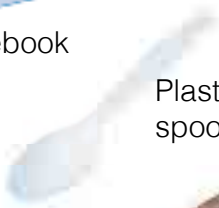

Steel can


Aluminium can

Objects that electricity cannot pass through


Notebook


Rubber band


Plastic spoon


Glass cup


Wood ruler

Summary

A clip, nails and steel can are made of iron. An aluminium cans is made of aluminium. Materials such as iron and aluminium are called **metals**. Gold, silver and copper are also metals.

Electric current flows through some materials. A material that electric current easily flows through is called a **conductor**. Electric current passes through metals easily. Metals are good conductors. Electric current does not flow through other materials. A material that does not allow electric current to flow through easily is called an **insulator**. Plastic, rubber, glass and wood are some examples of insulators.

Conductors

Insulators

Lesson 4: "Uses of Conductors and Insulators"

Materials can be classified into conductors and insulators. Conductors and insulators are very useful in our lives.

How do we use conductors and insulators in daily life?

Activity : Finding conductors and insulators

What We Need:

- power cord, cutter knife

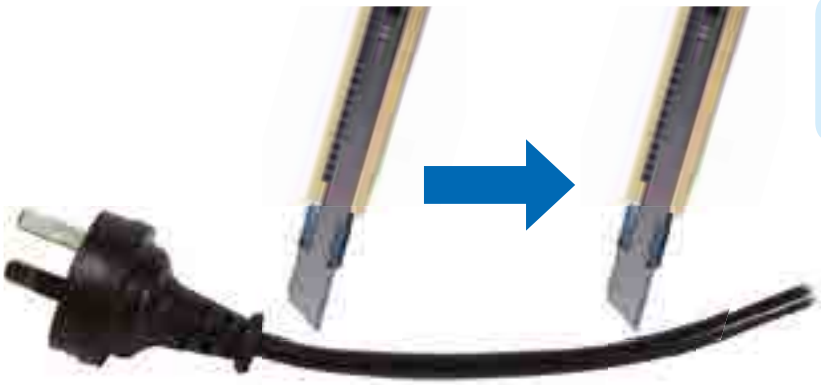
Be careful when you cut the cord with the cutter knife!

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?

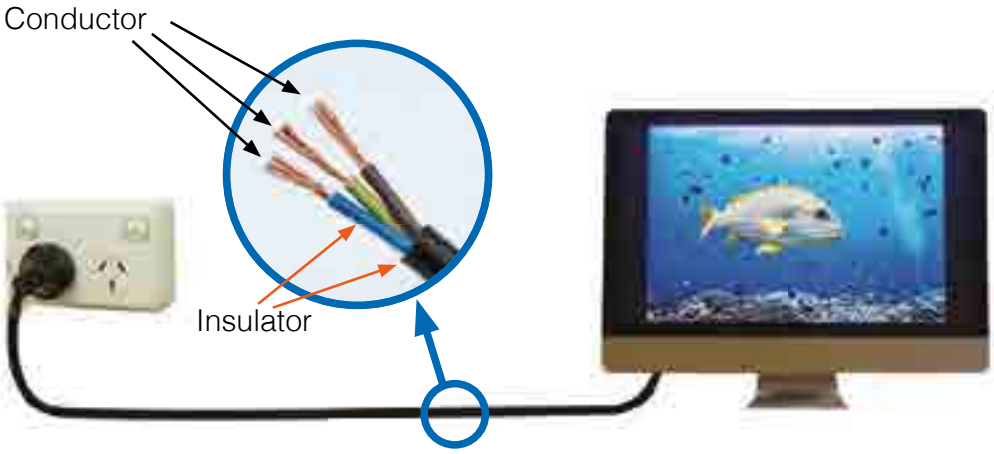
2. Cut the cord lengthwise with a cutter knife. Observe how the inside of the cord is formed.
3. Find what the cord is made of and which parts of the cord are conductors and insulators. Record your findings in the table.
4. Share your findings with your classmates. Talk about how and why conductors and insulators are used in a power cord.



Do you remember which materials are conductors or insulators?

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.

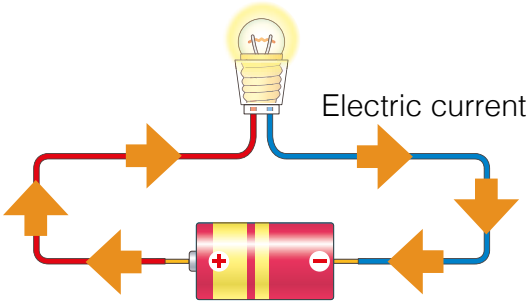
Do not put your finger into power point.

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.



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

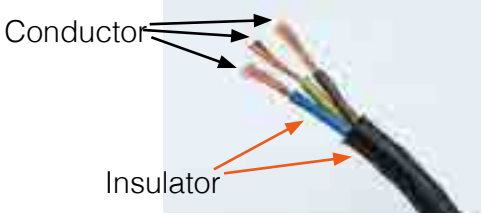

Open circuit

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.



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.

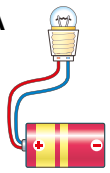
(3) Material such as iron, gold and copper are called _____.

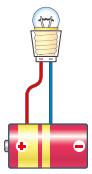
(4) Metal wires are _____ to connect an electrical appliance to the electric outlet.

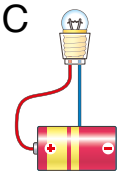
(5) The plastic or rubber covering surrounding the wires of an electrical appliance is called an _____.

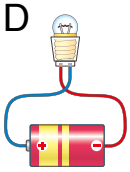
Q2. Choose the letter with the correct answer.

(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

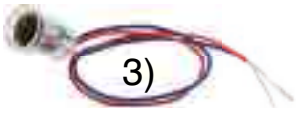
B. steel can, nail, copper

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)

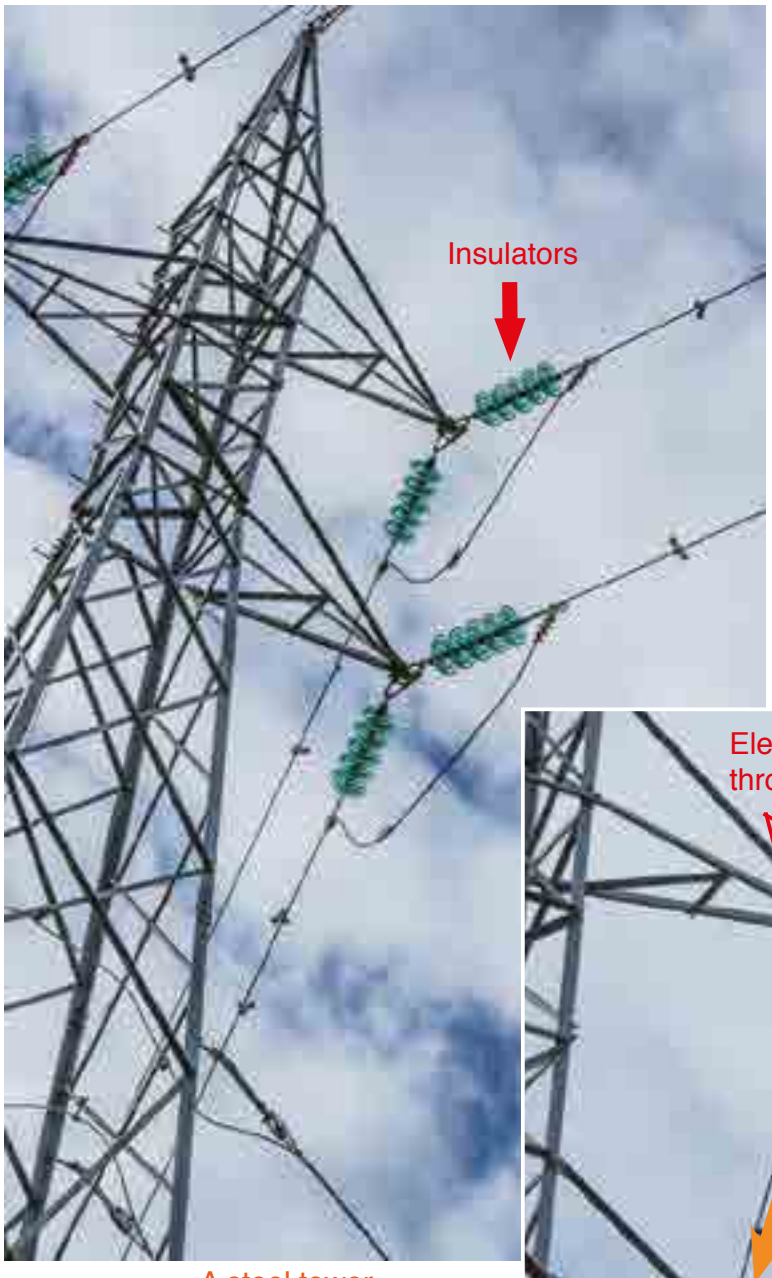
4) 

5) 

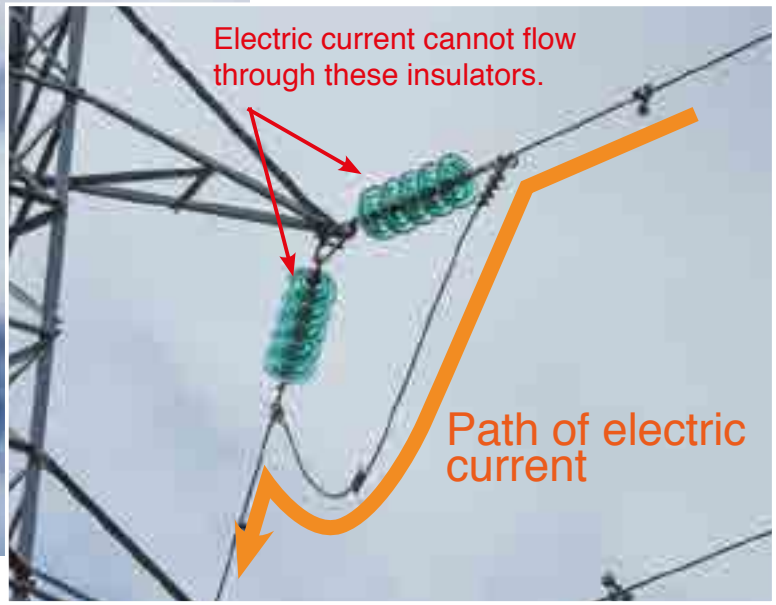
Q4. Explain why metal wires in a power cord of an electric appliance is covered with rubber?

Why doesn't electric current escape from a steel tower?

We can find electric wires hanging on a steel tower or an electric pole. Look at the picture below that shows electric wires and a steel tower. We learnt that a metal is a conductor that electricity passes through. Can you guess why the electric current does not escape to the ground through the steel tower? You can find round and thin shaped objects connected between the steel tower and electric wire. Those are insulators made of glass and ceramic. Electric current cannot pass through the insulator so the current takes another route as shown below without escaping through the steel tower.



A steel tower



Chapter Test

8. Electricity 1

Q1

Complete each sentence with the correct word.

(1) Electricity is a form of _____ which has an ability to do things.

(2) Two main sources of electricity are power points and _____.

(3) The circle of a pathway that electricity flows is called an electric_____.

(4) A dry cell has a _____ terminal and negative terminal.

Q2

Choose the letter with the correct answer.

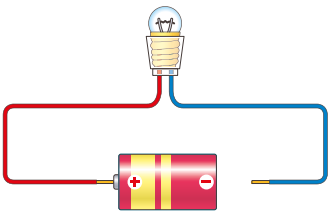
(1) Which of the sentences is correct about the circuit shown?

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

Q3

(1) Name two devices that use battery to work.

_____

(2) Name two materials that electric current does not flow through easily.

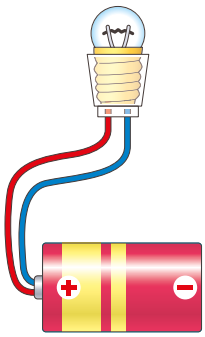
_____

(3) What is the function of a switch in an electric circuit?

_____

_____

(4) Look at the picture on the right. How do we change the connection of the wire to light the bulb?



_____

_____

_____

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.

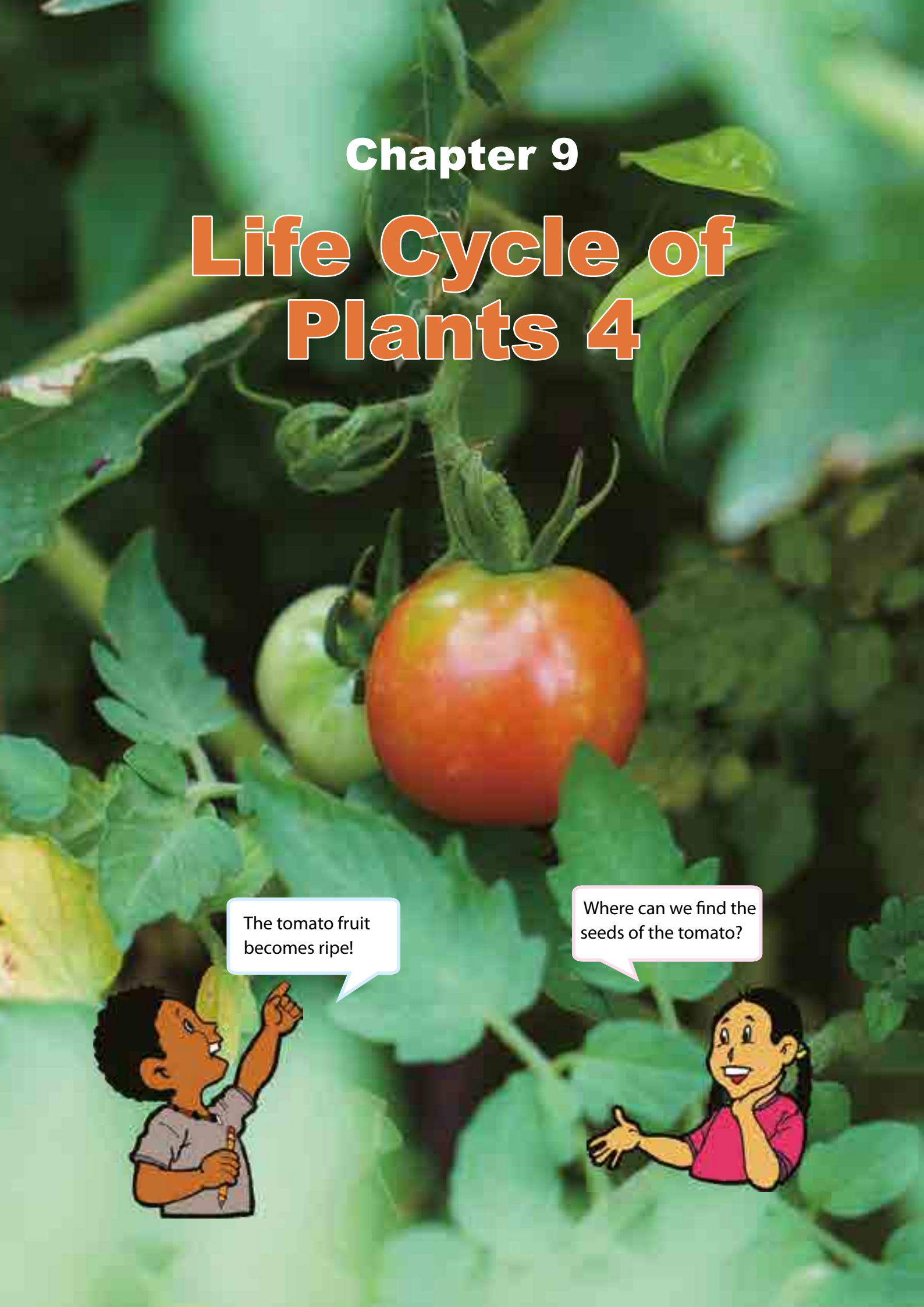
_____

_____

_____

Chapter 9

Life Cycle of Plants 4



9.1 Stages of Life Cycle of Plants 4

Lesson 1: "Fruits"

After adult plants make flowers, they make fruits. Let's observe the fruits.

What is a fruit made up of?

Activity : Observing tomatoes

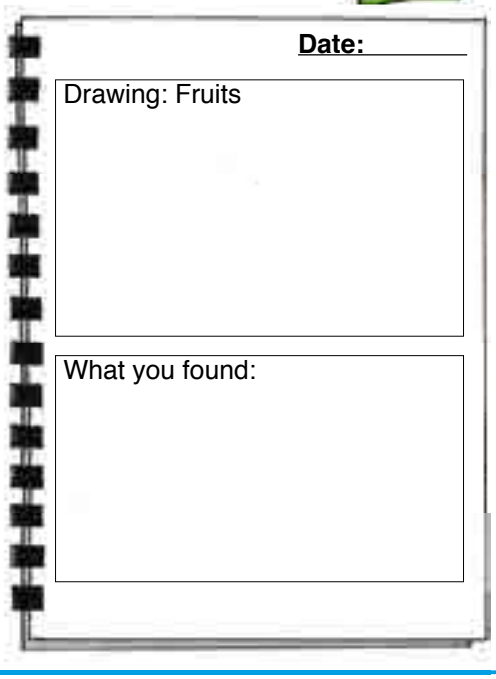
What We Need:

- tomato fruit, knife

Be careful when you cut a fruit with a knife!

What to Do:

1. Draw a chart like the one shown below.
2. Go out of the classroom and pick a ripe tomato from your plant.
3. Cut the tomato in half and draw the sketch of the tomato on the chart.
4. Observe the tomato carefully and record what you found on the chart.
5. Share your findings with your classmates. Talk about what a fruit is made up of.

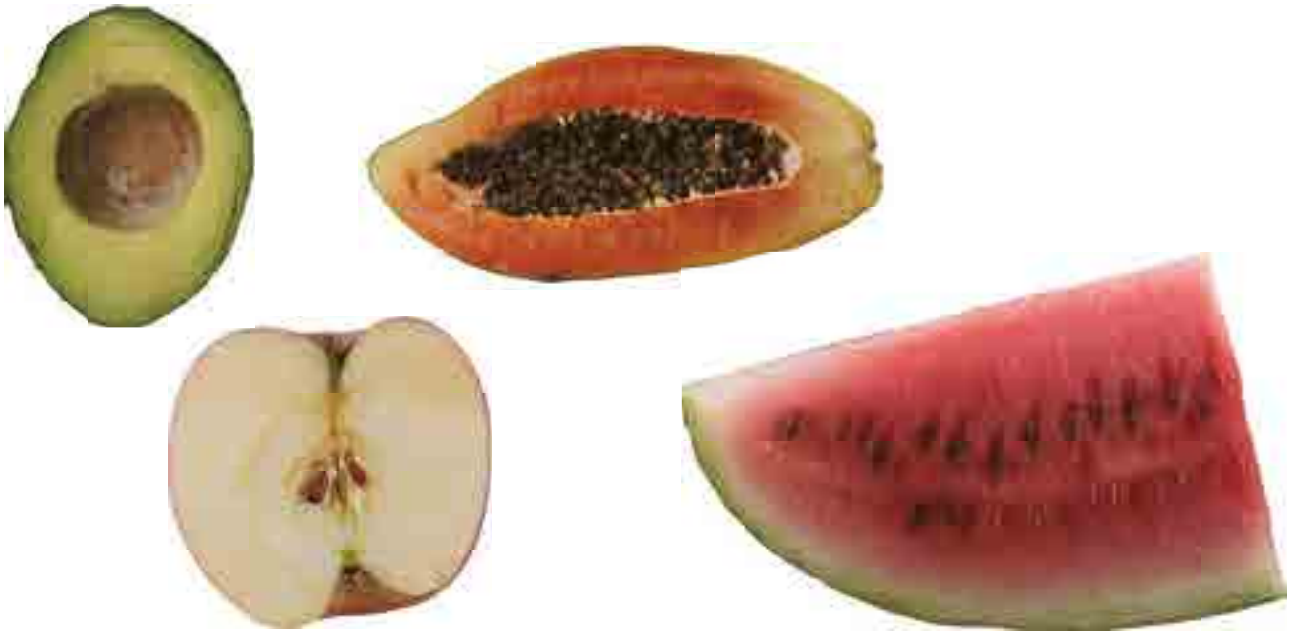


Summary

The adult plants grow and produce flowers. The flowers make **fruits**. Fruits come in different shapes, sizes and colours. Some fruits are soft, juicy and some are hard.

Fruits have different shapes, sizes and colours.

A fruit is the part of a plant that has seeds. Some fruit contain many seeds. Seeds grow inside the fruit.



A fruit contains seeds.

Lesson 2: "Life Cycle of Plants"

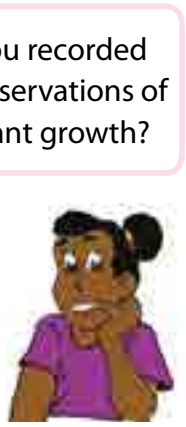
All plants grow, change and finally die. We have observed the plant growth and changes so far. Let's wrap up the life cycle of a plant!

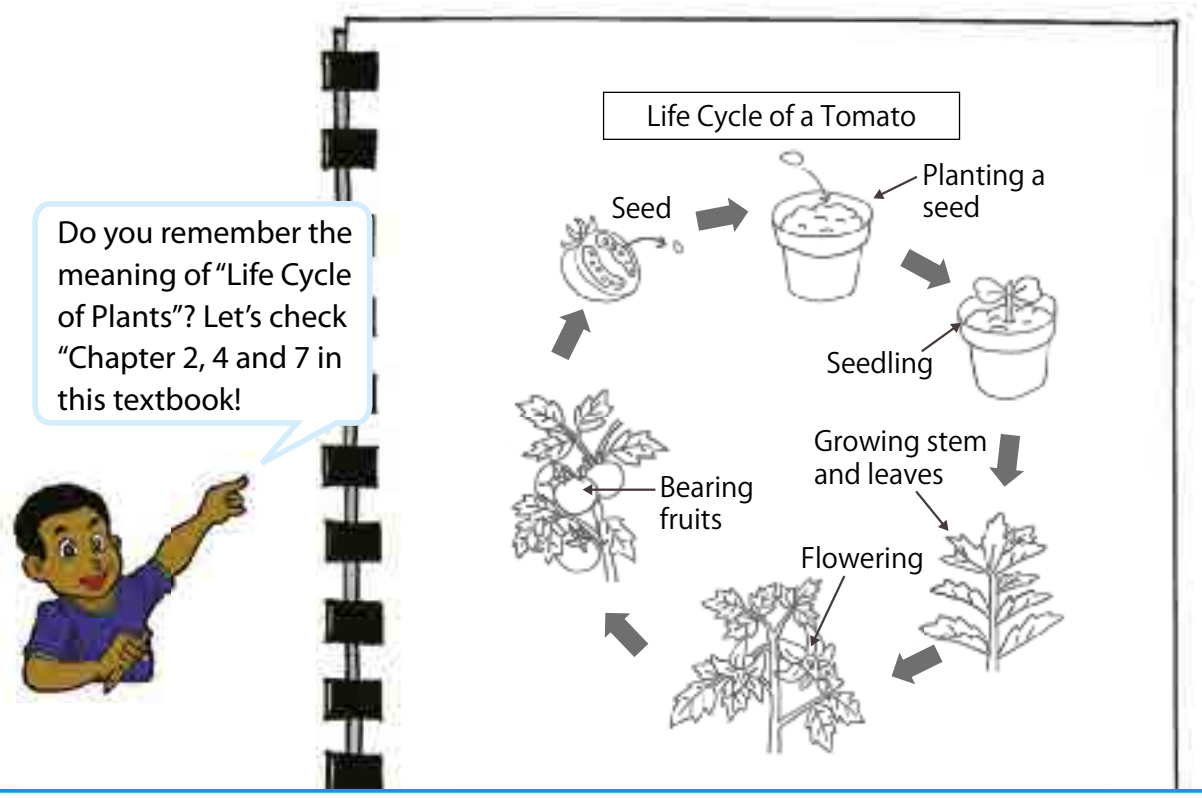
How do plants grow and change during their life cycle?

Activity : Plant life cycle

What to Do:

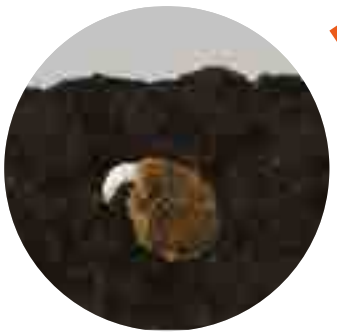
1. Check the records of the plant growth you have observed in your exercise book.
2. Summarise how the plant grows and changes in order in your exercise book as shown below.
3. Share your findings with your classmates. Talk about the life cycle of plants.





Summary

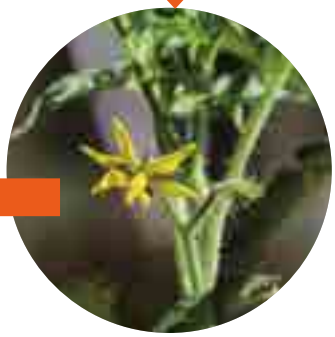
The plant life cycle starts from a seed. The seed sprouts and a seedling grows. The seedling changes into an adult plant as it grows. The adult plant flowers bears fruits and produces seeds. Then the adult plant finally dies. The seeds grow into new plants again. This is called the **life cycle** of plants.



A seed grows in soil

A seedling sprouts

A seedling grows and changes



An adult plant flowers

Flowers grow into fruits

An adult plant produces seeds

An adult plant dies

Life Cycle of Plants

Summary and Exercise

Summary

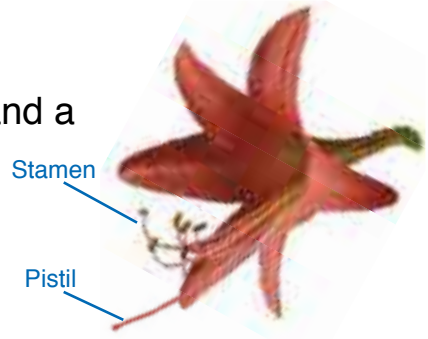
2.1, 4.1, 7.1, 9.1
Life Cycle of plants

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.

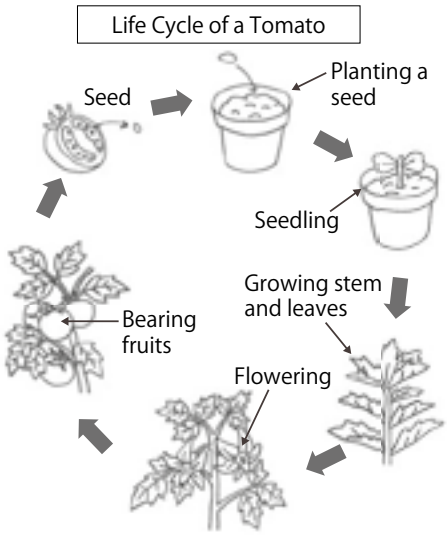
Parts of a Flower

- 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.



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.



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.

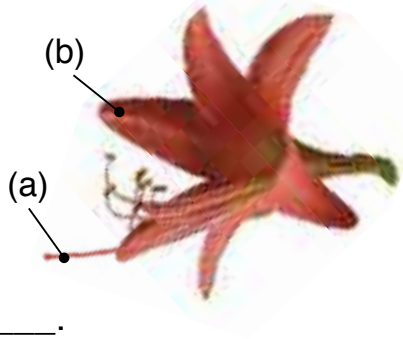
(3) Flowers grow into _____ which contains many seeds.

(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) 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?

How old is the oldest tree?

A Life cycle of tomato plant begins from a seedling and ends when it is an adult. It takes less than a year for the life cycle to be completed. The trees have generally longer life span than that of herbs. Look at the picture below.The tree is one of the oldest-known trees in the world. Can you guess how old it is? The tree is estimated to be at least 1,000 years old. There are some trees living over 2,000 years!

The tree is estimated to be over 1,000 years old (Japan)

Chapter Test

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

Q1

Complete each sentence with the correct word.

(1) A fruit contains many _____which grow inside it.

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

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

(4) A flower pollen is stored in the _____.

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

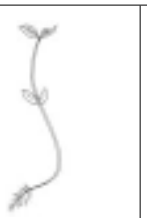
B. seed ➞ bud ➞ fruit ➞ adult plant ➞ seed

C. adult plant ➞ seedling ➞ seed ➞ adult plant

D. flower ➞ seed ➞ spore ➞ adult plant ➞ flower

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.

Q4

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

Similarities: _____

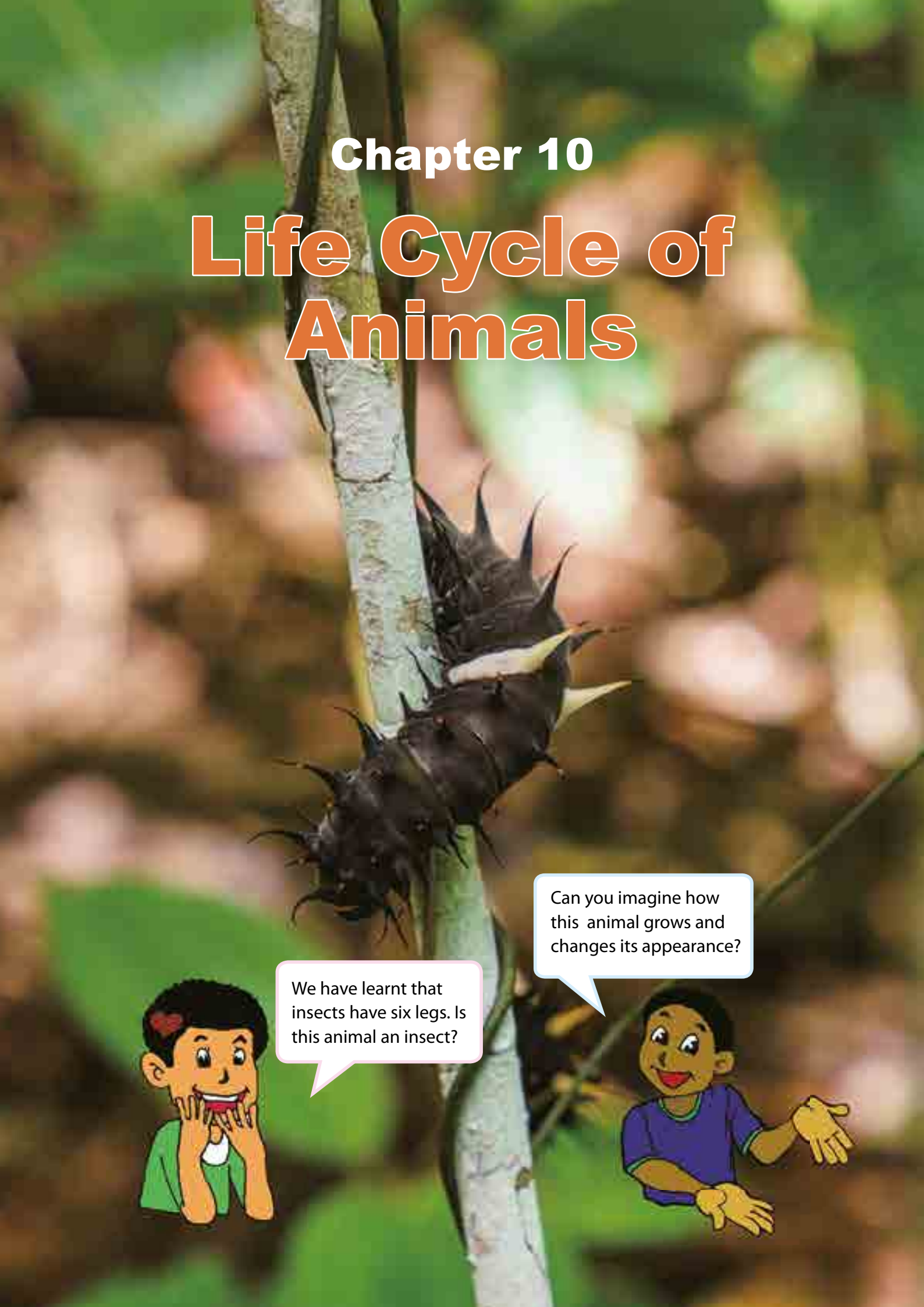
Differences: _____

(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.

_____

Chapter 10

Life Cycle of Animals



10.1 Stages of Life Cycle of Animals

A **life cycle** is the series of changes that a living thing goes through during its life.

Lesson 1: "Life Cycle of Insects"

Insects are living things. All living things grow and change. How do insects grow and change during their life cycle?

What is a life cycle of an insect?

Activity : A life cycle of a butterfly

What to Do:

1. Draw a table like the one shown below.

	Youngest → Oldest			
No. of Picture				

2. Look at the pictures of a growing butterfly below.
3. Put the pictures in order from the youngest to the oldest and write the number of the picture in the table.
4. Share your ideas with your classmates. Talk about how a butterfly grows and changes.


1

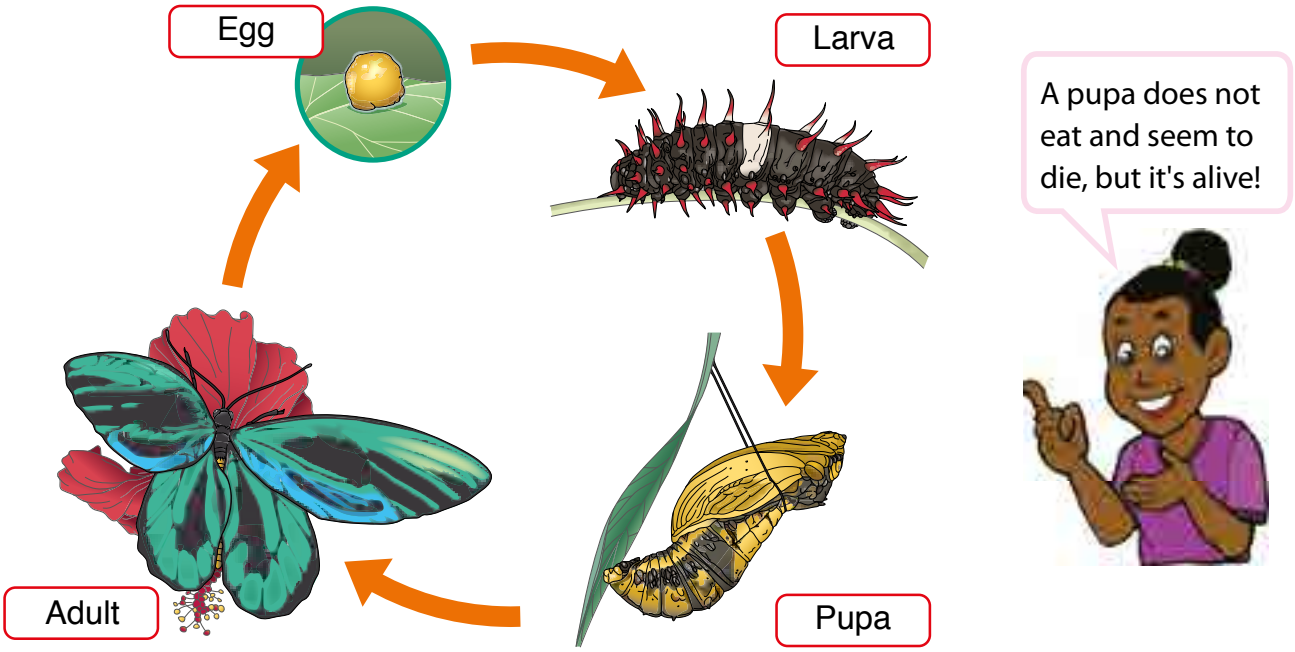

2


3


4

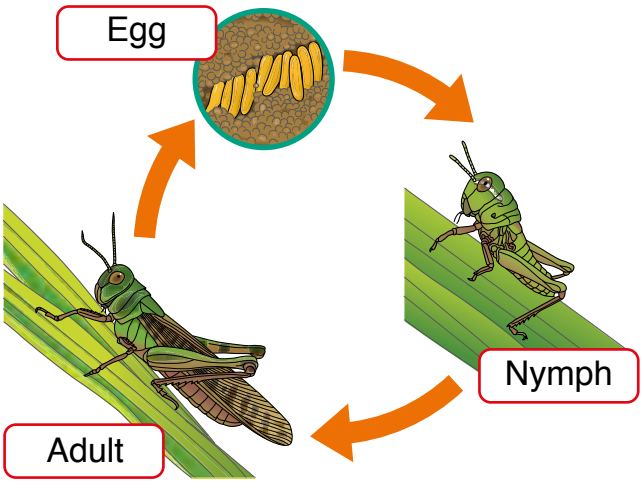
Summary

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

Lesson 2: "Life Cycle of Fish and Amphibians"

Fish and amphibians are groups of animals. How do they grow and change? Are their life cycles alike or different?

What is the life cycle of a fish and an amphibian?

Activity : Comparing life cycles of Fish and amphibians.

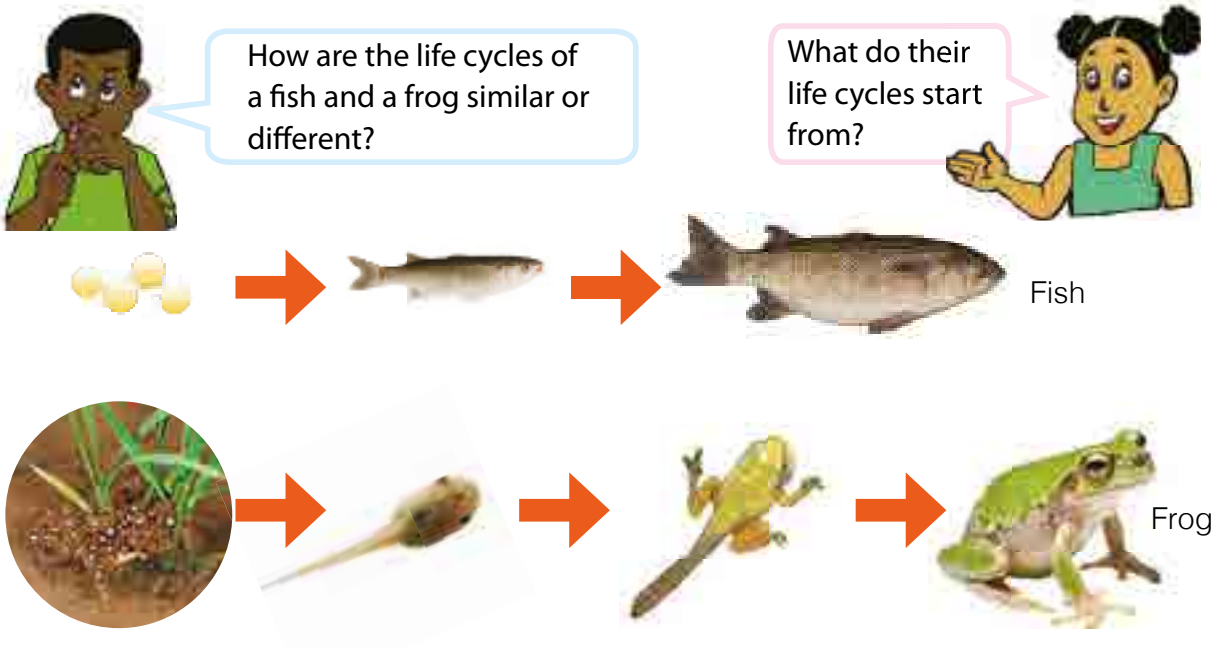
What to Do:

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.

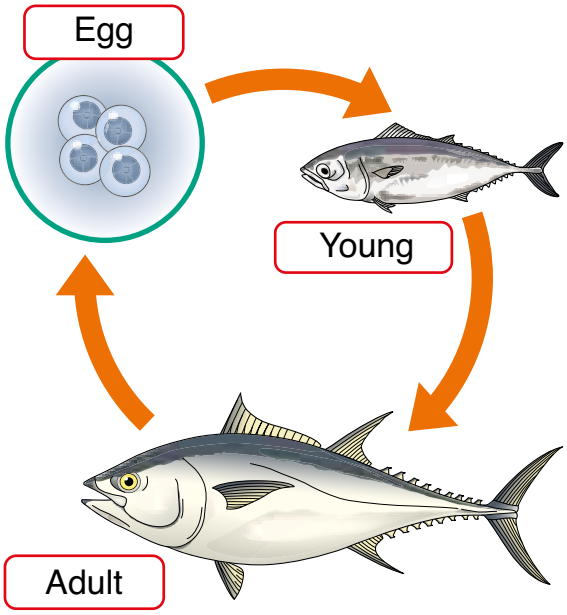
3. Observe how a fish and a frog grow and change. Write down the steps of their change in "Life cycle" column in the table.
4. Compare how the life cycles are alike or different.
5. Record your observations in the table.
6 Share your ideas with your classmates. Talk about how the life cycles of a fish and a frog are alike or different.



Summary

Life Cycle of Fish

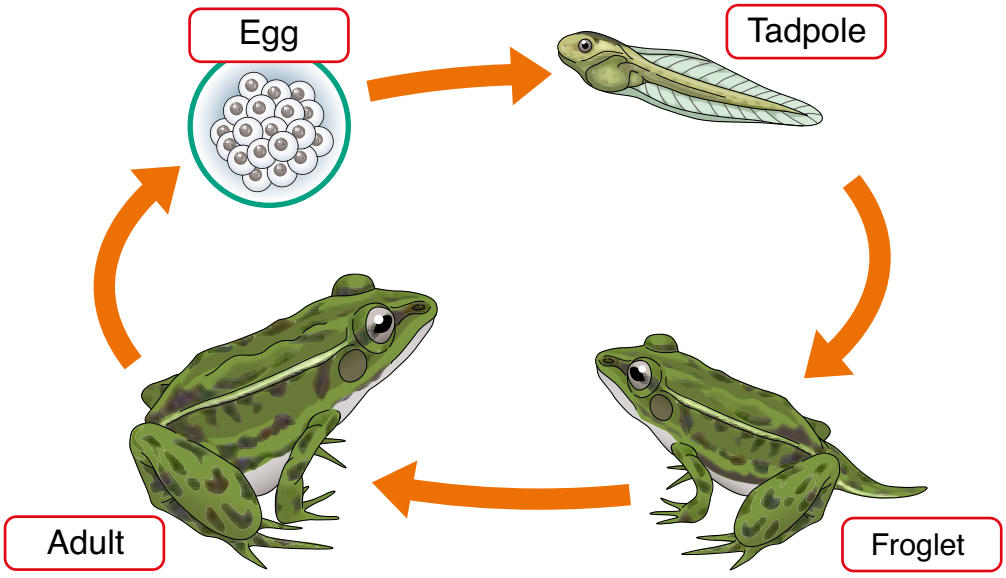
Fish do not change their form as they grow. Young fish looks similar to an adult fish. Like insects, the life cycle of a fish starts from an egg. A young fish hatches from an egg. It grows and becomes an adult fish. The adult fish lays eggs in water and a new life cycle begins.



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

Lesson 3: "Life Cycle of Reptiles and Birds"

Living things have their own life cycles. How about reptiles and birds? Do they have similar or different life cycles?

What is the life cycle of a reptile and a bird?

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.

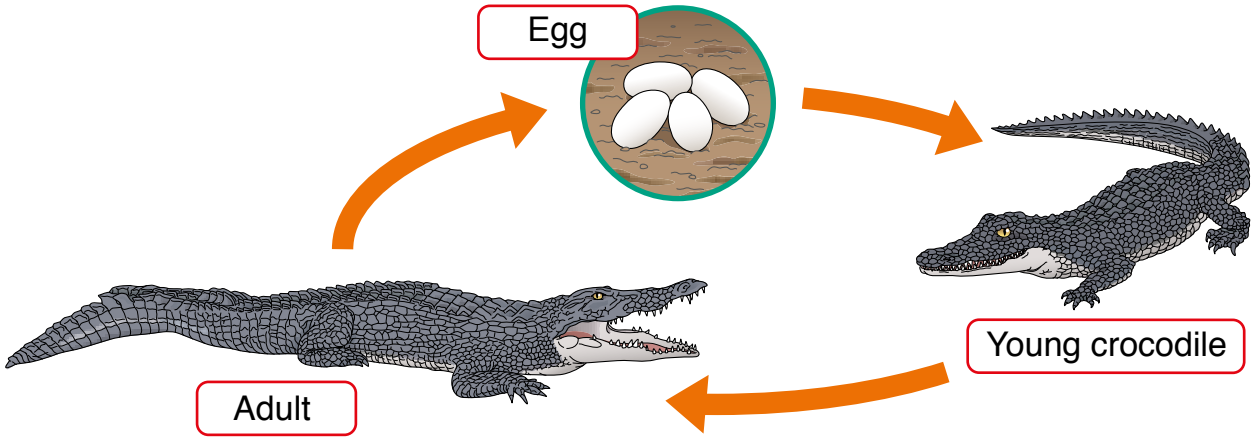
Crocodile

Chicken

Summary

Life Cycle of Reptiles

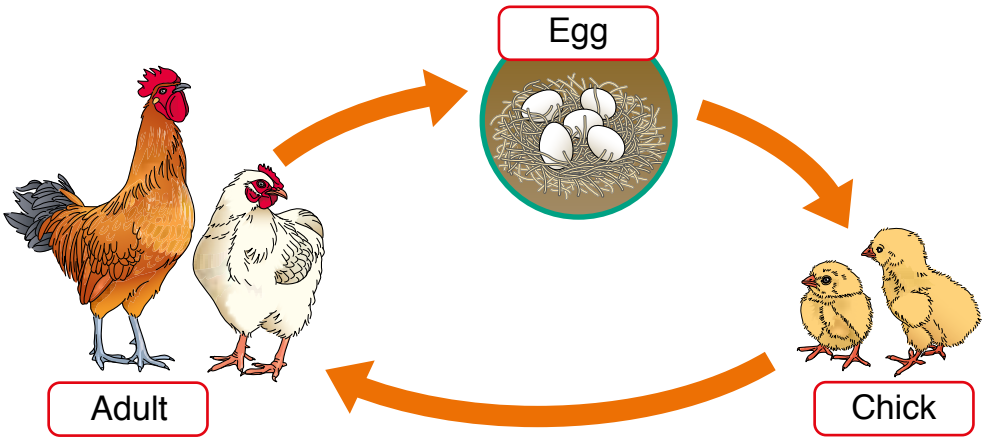
A crocodile is a reptile. Unlike frogs, the crocodile does not change its form as it grows. A young crocodile looks similar to an adult crocodile. The life cycle of a crocodile starts from an egg. The young crocodile hatches from an egg. It grows and becomes an adult crocodile. The adult crocodile usually lays eggs on land. Lizards, snakes and turtles also have the same life cycle as crocodiles.



Life cycle of crocodile

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.



Life cycle of chicken

Lesson 4: "Life Cycle of Mammals"

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?

What is the life cycle of mammals?

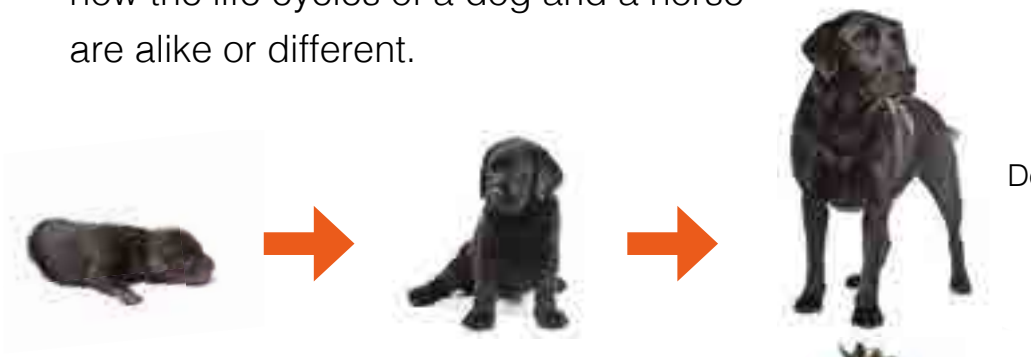
Activity : Observing life cycles of mammals

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.



Dog

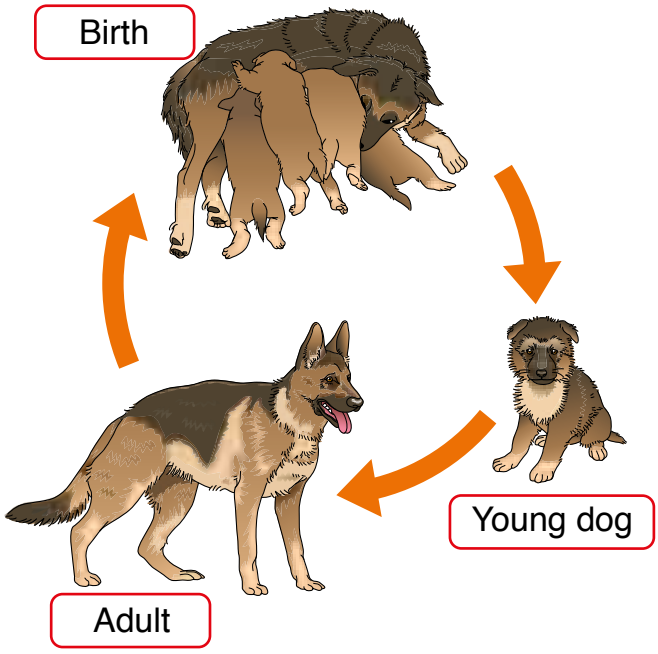
Horse

Summary

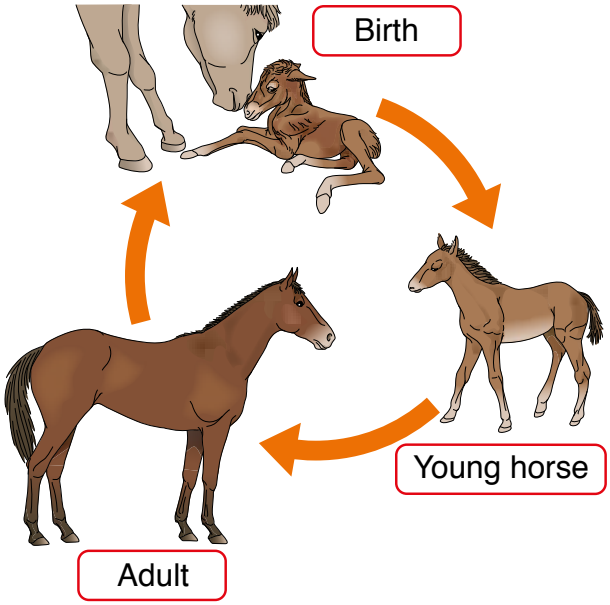
Life Cycle of Mammals

Most mammals such as a dog, cat and horse have a similar life cycle. A dolphin, whale and human also have a similar life cycle. Unlike insects, fish, amphibians, reptiles and birds, a young mammal does not hatch from an egg.

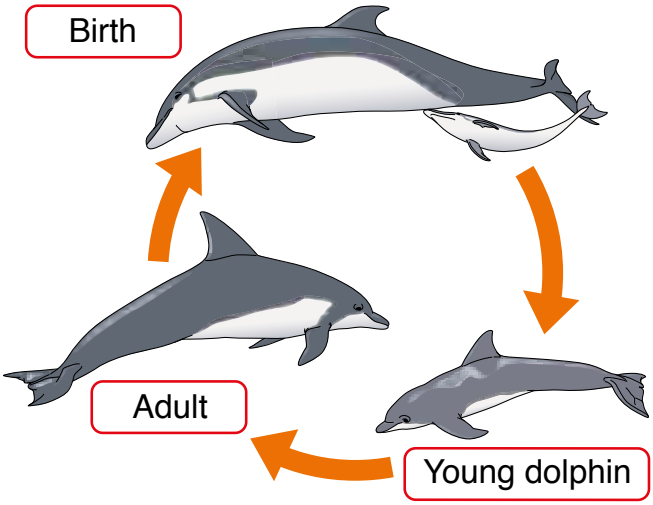
When a young mammal is born, it comes out of its mother's body. At birth, a young mammal looks similar to the adult mammal. The young mammal grows and becomes an adult mammal. The adult mammal gives birth to a young mammal and a new life cycle begins.



Life cycle of a dog



Life cycle of a horse



Life cycle of a dolphin

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.

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 _____.

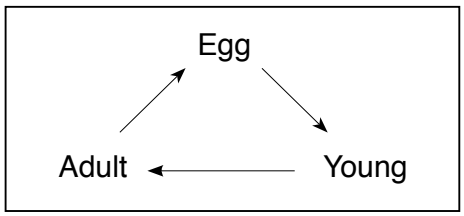
(2) The group of animals that lay eggs in the water and their young looks similar to the adults are called _____.

(3) The second stage in the life cycle of a butterfly is called _____.

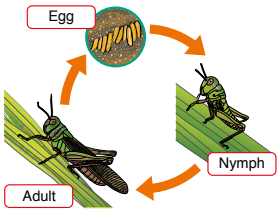
Q2. Choose the letter with the correct answer.

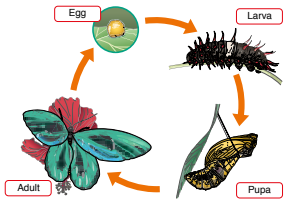
(1) The diagram shows a life cycle of some animal groups. Which of the following animals do <u>not</u> go through this life cycle?

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?

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

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_____.

(2) When a frog first hatches from an egg, it is called a _____.

(3) A fully grown animal is called an _____.

(4) When animals make their young again and again is called _____.

Q2

Look at the pictures below and answer the following questions.

1

2

3

4

(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

Q3

Study the pictures of below and answer the following question.



(1) State how the chick looks like the adult chicken?

_____

(2) What is the difference between life cycle of chickens and pigs?

_____

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?

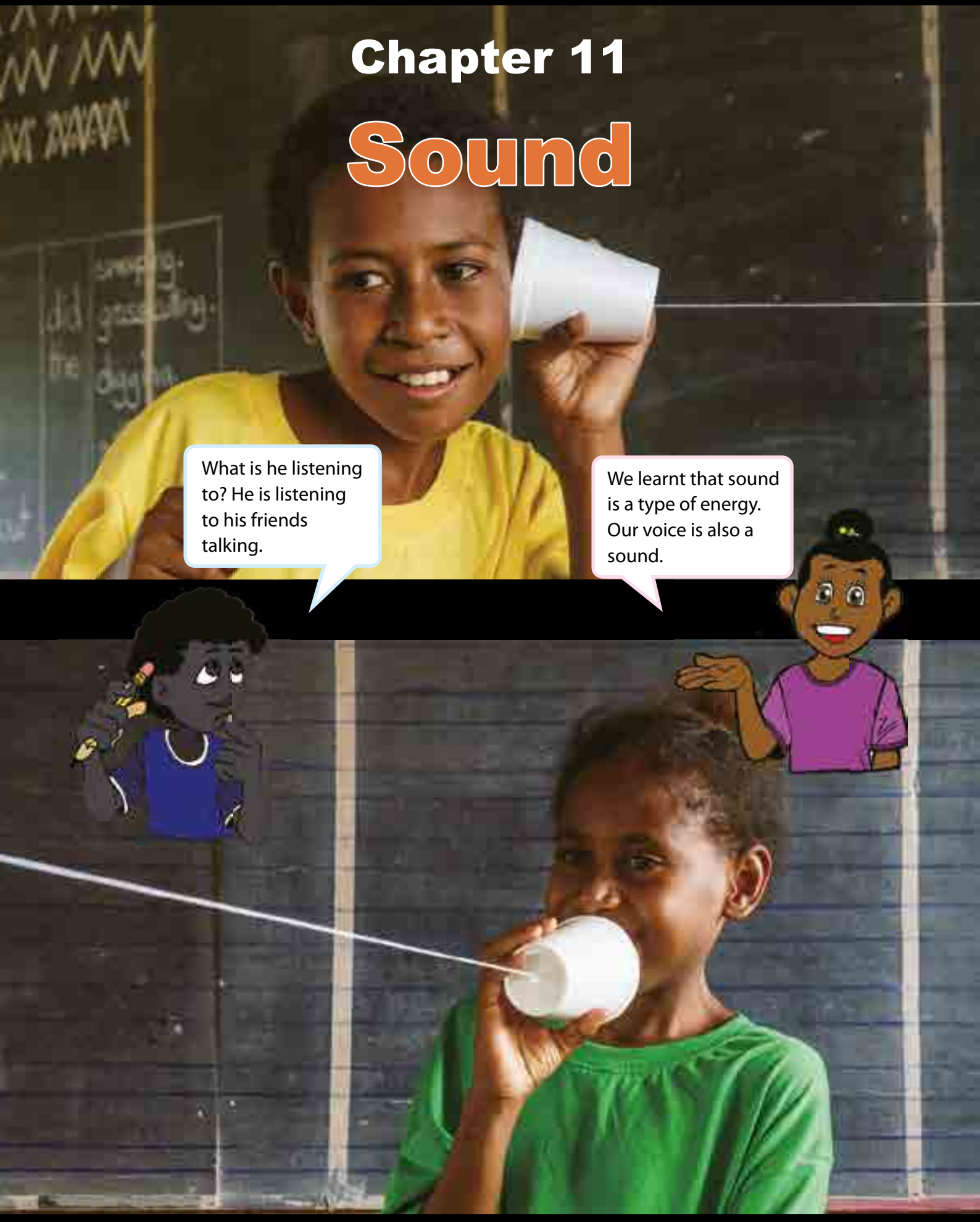
_____

(2) What would the tadpoles use their gill like structures for?

_____

Chapter 11

Sound



11.1 Properties of Sound

Lesson 1: "Sound"

Stop for a moment and just listen. We can hear different kinds of sound. Sound is all around us. But, what makes sound?

How is sound made?

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.

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.

Lesson 2: "Sound Travelling"

Sound is made when objects vibrate. But, why do we hear sound when objects vibrate?

How does sound travel?

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.

Result

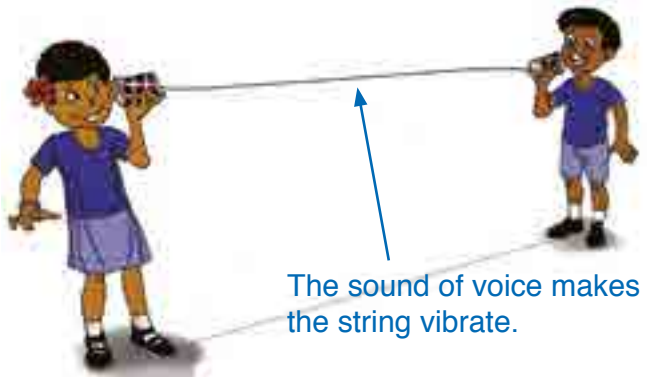
We can hear our partners talking when two cups are connected with a string. We cannot hear our partners talking when the string is removed from the cups.

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

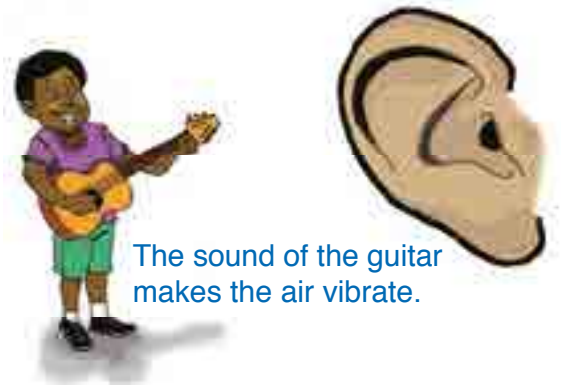


The sound of voice can travel through a string.

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.



The sound of a guitar can travel through air.

Lesson 3: "Soft and Loud Sound"

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.

What makes sound soft or loud?

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.

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

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.

Lesson 4: "High and Low Sound"

When we play a guitar, we can hear different sounds. Some sounds are higher or lower than other sounds.

What makes sound high or low?

Activity : Making high and low sound

What We Need:

- 30 cm ruler

What to Do:

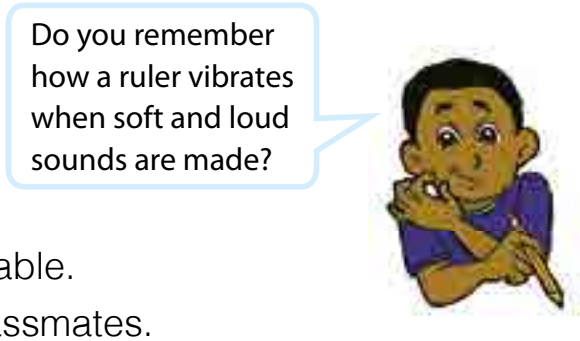
1. Draw a table like the one shown below.

Length of ruler on the desk	What sound did you hear	How the ruler vibrates
5 cm		
15 cm		

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.

Result

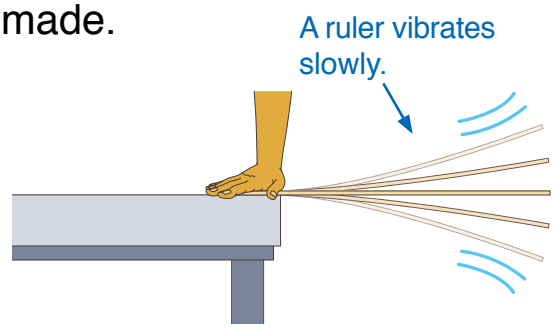
When we placed 5 cm length of the ruler at the end of the desk, we heard a low sound and the ruler vibrated more slowly. When we placed 15 cm length of the ruler at the end of the desk, we heard a high sound and the ruler vibrated more quickly.

Results of the activity

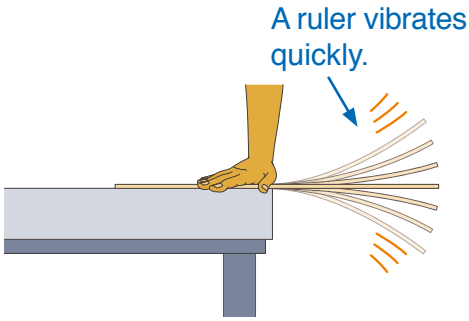
Length of ruler on the desk	What sound did you hear?	How the ruler vibrates
5 cm	Lower sound	More slowly
15 cm	Higher sound	More quickly

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.

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

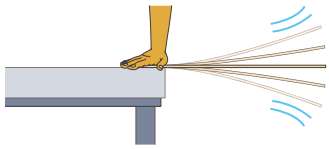
- Sound travels through a medium as vibrations.
- A matter that transports sound is called a medium.

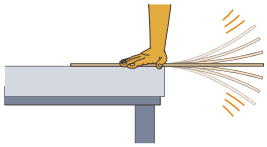
Soft and Loud Sound

- 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.





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.

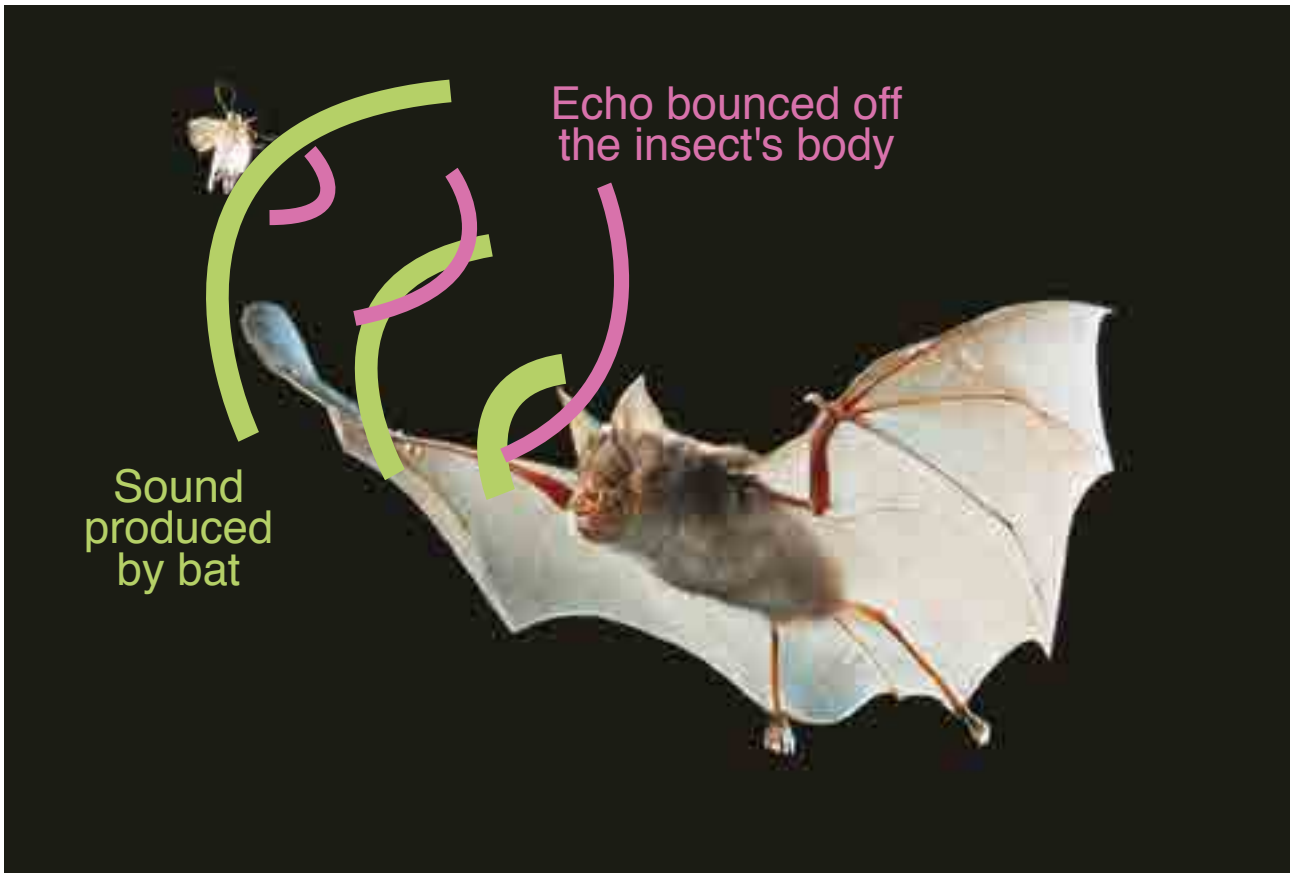
Q3. If you see something vibrate, what will you hear?

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.

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.

Chapter Test

11. Properties of Sound

Q1

Complete each sentence with the correct word.

(1) A form of energy that can be heard is _____.

(2) Sound is made when objects _____.

(3) Big vibrations of sound produce _____ sounds.

(4) _____ 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 <u>not</u> true about how sound travels?

A. Sound travels through a medium.

B. Sound travels through air.

C. Sound cannot travel through water.

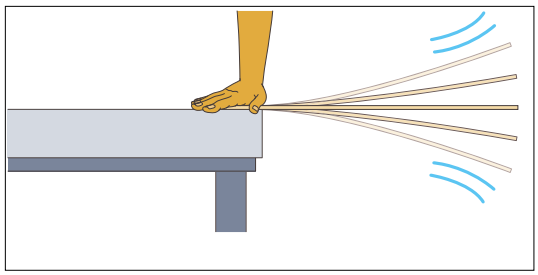
D. Sound travels through solid objects.

Q3

(1) What does the softness and loudness of sound represent?

_____

(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?

_____

(3) What can be done to change the volume of sound produced by a drum from loud to soft?

_____

_____

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?

_____

_____

Chapter 12

Matter Change

12.1 Physical and Chemical Changes in Matter

Lesson 1: "Physical Properties"

Matter has different kinds of properties; physical and chemical properties.

What are physical properties of matter?

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.

Summary

All matter have their own physical properties.

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.

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.

Lesson 2: "Physical Changes in Matter"

Matter has its physical properties. When matter changes its physical properties, what will happen to the matter?

How does matter change if its physical properties change?

Activity : Changing physical properties of matter

What We Need:

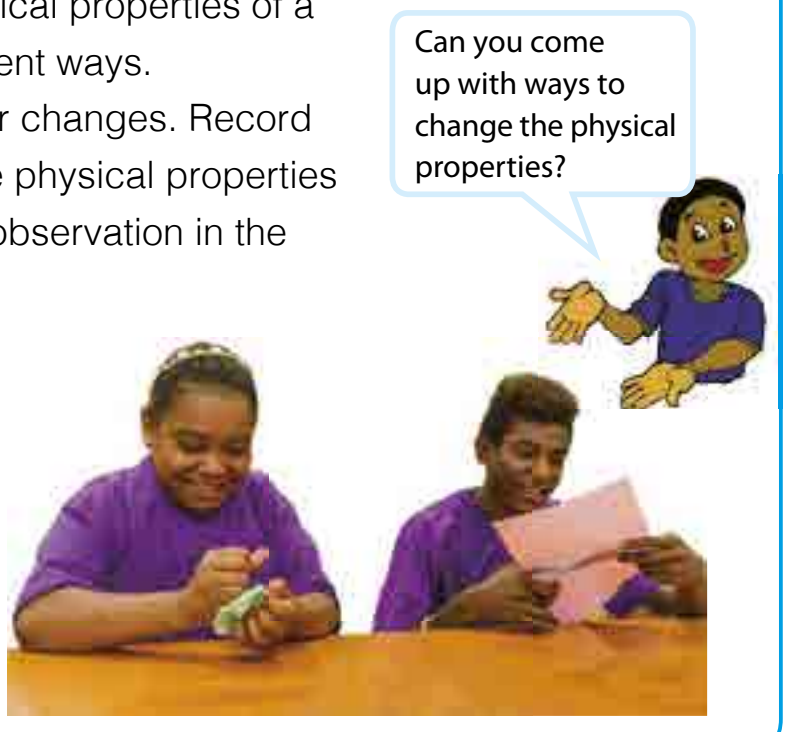
- sheets of scrap paper, different colours of marker pen, scissors

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.



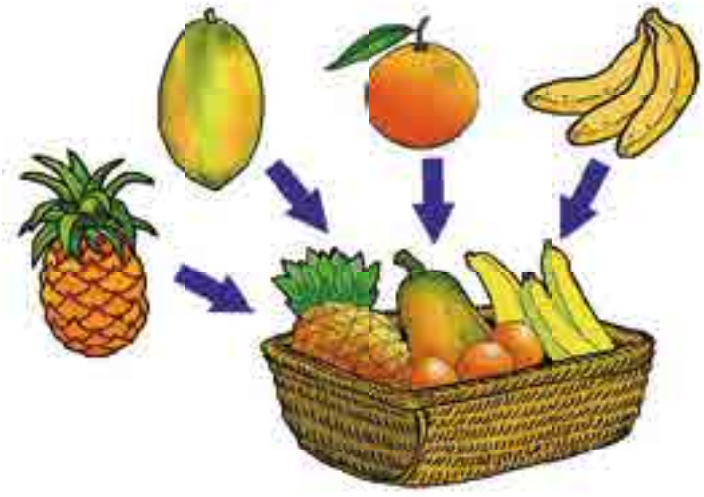
Summary

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.

Lesson 3: "Chemical Changes in Matter"

A physical change is a change in the way that matter looks. Is there a different way in which matter changes?

Does a matter change in a different way?

Activity : Burning a wood

What We Need:

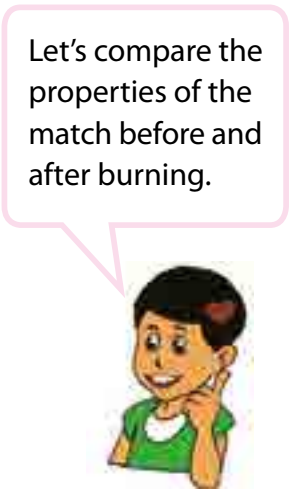
- wooden matches, plate

What to Do:

1. Draw a table like the one shown below.

	Texture	Colour	Other properties
A match before burning			
A match after burning			

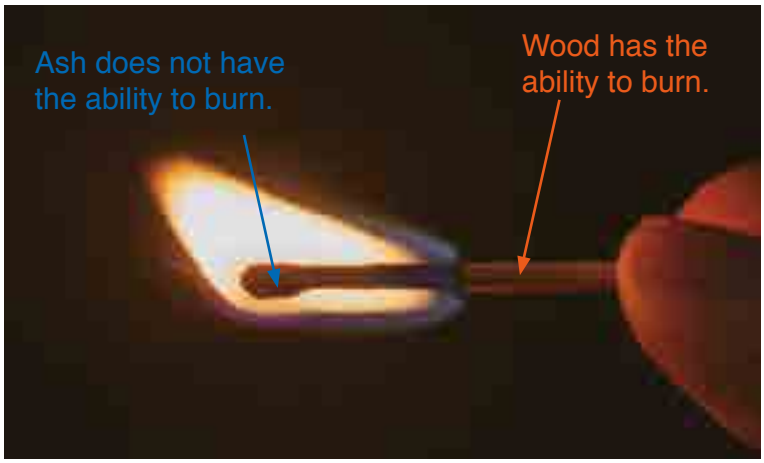
2. Observe the properties of a wooden match and record your observations in the table.
3. Light the match and put it on a plate. Observe what is happening to the match.
4. After it has burnt, observe the properties of the burnt part of the match. Record your observations in the table.
5. Share your findings with your classmates. Talk about how the wooden match is different before and after it has burnt.



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

Lesson 4: "Comparing Physical and Chemical Change"

We have learnt about physical and chemical changes in matter. What are the differences between physical and chemical changes?

How are physical and chemical changes different?

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.


Broken glass


Sliced bread


Squeezing an orange for juice


Baked cup cake


Burning wood


Crushed can


Rotten tomato


Boiling water

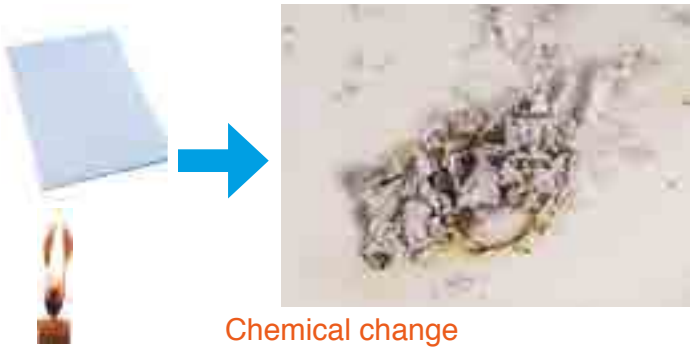
Summary

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.

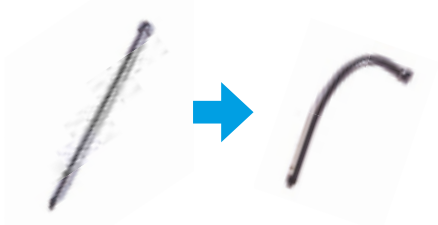
Physical change

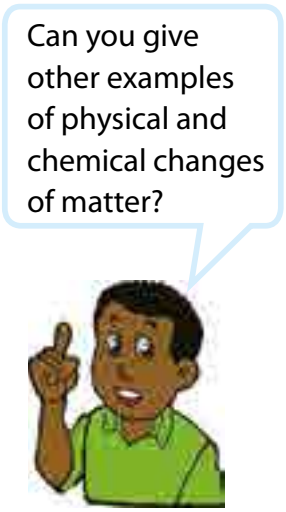
However, when paper burns, ash is formed. The ash has different properties from paper. The ash is no longer paper. Burning paper is a chemical change.



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.



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.

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 <u>not</u> 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?

12.2 States of Water

Lesson 1: "Water around Us"

We can find different forms of water around us. What forms does water have?

In which forms can water exist?

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.

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.

Lesson 2: "Heating Water"

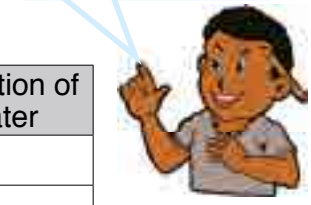
Water can be found around us. What happens if water is heated?

How does water change its form when it is heated?

Activity : Change in water by heating

What We Need:

- water, thermometer, small sized pan, stove, watch(clock)



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!

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 Steam rose
10	100	Many big bubbles appeared
12	100	Many big bubbles appeared
14	100	Many big bubbles appeared

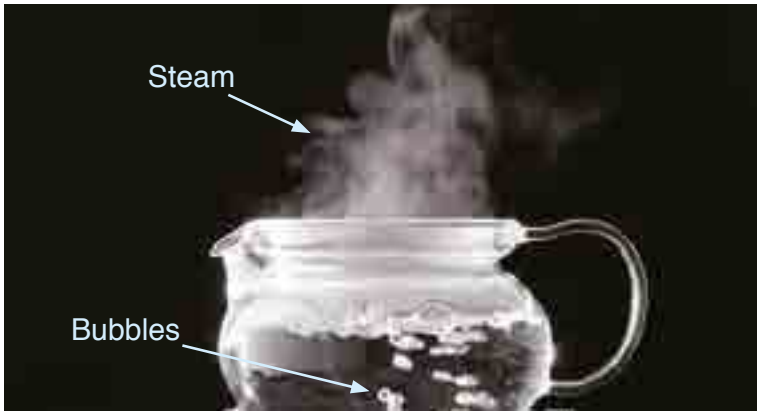
Summary

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.

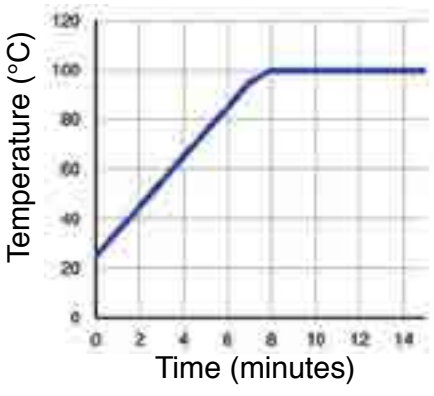
The temperature of water does not exceed 100 degrees Celsius (°C) while water is boiling.

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.

Lesson 3: "What is Steam?"

When water is heated, steam rises from the surface of the water. What is steam?

What is steam made of?

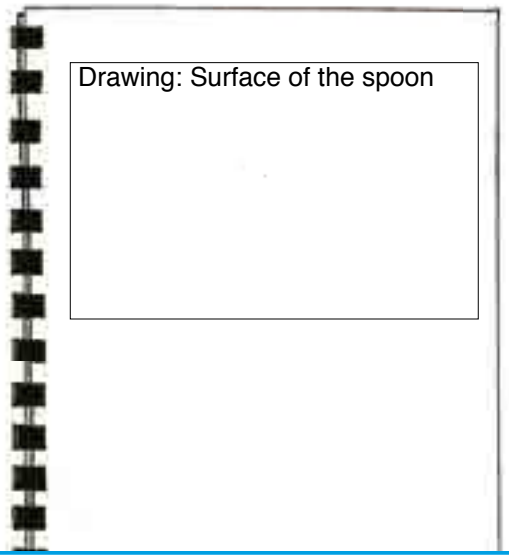
Activity : Observing steam

What We Need:

- kettle, stove, spoon, water

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.
7. Share your observation with your classmates. Talk about how the steam is formed and what steam is made of.



Summary

Water droplets on a spoon

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.

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.

Lesson 4: "Melting Ice"

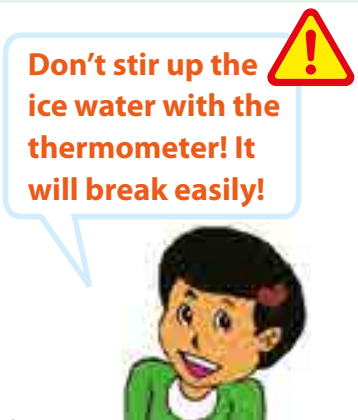
When water is placed into a freezer, it changes into ice because water is cooled down. What happens if ice melts?

How does ice change its form when it melts?

Activity : Observing a melting ice

What We Need:

- ice cubes, thermometer, glass cup, stick (for mixing water), watch (clock)



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.

Time (mins)	Temperature (°C)	Conditions of Ice cubes
0		
2		
4		
6		
8		
10		
12		
14		
16		
18		
20		

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

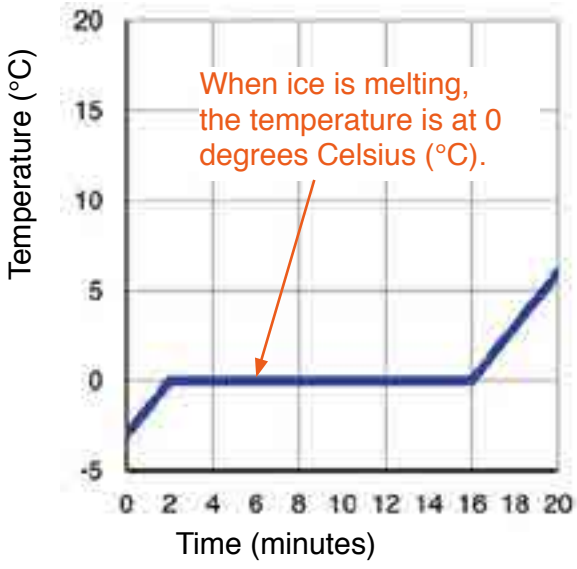
What happened when the temperature started to increase?

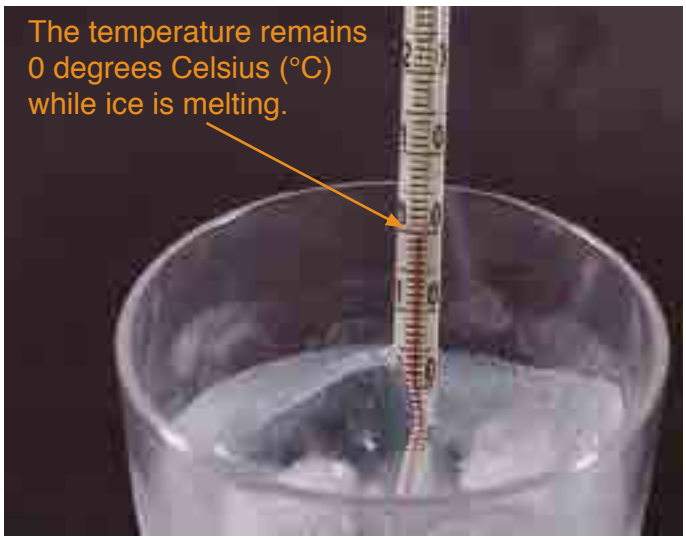
Summary

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.





Lesson 5: "Changes in States of Water"

Water can exist in three forms as ice, water and water vapour.

How does water change in its form?

Activity : Changing forms of water

What to Do:

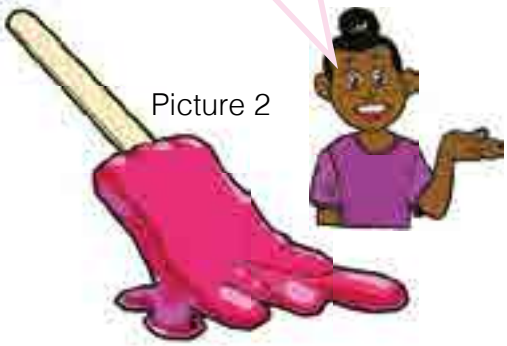
1. Draw a table like the one shown below.

	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.

What is the 'white cloud' from the mumu? Is it smoke?

Picture 1



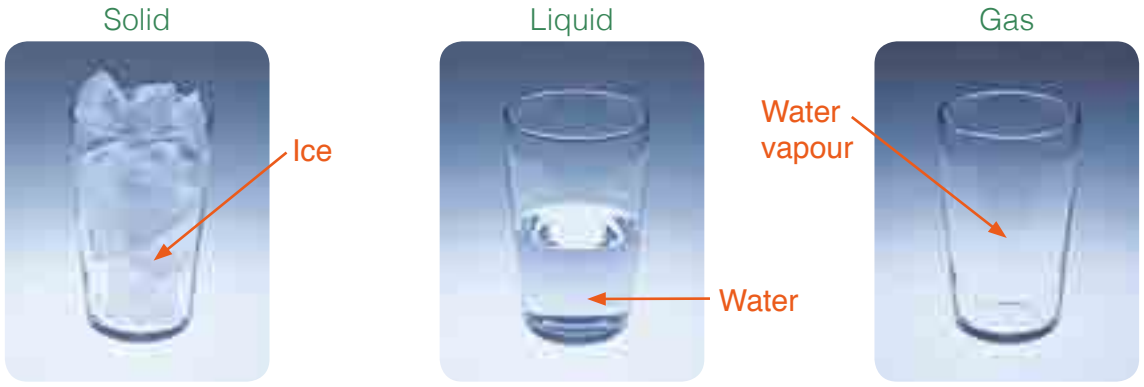
Picture 2

Picture 3

Summary

Three States of Water

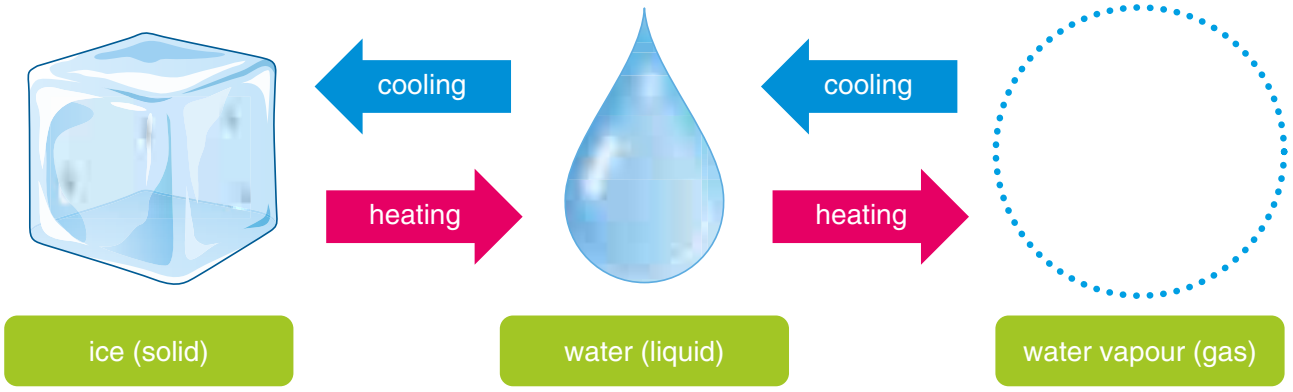
There are three forms of water such as ice, water and water vapour. Ice is the frozen form of water. This form of water is called **solid**. Ice is the solid state of water. Water is the form of water in which we are most familiar with. This form of water is called **liquid**. Water is the liquid state 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

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.

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 (^{o}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 (^{o}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?

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

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 _____ change.

(2) In a chemical change, the original matter and the new matter have different _____.

(3) The process which liquid water becomes solid is called _____.

Q2

Choose the letter with the correct answer.

(1) Which of the following is <u>not</u> 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

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?

_____

(b) What happens if the beaker is continuously heated?

_____

_____

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

_____

_____

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]

_____

_____

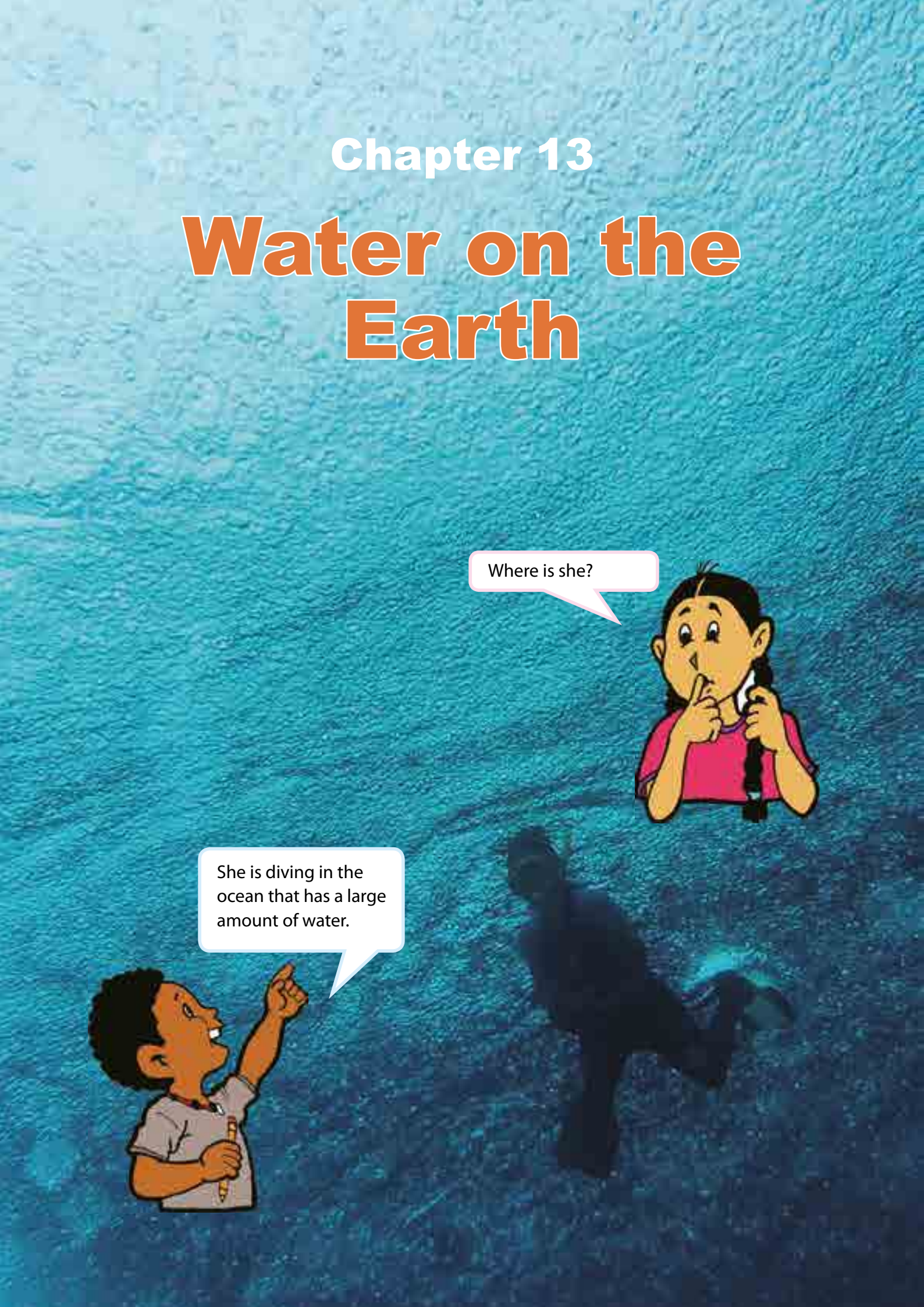
(b) Describe a physical change that you observe every day. Explain how this physical change is useful.

_____

_____

Chapter 13

Water on the Earth



13.1 Water in Natural World

Lesson 1: "Sources of Water"

Look around us! We can find water in many places.

Where does water come from?

Activity : Finding water around us

What to Do:

1. Draw a table like the one shown below.

Where can you find water?

2. Make a list of where you can find water in the table.
3. Share your ideas with your classmates. Talk about where water comes from.

Summary

Water can be found in many places on the earth. The place where water comes from is called **source of water**. Sources of water can be classified into two groups; **natural sources** and **man-made sources of water.**

Natural Sources of Water

Rain, oceans, rivers, lakes, streams, ponds and springs are natural sources of water. Salt water can be found in oceans and seas. Rivers, lakes, streams, ponds and springs have fresh water. Fresh water is also found underground.

Natural sources of water

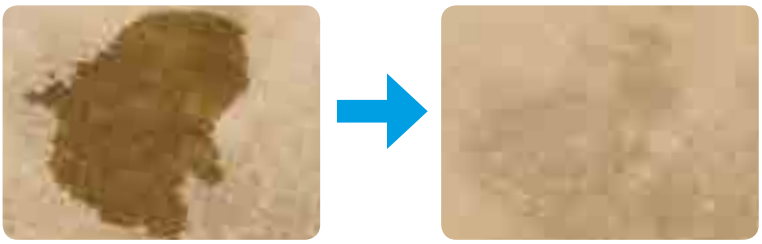
Man-made Sources of Water

Dams, wells, tube wells, water taps and hand-pumps are man-made sources of water.

Man-made sources of water

Lesson 2: "Puddle Is Gone!"

We find puddles on the ground after rain. After a while, the puddle disappears.

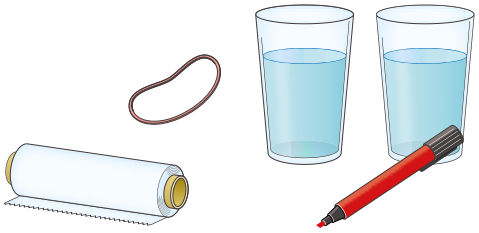


Where has the puddle gone to?

Activity : Finding where water goes

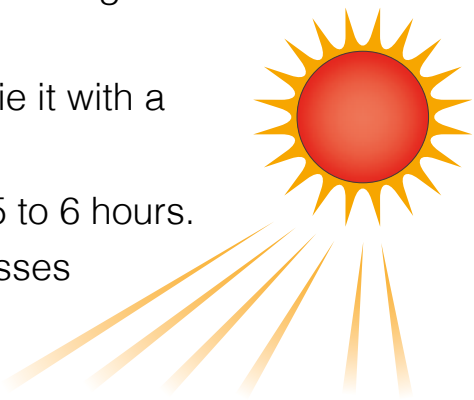
What We Need:

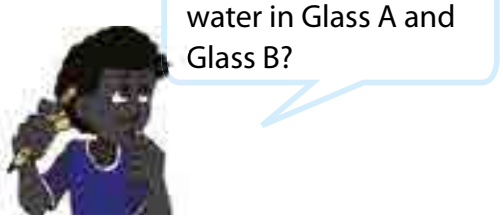
- two glasses, water, rubber band, plastic wrap, marker pen

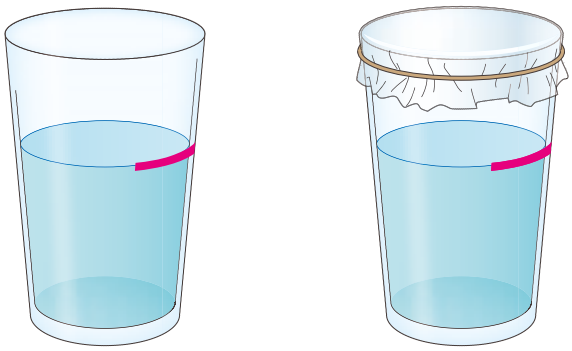


What to Do:

1. Pour same amount of water into two glasses and label them A and B. Put a mark at the water level on the glasses with a marker.
2. Cover glass B with a plastic wrap and tie it with a rubber band.
3. Place the glasses in a sunny place for 5 to 6 hours.
4. Observe the amount of water in the glasses and on the wrap.
5. Share your observation with your classmates.



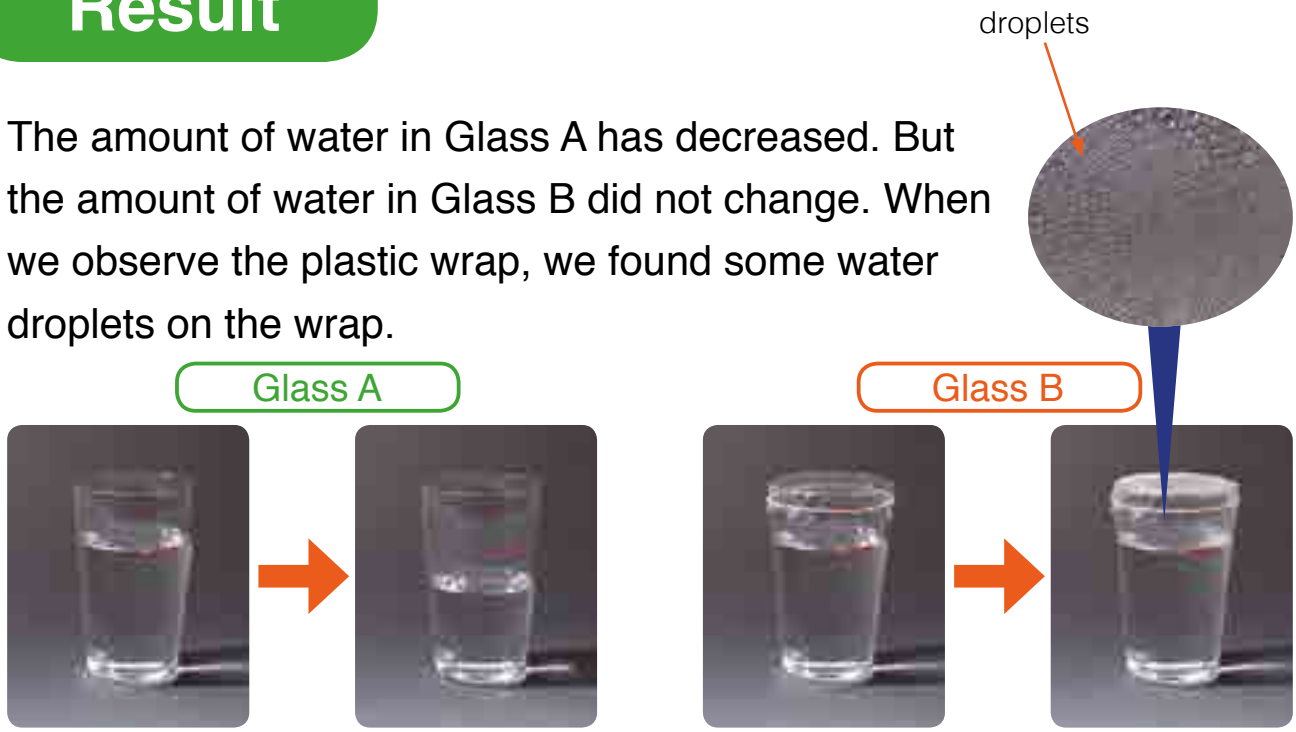




Glass A Glass B

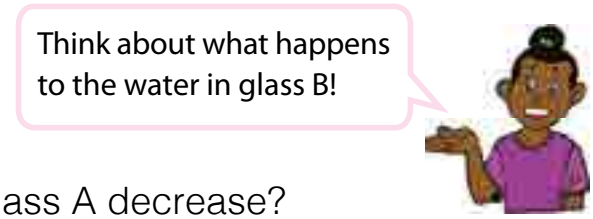
Result

The amount of water in Glass A has decreased. But the amount of water in Glass B did not change. When we observe the plastic wrap, we found some water droplets on the wrap.



Discussion

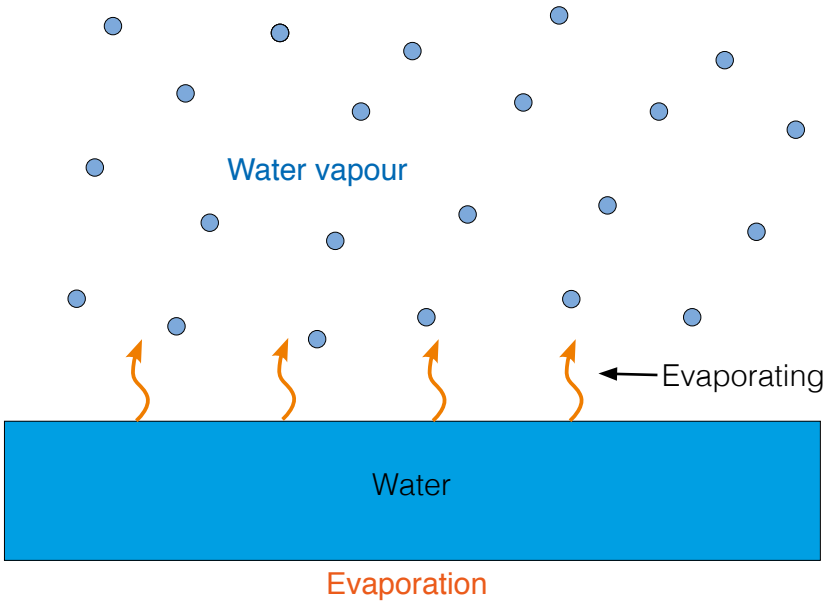
Where has the water gone to?



1. Think about the following questions based on the results:
   - Why did the amount of water in Glass A decrease?
   - Why are some droplets observed on the plastic wrap of Glass B?
2. Talk about where water has gone to.

Summary

Water always leaves the surface of water and ground and goes up into the air as water vapour. The change of state of water from liquid to gas is called **evaporation**.



Lesson 3: "Water in Air"

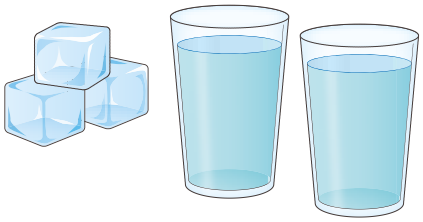
We learnt that water vapour leaves the surface of water and goes into the air. Does water vapour really exist in the air?

How can we find water vapour in air?

Activity : Finding water vapour in the air

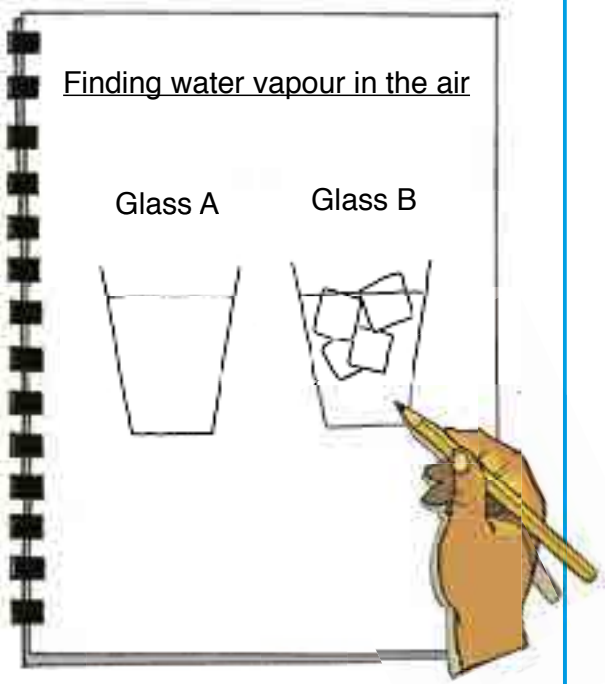
What We Need:

- two glasses with water, ice cubes

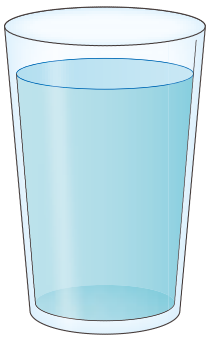


What to Do:

1. Wipe the surface of two glasses with a dry towel and pour same amount of water in both glasses.
2. Put ice cubes into one of the glasses and wait for a while.
3. After a while, observe what happens to the surface of both glasses and sketch the surface of the two glasses in your exercise book.
4. Share your observation with your classmates.

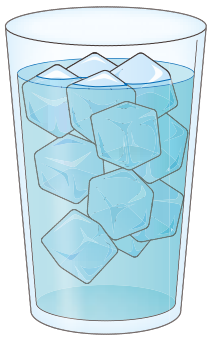


Glass A



A glass with water

Glass B



A glass with water and ice cubes

Let's compare the surface of the two glasses! What is the difference between them?

Result

Droplets can be seen on the surface of Glass B, but droplets are not seen on the surface of Glass A.

Discussion

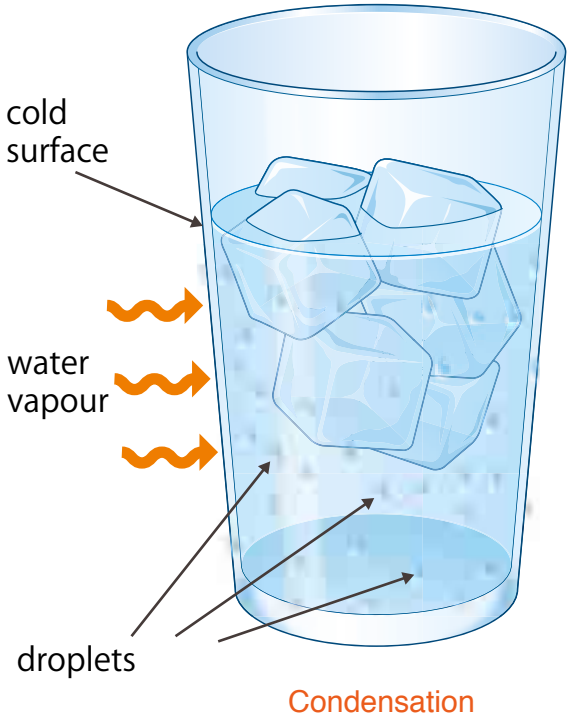
Where do droplets come from?

1. Think about the following questions based on the results:
   - What condition is different in Glass A and Glass B?
   - Why are droplets formed only on the surface of Glass B?
2. Talk about where the droplets came from with your classmates.

Summary

Droplets on the surface of the glass come from the water vapour in the air. When air comes into contact with a cold surface, the air cools down. Water vapour in the air cools down and is presented as droplets on the cold surface.

Water vapour changes into water by cooling. The change of state from air to liquid is called **condensation**.



Condensation

Lesson 4: "Water Cycle"

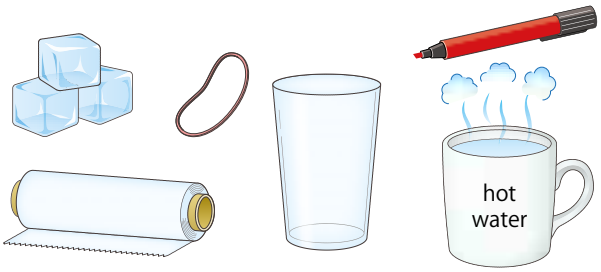
Almost 70 percent of the earth's surface is water. Water can be found in oceans, rivers and as rain on the earth. Where does rain come from? Where does the water in oceans and rivers go to?

Where does water on Earth go and come from?

Activity : A model of changes in states of water on earth

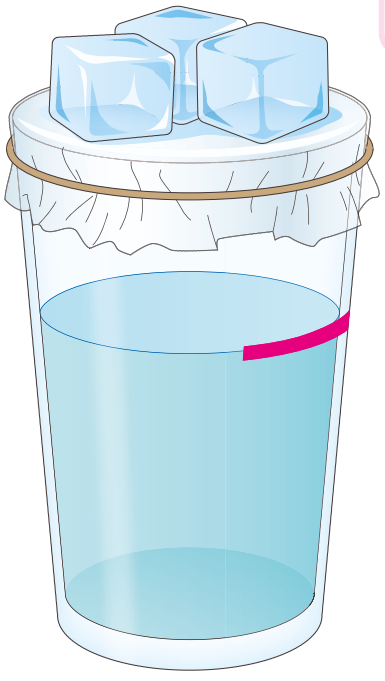
What We Need:

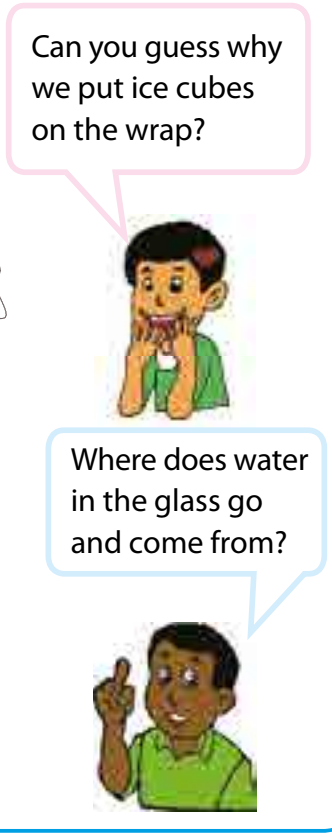
- glass, hot water, ice cubes, plastic wrap, rubber band, marker pen



What to Do:

1. Pour hot water into a glass.
2. Wrap the mouth of the glass with a plastic wrap immediately and tie it with a rubber band.
3. Place a few ice cubes on the plastic wrap.
4. Observe what happens to the inside of the glass and the plastic wrap.
5. Record your observation in your exercise book.
6. Share your observation with your classmates. Talk about how the states of water in a glass change.



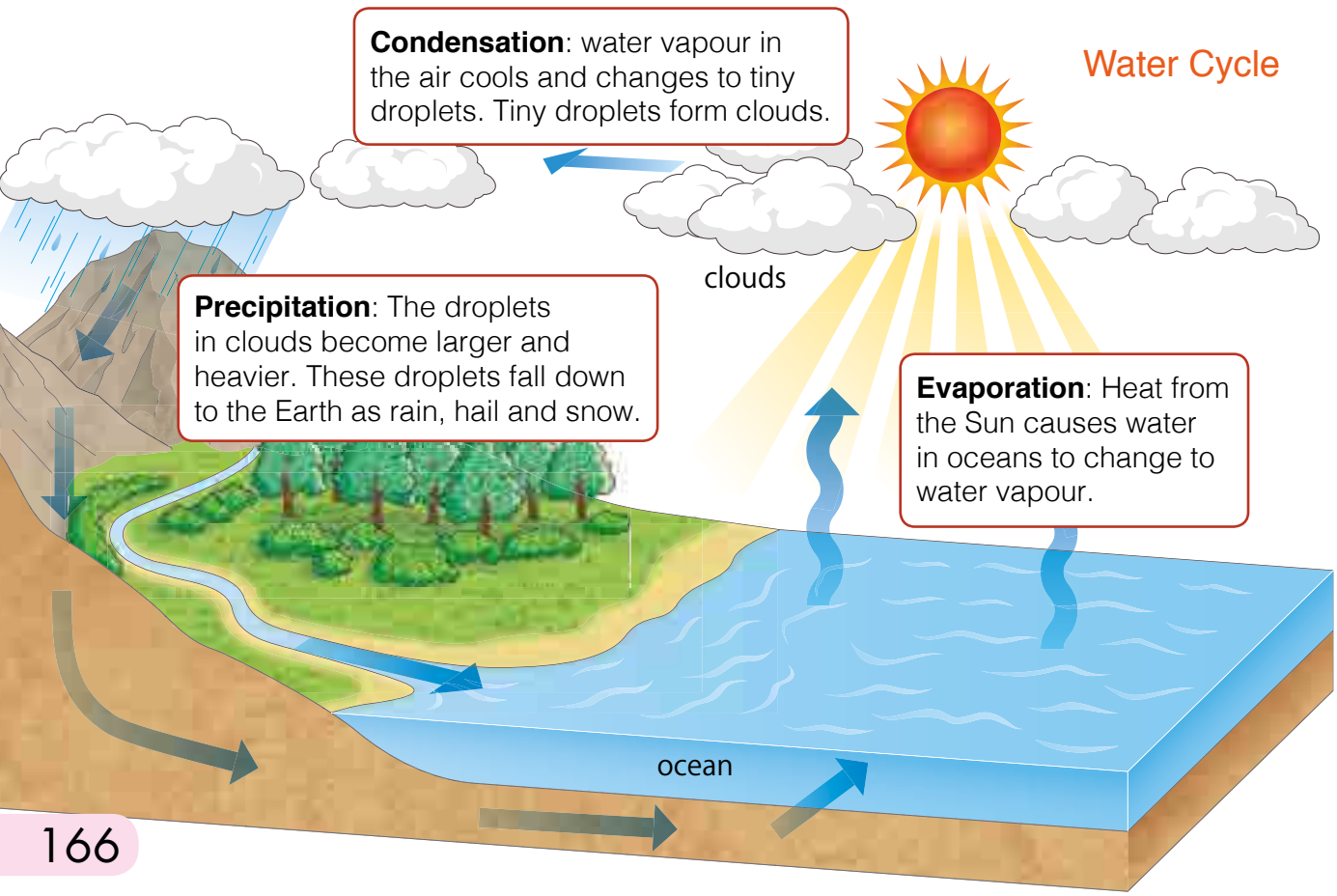


Summary

Water never runs out on Earth. Water on the Earth is always moving through the water cycle. The **water cycle** is the movement of water between the air and the Earth as water changes its state.

When heat from the Sun is added to water in oceans and rivers, liquid water evaporates and forms water vapour in the air. As water vapour rises in the air, it cools and condenses into tiny droplets. These tiny droplets form clouds. The tiny droplets in clouds become larger and heavier. These larger water droplets fall back to Earth as **precipitation**. Precipitation is any form of water that falls from clouds such as rain, snow and hail. Some precipitation are collected in oceans and rivers. Some are soaked into the ground and become groundwater.Water on the Earth moves between the air and the Earth by changing its state from one form to another over and over again.

Precipitation as hail



Summary and Exercise

Summary 13.1 Water in Natural World

Sources of Water

- The sources of water can be classified into two groups called natural sources and man-made sources of water.

Natural sources of water		Man-made sources of water	
			
Waterfall	Salt water	Water tap	Pond

Puddle is Gone

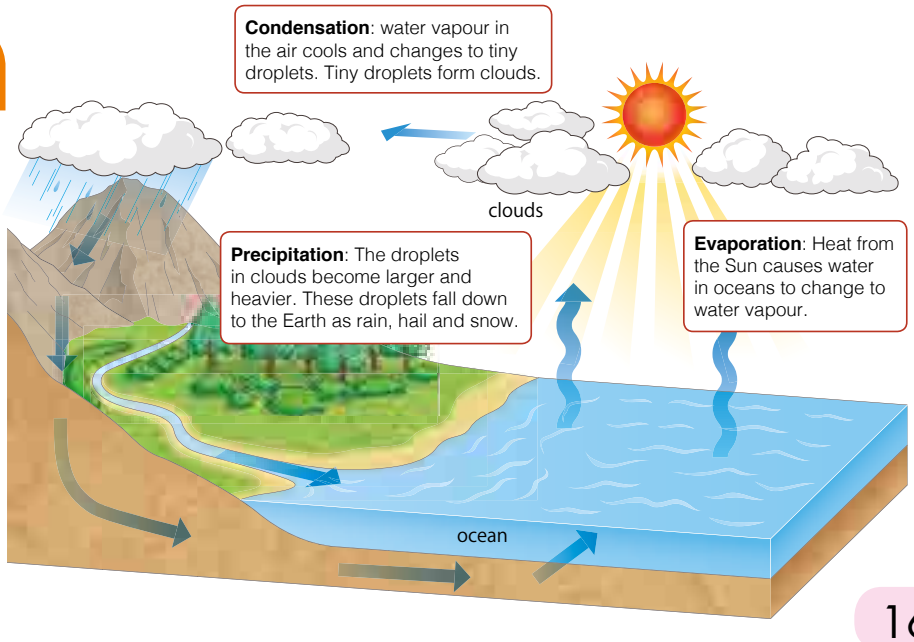
- Water changes into water vapour when heat is added to water.
- The process of changing water from liquid state to gaseous state is called evaporation.

Water in Air

- Water vapour changes into water by cooling.
- The process of changing water from gaseous state to liquid state is called condensation.

Water Cycle

- The water cycle is the movement of water between the air and the earth as water changes state.



Exercise 13.1 Water in Natural World

Q1. Complete each sentence with the correct word.

(1) The place where water is found on the Earth is called_____ of water.

(2) Two main sources of water are natural sources and_____ sources of water.

(3) The change of state from water vapour to water is called_____.

Q2. Choose the letter with the correct answer.

For question (1) and (2), refer to the diagram below showing the water cycle.

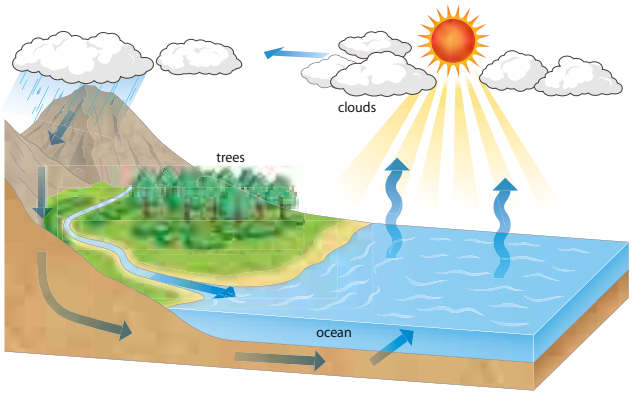
(1) Which part of this cycle includes the rain?

A. Evaporation

B. Precipitation

C. Condensation

D. Runoff



(2) Which of the following allows water to move from the ocean to the air?

A. Evaporation

B. Precipitation

C. Condensation

D. Runoff

Q3. Where can fresh water be found? Write down 2 examples.

Q4. Describe what happens to water as it moves through the water cycle.

13.2 Water and Human

Lesson 1: "Importance of Water for Our Life"

Water is very important. Without water we cannot survive. Why is water so important to us?

How do we use water in our daily lives?

Activity : Finding uses of water in daily life

What to Do:

1. Draw a table like the one shown below.

How do we use water?

2. Make a list of how we use water in our daily lives in the table.
3. Share your ideas with your classmates. Talk about why water is important for our lives.

When or where do we use water?

When I feel thirsty, I drink water!

Summary

Water is very important in our daily lives. We use water in many ways. Water is used for drinking, preparing food, washing hands and clothes. When we take a shower we use water too.

Washing hands with water

Drinking water

Water is also used for agriculture and fish farming. When we grow crops or fish, water is required because plants and fish need water to grow and survive.

Fish farm

Water is widely used for generating electricity. Many power plants are built near a river, waterfall and dams to generate electricity.

Power plant

Lesson 2: "Water Pollution"

Water is very important to us. We need clean water to survive but sometimes we find dirty water in rivers or oceans.

What makes water dirty?

Activity : Finding the causes of dirty water

What to Do:

1. Draw a table like the one shown below.

Causes of dirty water

2. Look at the picture below and find the causes that make water dirty.
3. Make a list of your findings in the table.
4. Share your ideas with your classmates. Talk about what makes water dirty.

Summary

Water pollution

The addition of harmful things into the water is called **water pollution**. Waste, sewage, oil and detergent spilled in water are harmful things.

Water pollution happens when harmful things get into water. Water pollution has many causes. When we throw away rubbish into water, it may cause water pollution. Oil from ships spilled into the ocean may cause water pollution. Waste, sewage and oil from factories, homes and farms are common causes of water pollution.

Rubbish in water

Oil from ship

Polluted water can make people sick if they drink it. It is also harmful to plants and animals. Polluted water can kill water plants and can cause fish to die .

Water pollution causes fish to die.

Lesson 3: "Keeping Water Clean"

Water pollution is harmful to all living things. Polluted water can make people and animals sick or die if they drink or swim in it.

How can we solve the problems of water pollution?

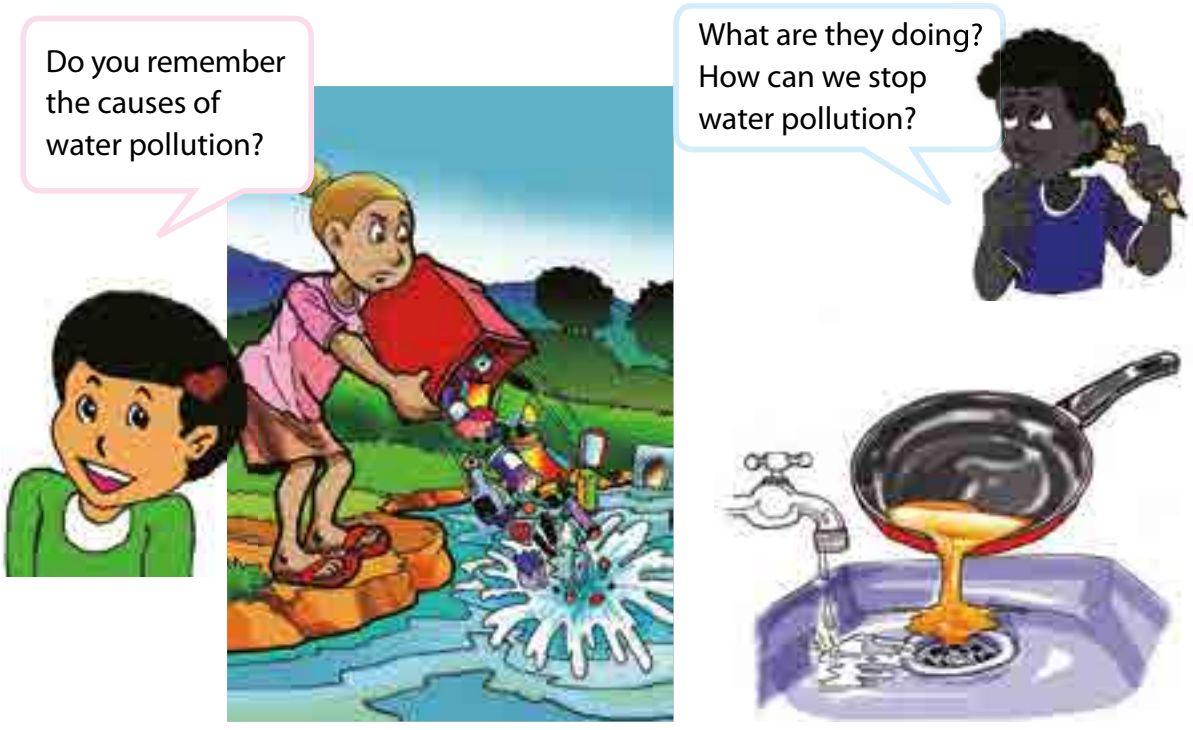
Activity : Ways to save our water

What to Do:

1. Draw a table like the one shown below.

What can you do?

2. Make a list of what you can do to solve the problems of water pollution in the table.
3. Share your ideas with your classmates. Talk about the ways that you can solve the problem of water pollution.



Summary

Children pick up rubbish on the beach.

We can solve the problems of water pollution in many ways. We can help to reduce water pollution by picking up rubbish on the beach, lake and river. We can help keep water clean by cleaning up oil in water.

We can prevent water pollution by reducing the amount of harmful things that is put into the water. The following are some simple tips to help prevent water pollution;

- Avoid throwing away rubbish into ponds, rivers, lakes or oceans. Always look for the rubbish bin.
- Don't throw paints, used oil or other forms of litter down the drainage pipes.
- Use environmentally friendly household products, such as washing powder and household cleaning agents.

Putting rubbish in a rubbish bin helps prevent water pollution.

Do not throw oils down the drainage pipes.

Discussion

"What can you do to prevent water pollution?"

1. Make a list of your rules to prevent water pollution.
2. Share your ideas with your classmates and decide on the common rules.

Summary and Exercise

Summary 13.2 Water and Human

Importance of Water for our life

☑ Water is important for our daily life. We use water in many ways.

Uses of Water			
			
Drinking water	Fish farm	Washing hands	Power plant

Water Pollution

☑ Water pollution happens when harmful things get into the water.

Causes of water pollution
1. Throwing rubbish into water sources.
2. Oil spilled into oceans from ships.
3. Dumping of waste and sewage from factories, homes and farms into water sources.

Keeping Water Clean

☑ Water pollution is harmful to all living things. Polluted water can make people and animals sick or die if they drink or swim in it.

Ways of keeping water clean
1. Avoid throwing rubbish into water sources.
2. Avoid throwing paints, oils or other forms of litter down the drainage pipe.
3. Use environmentally friendly household products.

Summary and Exercise

Exercise 13.2 Water and Human

Q1. Complete each sentence with the correct word.

(1) The addition of harmful things to water causes _____ pollution.

(2) Water pollution may occur when _____ from ships are spilled into the ocean.

(3) Water pollution can be prevented by picking up_____ at the beach, lake and river.

(4) Water is most widely used for generating_____.

Q2. Choose the letter with the correct answer.

(1) Which of following would cause water pollution?

i. Throwing away rubbish into the river

ii. Pouring used oil down the drainage pipe

iii. Picking up rubbish on the beach

A. i and ii B. i and iii

C. ii and iii D. i, ii and iii

(2) We use detergents to wash dishes. What is the best way to prevent water pollution caused by the detergents?

A. Pouring it down the drain.

B. Throwing its empty bottle into the ocean.

C. Reducing the amount to use.

D. Throwing it away into the river.

Q3. Answer the following questions.

(1) Why is water important for our daily lives? Write down two reasons.

(2) How can we help prevent water pollution? Write down two ways.

Q4. Water is a natural home for many plants and animals. How will the fish living in the polluted water affect human health?

Water in our body

Water is one of the most important things for all living things to survive. Up to 60 percent of the human adult body weight comes from water. Babies and kids have more water than adults. For newborn babies, 78 percent of their weight is water.

A boy who has 40 kg of body weight has about 24 kg of water that is equivalent to forty eight 500 mL bottles of water.

Each day, we must take in a certain amount of water. Generally, an adult male needs about 3 litres per day while an adult female needs about 2.2 litres per day. All of the water a person needs does not have to come from drinking liquids, as some of this water is contained in the food we eat.

About 48 bottles of water (500 mL) is equivalent to the amount of water inside the boy whose body weight is 40 kg.

1 bottle of water (500 mL) contains 0.5 kg of water.
48 bottles times 0.5 kg is 24 kg of water.

Chapter Test

13. Water on the Earth

Q1

Complete each sentence with the correct word.

(1) Sources of water can be classified into _____ sources of water and _____ sources of water.

(2) _____ is any form of water that falls from clouds.

(3) Water pollution is the addition of _____ _____ into water.

Q2

Choose the letter with the correct answer.

(1) Which of the following shows the change of state of evaporation?

A. From gas to liquid.

B. From solid to liquid.

C. From liquid to gas.

D. From solid to gas.

(2) What is the function of clouds in the water cycle?

A. Clouds carry water from the ocean and drop it as rain.

B. Clouds fall down on Earth to cool the temperature.

C. Clouds prevent the heat from the sun to protect the fish in the ocean.

D. Clouds take in polluted water from the ocean and keep its water clean.

(3) Which is <u>not</u> a cause of water pollution?

A. Sewage

B. Compost

C. Rubbish

D. Oils from ships

(4) Which action can prevent water pollution?

A. Don't drink natural water because it might be dirty.

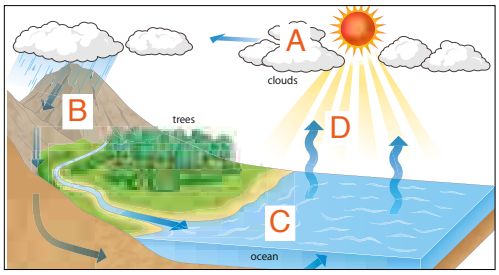
B. Throw away plastic bags into the river after shopping.

C. Throw cooking oils down the drain because it is liquid.

D. Use environmentally friendly household products.

Q3

For question (1) and (2), refer to the diagram below showing the water cycle.



(1) Which letter shows water condensing?

_____

(2) How can water vapour in air return to Earth?

_____

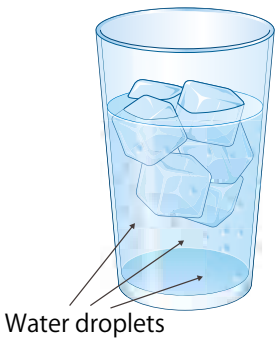
_____

Q4

(1) When you arrive at school on a rainy day, your rain hat is covered with water drops. At the end of the day, your rain hat is dry. What kind of change has taken place?

_____

(2) Grace put some ice in a glass and left them for a few minutes as shown on the right. After that, she observed droplets on the surface of the glass.
Where did the droplets come from?
And how are they formed?



_____

_____

Chapter 14

Structures and Movement of Human

14.1 Bones and Muscle

We can move our body freely. We can walk, throw a ball and lift things. How can we move our body? Let's investigate our body.

Lesson 1: "Our Bones"

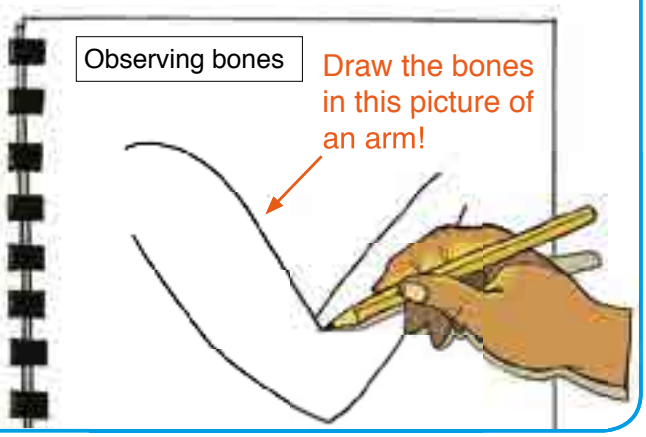
We have a lot of bones in our body. How do our bones help us? How do our bones work?

What are bones?

Activity : Observing bones

What to Do:

1. Draw a picture of an arm as shown below.
2. Touch and move your arm and predict how the bones are structured in your arm.
3. Draw the bones in the picture based on your prediction.
4. Share your ideas with your classmates. Talk about how the bones in the arm help us.

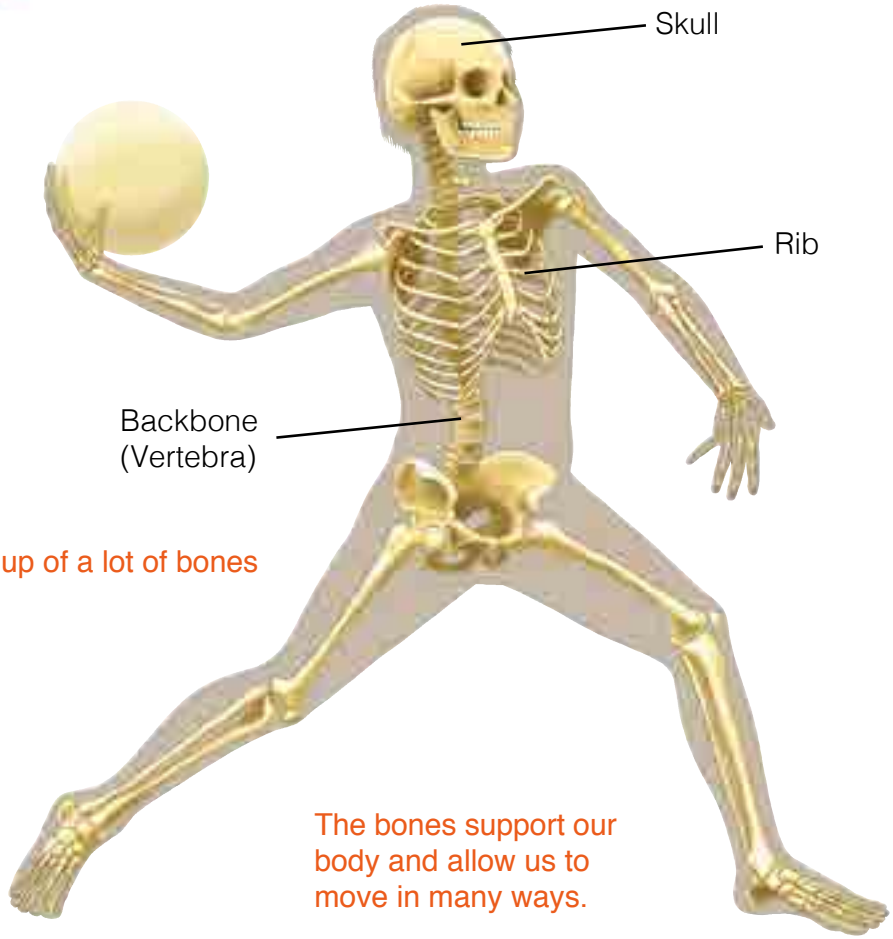


Summary

Our body is made up of a lot of **bones**. The adult human body has 206 bones. The bones are growing and changing all the time as we grow.

The bones support our body and give the body its shape. The bones also protect the organs in the body and help us move in many ways.

Bones in an arm



Our body is made up of a lot of bones

The bones support our body and allow us to move in many ways.

A group of bones that gives body shape and support, protects the organs inside the body and allows us to move in many ways is called the **skeletal system**. A **system** is a group working together to do a particular work. A group of bones forms our body to work together.

Lesson 2: "Bending Body Parts"

Our body is made up of a lot of bones. These bones help us to move in many ways.

Why can we bend our body?

Activity : Finding body parts that we can bend

What to Do:

1. Draw a table like the one shown below.

Body parts that we can bend

2. Find your body parts that you can bend.
3. Record the name of the body parts in the table.
4. Share your findings with your classmates.

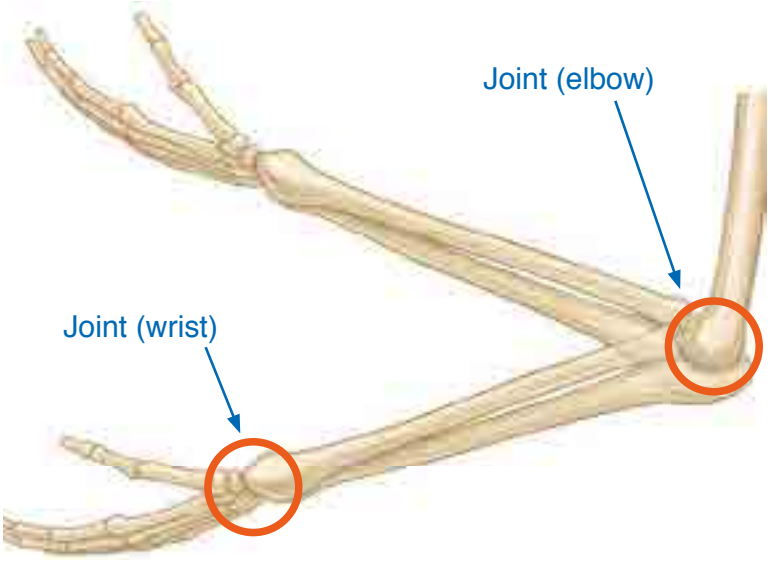
Discussion

How do the bones help us when we bend our body parts?

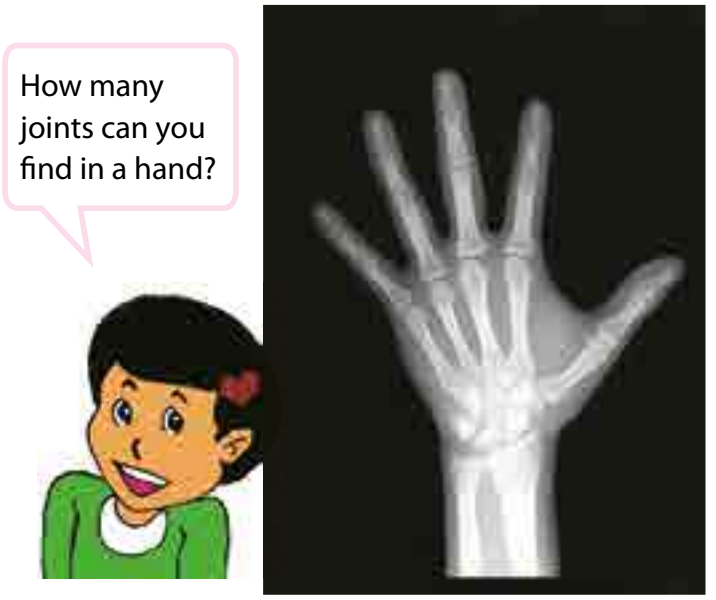
1. Think about the following questions:
   - Do we bend our bones when we bend our body parts?
   - If not, how are the bones arranged to bend our body parts?
2. Talk about your ideas with your classmates.

Summary

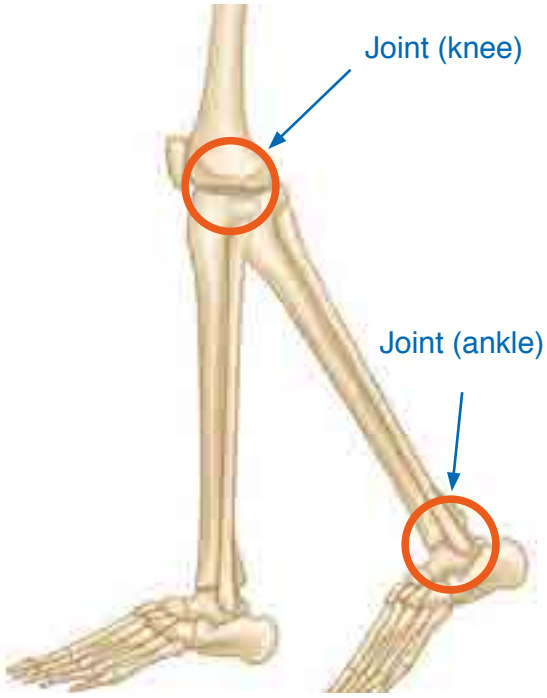
We can bend parts of our body where two bones join together. The place in the body where two bones meet is called a **joint**. For example, our knees and elbows are joints. Without the joints, it would not be possible to raise our hands or knees.



Joints in an arm



An X-Ray of a hand



Joints in a leg

Lesson 3: "Animals With or Without Bones"

People have a lot of bones in their bodies. How about animals? Do they have bones in their bodies?

Do all animals have bones?

Activity : Observing animals' bones

What to Do:

1. Draw a table like the one shown below.

Animals	Your observation
Insect	
Crab	
Lizard	
Turtle	

2. Look at the X-ray of animals below and observe them to see if they have bones or not. Record your observation in the table.
3. Share your ideas with your classmates. Talk about animals with or without bones.


Lizard


Fish


Insect (beetle)

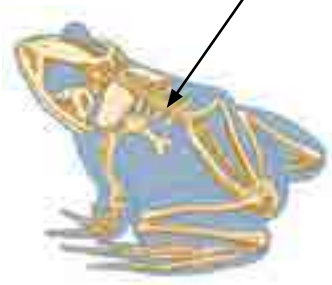

Crab

Summary

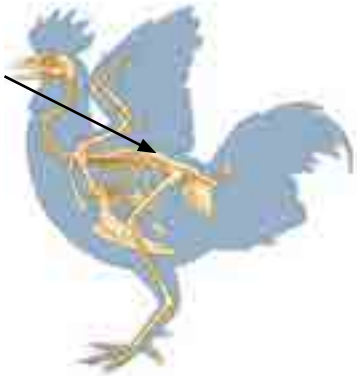
Some animals have bones but some do not have. Animals can be classified into two groups based on whether or not they have a backbone. A backbone helps to support their body.

Animals with a Backbone

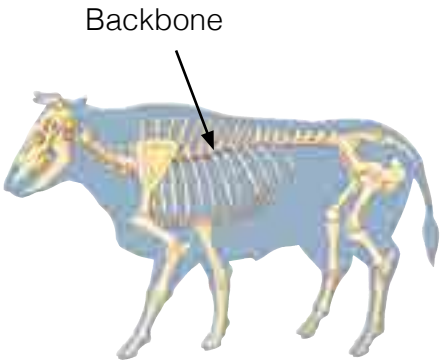
Fish, amphibians, reptiles, birds and mammals are animals with a backbone.



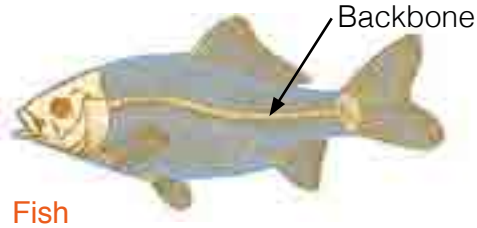
Amphibian (frog)



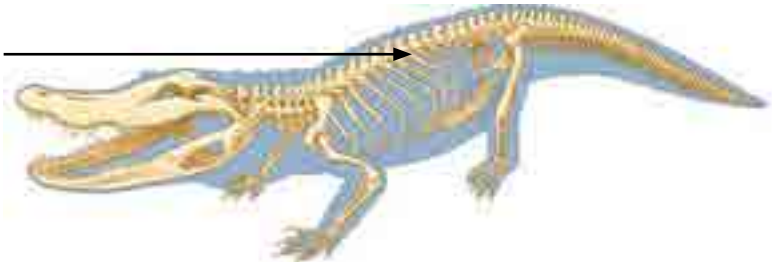
Bird (chicken)



Mammal (cow)



Fish



Reptile (crocodile)

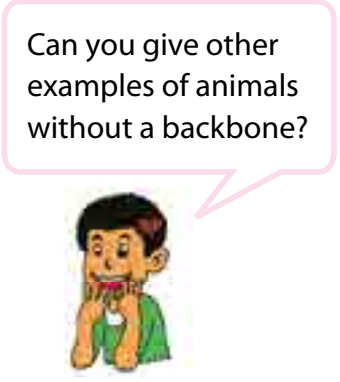
Animals without a Backbone

Most of the animals on the Earth do not have a backbone. Insects, crabs, spiders and earthworms are examples of animals without a backbone. Some animals live on land and some live in water.

Crab

Earthworm

Spider



Lesson 4: "Our Muscles"

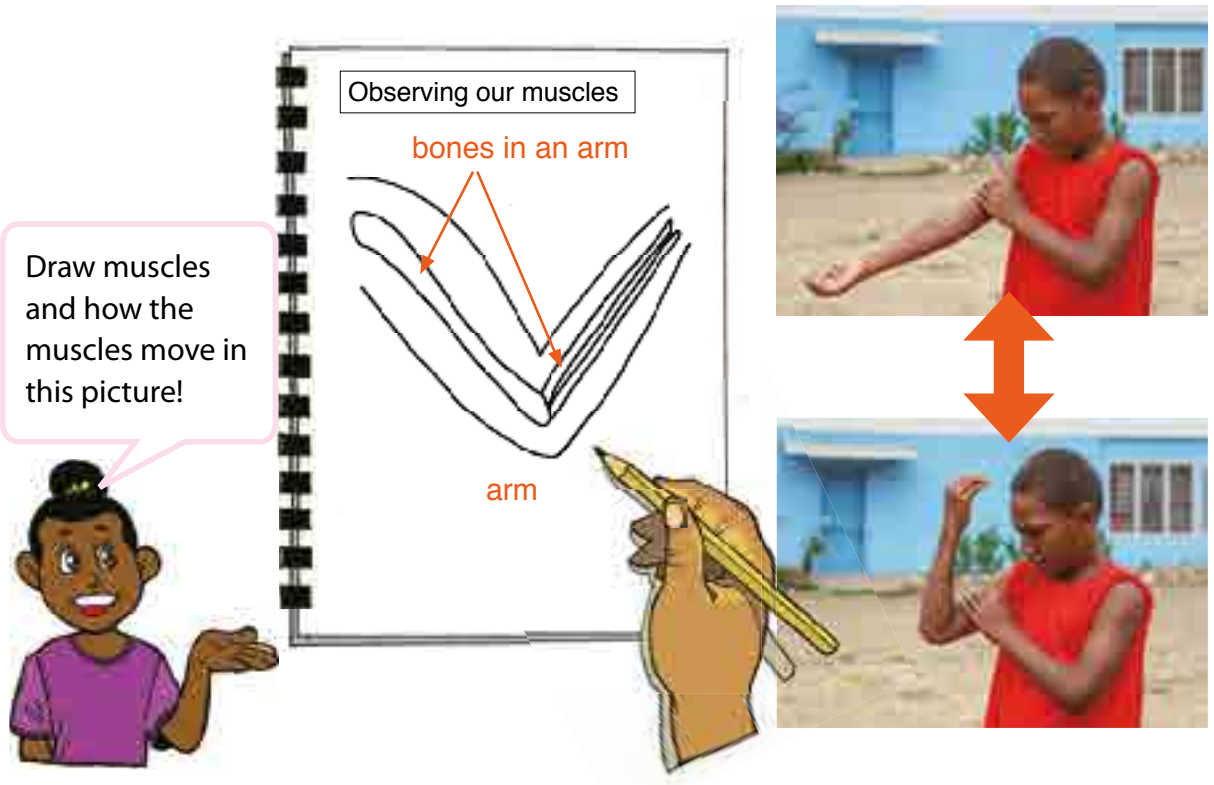
We have a lot of bones in our body. We also have muscles in the body. How do our muscles help us? How do our muscles work?

What are muscles?

Activity : Observing our muscles

What to Do:

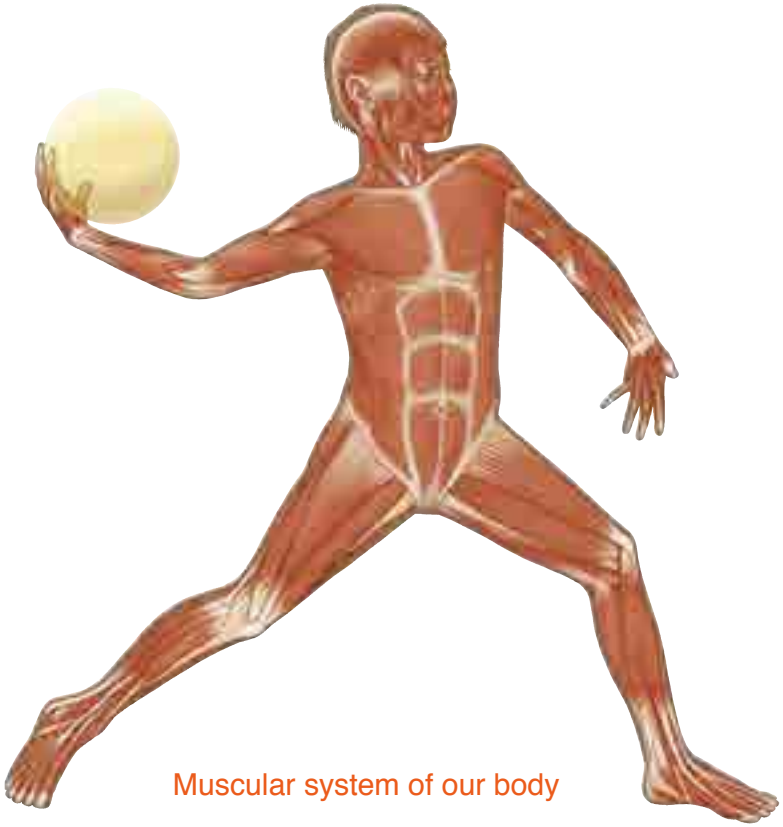
1. Draw the picture of an arm as shown below.
2. Straighten and bend your arm. Observe how the muscles move and where the muscles are in the arm.
3. Draw the muscles in the picture and describe how the muscles move based on your observation.
4. Share your ideas with your classmates. Talk about how muscles work.



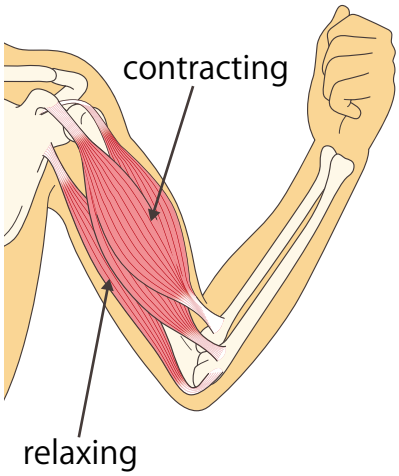
Summary

Our body is made up of **muscles**. The muscles are under our skin and they cover our bones. We have more than 600 muscles in our body. Muscles work by **contracting** and **relaxing**. When muscles contract, they get shorter and thicker. When muscles relax, they get longer and thinner. Muscles work together to help us move. Muscles help keep us upright. They also give our body the power to lift and push things. A group of muscles that make the parts of our body move is called the **muscular system**.

Exercise helps keep our muscles strong. If we do not use our muscles they can become weak.



Muscular system of our body



Movement of muscles

Exercise helps keep our muscles strong.

Lesson 5: "Moving Body Parts"

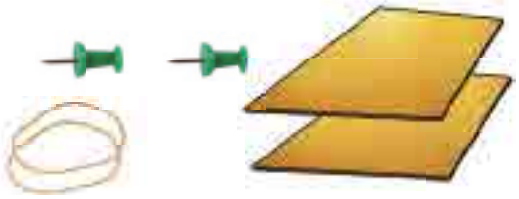
We have bones and muscles in our body. Bones and muscles help us move our body parts.

How do bones and muscles move our body parts?

Activity : Making a model arm

What We Need:

- cardboard, rubber bands, 2 drawing pins, tape

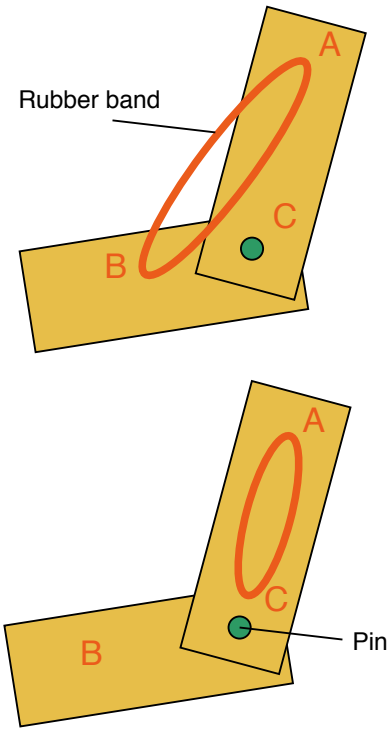


What to Do:

1. Draw a table like the one shown below.

	Your observation
Rubber band attached to A and B	
Rubber band attached to A and C	

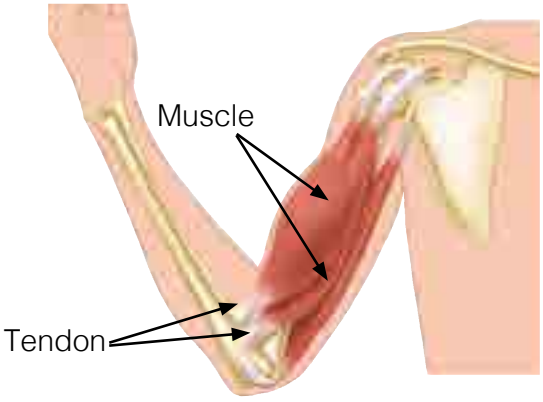
2. Make a model of an arm with the cardboard and pins like the picture on the right.
3. Attach the rubber band in point A to B.
4. Bend and straighten the model of the arm. Observe what happens to the rubber band. Record your observation in the table.
5. Remove the rubber band and attach it to points A and C. Repeat Step 3.
6. Share your findings with your classmates. Talk about how bones and muscles help to move our arms.



Result

If a rubber band is attached to points A and B, the rubber band is stretched when the model of the arm is stretched and it gets shorter when the model is bent. If the rubber band is attached to the points A and C, it does not change when the model is stretched or bent.

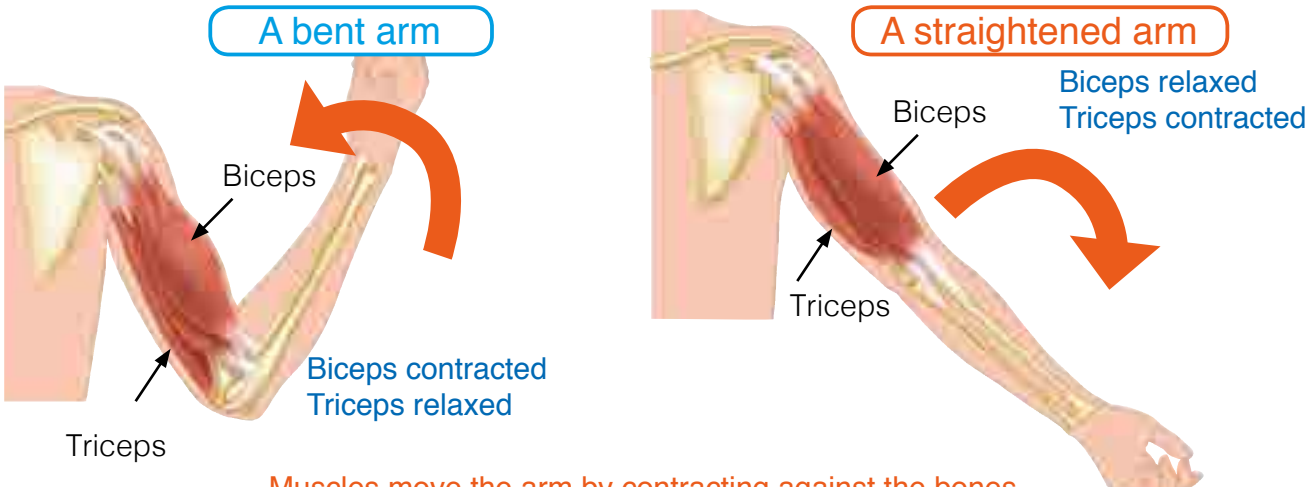
Summary



Structure of bones, muscles and tendons

The bones and muscles make our body move. Most of our muscles are attached to the bones with tendons. Tendons are like strong rubber bands. Muscles are attached at one end of one bone and at the other end of another bone.

Muscles move the body by contracting against the bones. By contracting, muscles pull on bones and allow the body to move. For example, the biceps and triceps are a pair of muscles in our arms. When the biceps contracts, it pulls on bones. This allows our arms to bend. When the triceps contracts, it pulls on bones. This allows our arms to straighten. When we bend our arms, biceps contracts and triceps relaxes. When we straighten our arms, triceps contracts and biceps relaxes.



Muscles move the arm by contracting against the bones.

Summary and Exercise

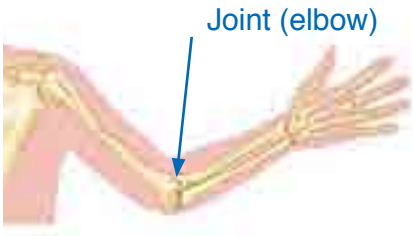
Summary 14.1 Bones and Muscle

Our Bones

- Our body is made up of a lot of bones.
- The bones give body shape, support and protect the organs inside the body, and allow us to move in many ways.
- A group of bones that forms our body is called the skeletal system.

Bending Body Parts

- The body parts where two bones join together is called the joint. We can bend the parts of our body at the joints.



Animals With or Without Backbones

- Animals can be classified into two groups according to whether they have a backbone or not.

Our Muscles

- Our muscles cover the bones and are under the skin in our body.
- Muscles work by contracting and relaxing.
- A group of muscles in our body is called the muscular system.

Moving Body Parts

- Most of our muscles are attached to bones with tendons.

  When muscle contract against the bone, they pull on bones and allow the body to move.

The biceps and triceps are pair of muscles in our arms	
When arm is bent	When arm is straighten
	
- Biceps contracted - Triceps relaxed	- Biceps relaxed - Triceps contracted

Exercise 14.1 Bones and Muscle

Q1. Complete each sentence with the correct word.

(1) The _____ give the body shape and support our body.

(2) Our bones are arranged with _____ between two bones to allow our body parts to bend.

(3) Fish, amphibians, reptiles, birds and mammals are all animals _____ backbones.

(4) Spiders, crabs, worms and slugs are all animals _____ backbones.

Q2. Choose the letter with the correct answer.

(1) According to the diagram below, what happens to the bicep and tricep muscles when the arm is straightened?

A. Biceps relax and triceps contract.

B. Biceps and triceps relax.

C. Triceps relax and biceps contract.

D. Triceps and biceps contract.

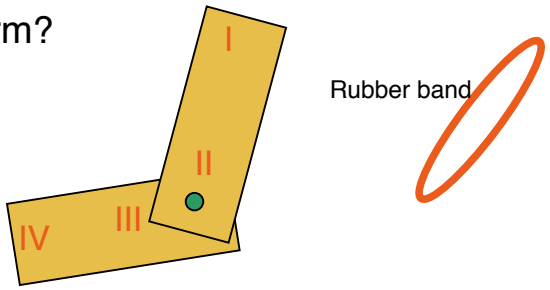
(2) Where will the rubber band be connected to so that the model of arm will move just like the real arm?

A. I to II

B. II to IV

C. I to IV

D. II to III



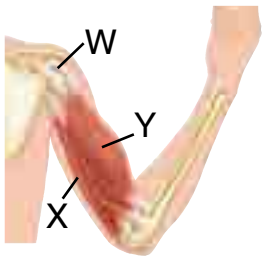
Q3. Study the picture on the right and answer the questions below.

(1) What is the name of the part labeled 'W'?

(2) What is the name of the muscle labeled 'X'?

(3) What the name of the muscle labeled 'Y'?

(4) When the arm is bent as shown in the diagram, how do the muscles labeled X and Y move?



Q4. What would happen if your body did not have a skeletal system?

Do the number of bones change in our life?

We learnt that an adult human body has 206 bones. Do you think the number of bones change through our lives? In fact, a baby's body has about 300 bones at birth. It's more than that of an adult. Do we lose some bones? As the baby grows, some bones join together to make one big bone. Eventually, these bones grow together to form 206 bones that an adult has. By the time you are about 25 years old, this process will be completed. After this happens, there can be no more changes.

Chapter Test

14. Structure and Movement of Human

Q1

Complete each sentence with the correct word.

(1) The _____ protect the organs inside the body and allow us to move in many ways.

(2) When we raise our hands, which joint do we bend _____.

(3) If we don't use our _____, they can become weak. To keep them strong, we need to exercise.

Q2

Choose the letter with the correct answer.

(1) Which of these animals has a backbone?

A. Spider
B. Crab
C. Frog
D. Worm

(2) Which sentence is true about the tendon?

A. Muscles are attached at two ends of one bone with a tendon.
B. Muscles are attached to different bones with tendons.
C. Bones are attached to other bones with tendons.
D. Muscles are attached to other muscles with tendons.

(3) Which sentence is <u>not</u> true about the bones?

A. The adult human body has 206 bones.
B. The bones are hard and do not change during a person's life time.
C. The bones allow us to move in many ways.
D. Skeletal system is a group of bones that forms our body.

(4) Which of following is <u>not</u> an example of a joint?

A. Tongue
B. Wrist
C. Knee
D. Elbow

Q3

(1) The picture on the right shows the changes of arm muscles when you bend your arm. Describe what happens to your bicep and tricep muscles.

_____

(2) Observe the two pictures on the right. Describe the differences of their skeleton between the crab and lizard.

Crab

Lizard

_____

_____

_____

(3) According to the 'hand x-ray' picture on the right, how many finger joints are there?

_____

Q4

(1) Why is it better for an adult's skull to have immovable joints and not movable joints.

_____

_____

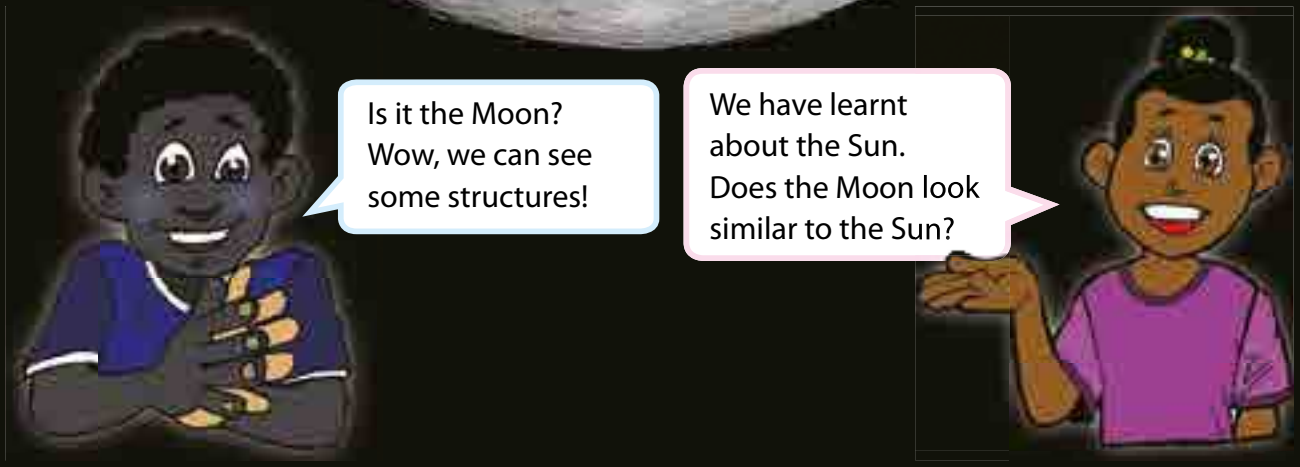
(2) What would happen if the muscles in our body do not contract?

_____

_____

Chapter 15

The Moon



15.1 Moon in the Sky

Lesson 1: "Moon"

Look at the night sky. What do you see? We can see the Moon and stars in the sky.

What is the Moon?

Activity : Surface of the Moon

What to Do:

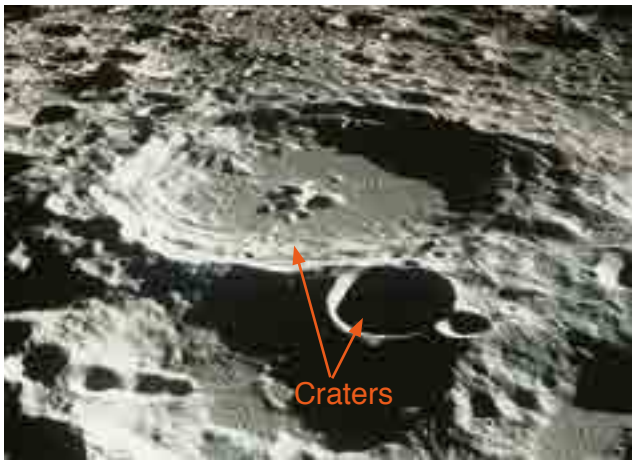
1. Draw a table like the one shown below.

Your findings

2. Look at the picture of the Moon on the left and below.
3. Write your findings about the surface of the Moon in the table.
4. Share your findings with your classmates. Talk about what you observed.

Summary

The Moon is a space object. It is a large sphere made of rock. The surface of the Moon is covered with **craters**, hills, mountains and valleys.



We can see craters, hills, mountains and valleys on the surface of the Moon.

The Moon is smaller than the Earth. It is about a quarter of the Earth's diameter. The Moon appears quite large because it is close to the Earth.

The Moon is a quarter of the diameter of the Earth.

Unlike the Sun, the Moon does not make its own light. We can see the Moon because it reflects the light from the Sun.

Lesson 2: "Movement of the Moon in the Sky"

When we look at the Moon at different times of the day, we can see it at different location.

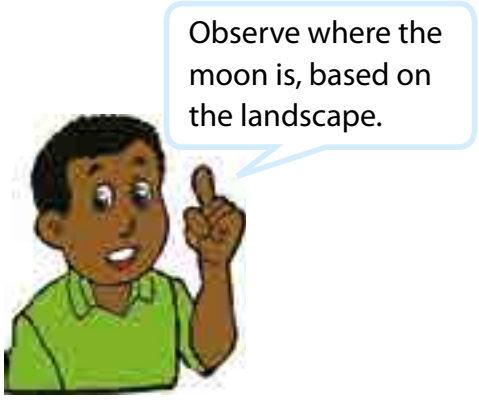
How does the Moon move in the sky?

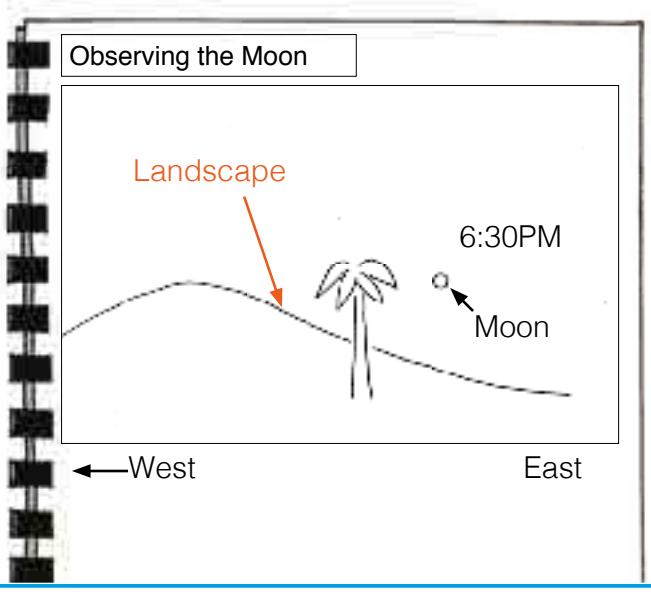
Activity : Observing the Moon

What to Do:

1. Go outside. Make an X on the ground.
2. Check the direction of North, South, East and West with a compass.
3. Stand at X and draw the landscape you see in your exercise book.
4. Observe the Moon and record the position of the Moon and the time like the one shown below.
5. Repeat step 3 and 4 three more times every 30 minutes during the day.
6. Share your ideas with your classmates. Talk about how the Moon moves.

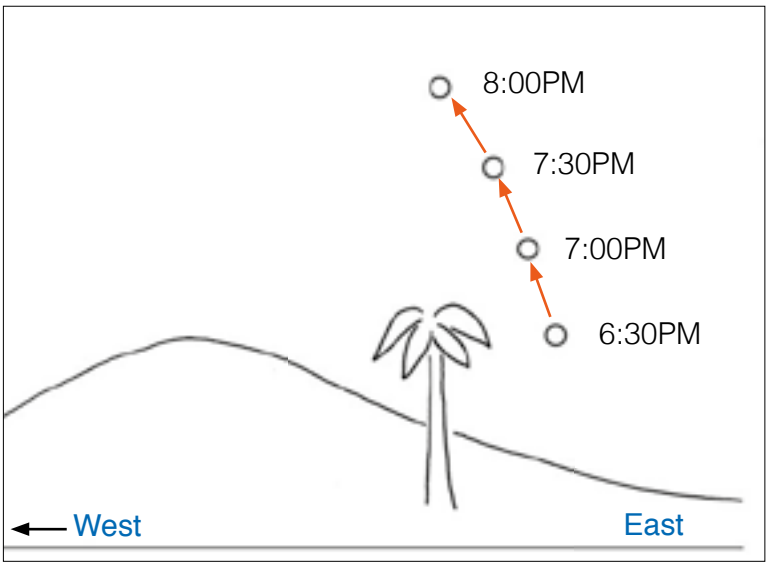
When you observe the moon at night, you need adult supervision.



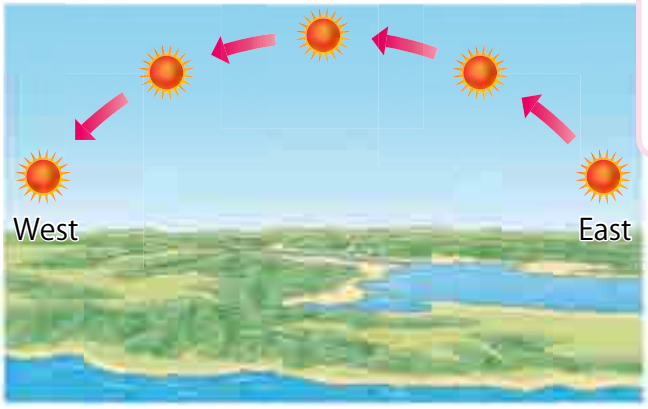


Result

The Moon changes its positions in the sky as time goes by.



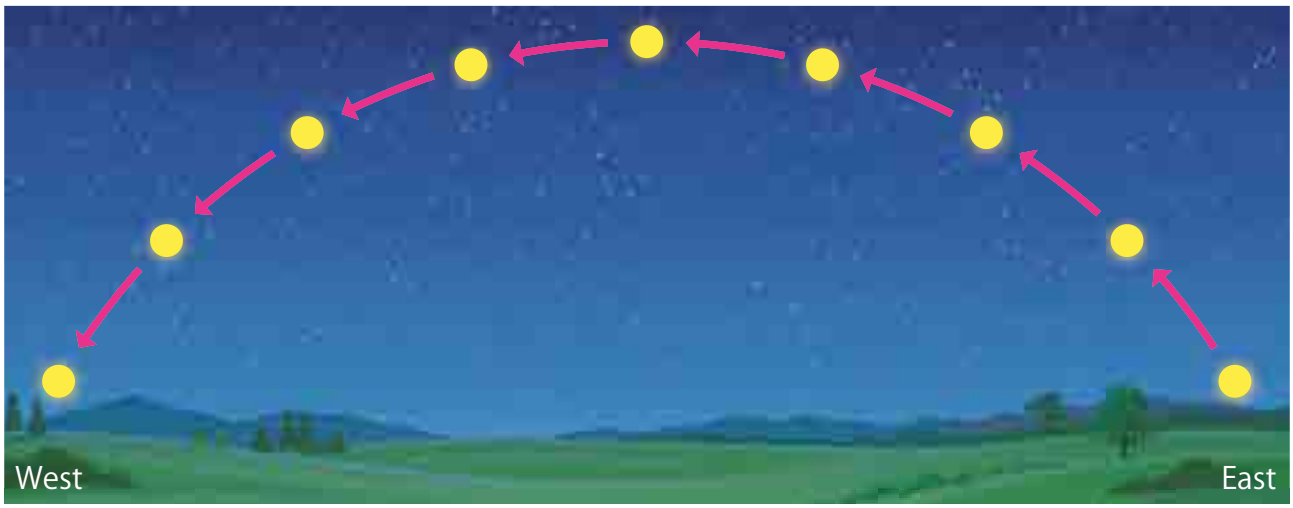
Examples of the movement of the moon



The movement of the sun

Summary

The Moon rises into the sky in the East, moves across the sky at its highest position and sets in the West.



The Moon seems to move from east to west during the day.

Lesson 3: "Changing Moon"

When we observe the Moon in the sky, the moon's shape looks a little different every night.

How does the Moon seem to change its shape?

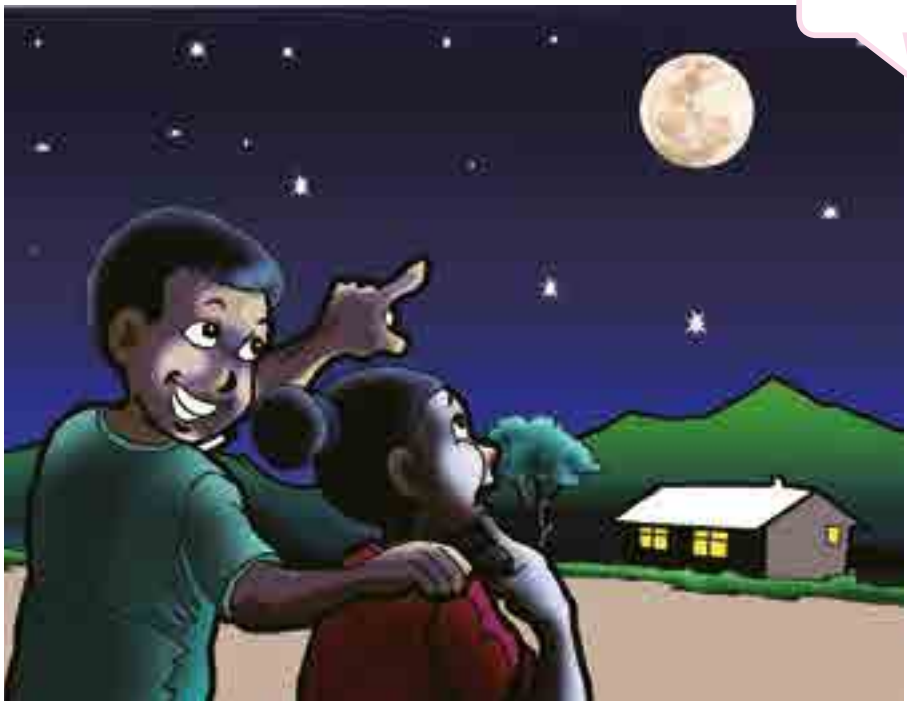
Activity : Changing shapes of the Moon

What to Do:

1. Draw a table like the one shown below.

Date					
Shape of the moon					

2. Look at the night sky and observe the Moon.
3. Write the date and draw the shape of the Moon in the table.
4. Repeat Steps 2 and 3 for five days.
5. Share your findings with your classmates.

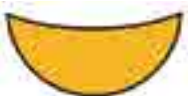


Let's compare your observation with what your classmates observed and talk about how the Moon changes.

You must observe the Moon with adults at night.

Result

The Moon seems to change its shape every night.

Date	10th Oct	11th Oct	12th Oct	13th Oct	14th Oct
Shape of the moon					

Example of results from observations on the shape of the Moon.

Summary

The Moon seems big and round on some nights. On other nights, it looks small and half round-shaped. The Moon does not change its shape, but the bright part of the Moon changes its shape every night. The changing shapes of the bright part of the Moon that we see are called **phases of the Moon**. There are different phases of the Moon. The phases repeat every 29.5 days.

Summary and Exercise

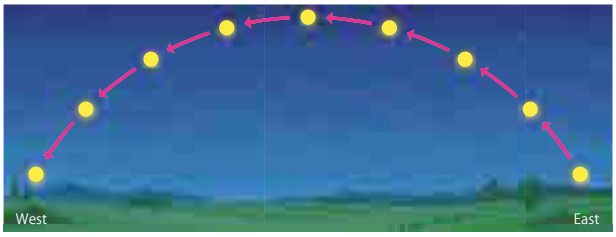
Summary 15.1 Moon in the Sky

Moon

- The moon is a space object. It is a large sphere made of rock.
- The surface of the moon is covered by craters, hills, mountains and valleys.
- The moon is smaller than the Earth and does not make its own light.
- The moon reflects light from the sun.

Movement of the Moon in the Sky

- The moon changes its position in the sky as time goes by.
- The moon rises into the sky in the East, moves across the sky and sets in the West during the day.



The Changing Moon

- The moon does not change its shape. The bright part of the moon changes its shape every night.
- The bright part of the moon are called **phases of the moon**. The following diagrams show the different phases of the moon.

Summary and Exercise

Exercise 15.1 Moon in the Sky

Q1. Complete each sentence with the correct word.

(1) The_____ is the closest space object to the Earth, that is a large sphere made of rocks.

(2) The changing shapes of the brighter part of the moon are called_____ of the moon.

(3) The moon rises in the_____, moves across the sky and sets in the_____.

Q2. Choose the letter with the correct answer.

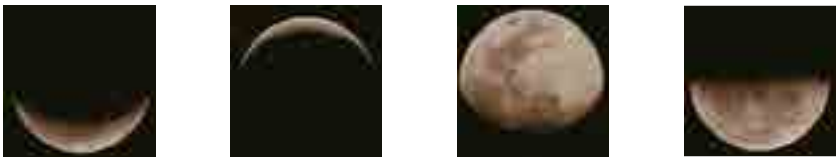
(1) Look at the picture on the right and answer the question.

What is the name of the round shaped structure on the moon surface?

A. Ocean C. Valley

B. Crater D. Lake

(2) What phase of the moon will come next in the sequence shown below?



A. B. C. D.

Q3. Answer the following questions.

(1) What is the name of the last moon phase before the new moon?

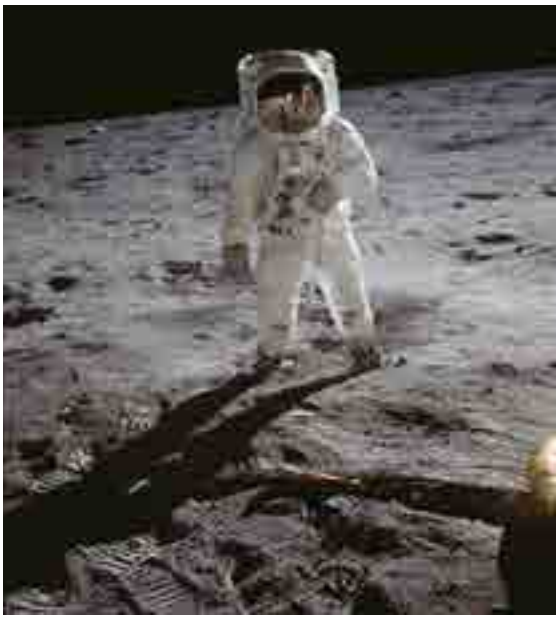
(2) Why does the moon shine?

(3) How many days does it take for the phases of the Moon to repeat?

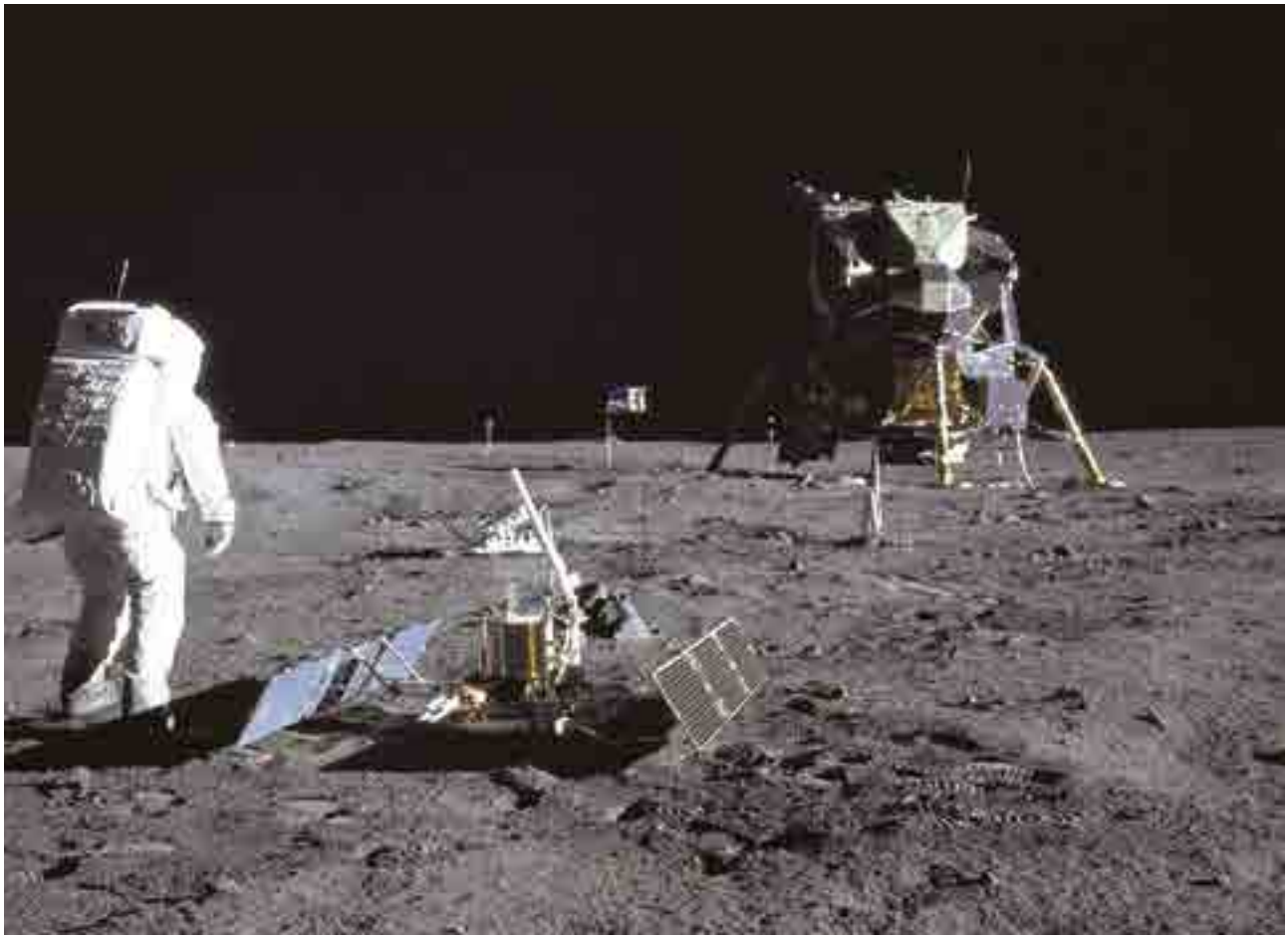
Q4. What is the similarity between the Moon and the Sun's movement in the sky?

Standing on the Moon

Is there any person who has stood on the Moon in human history? The answer is "yes".



Apollo 11 was the first mission organised to send people to the Moon. On July 20, 1969, two American astronauts became the first humans to land on the Moon's surface. Neil Armstrong was one of the astronauts. The moment he set foot onto the moon and took the first step, he said “That’s one small step for man and one giant leap for mankind”.



Astronaut and space craft on the Moon

Chapter Test

15. The Moon

Q1

Complete each sentence with the correct word.

(1) The Moon is a_____object.

(2) The surface of the Moon is covered with_____, hills, mountains and valleys.

(3) The Moon reflects the light from the_____.

Q2

Choose the letter with the correct answer.

(1) What is the Moon made of?

A. Water

B. Rocks

C. Air

D. Plants

(2) From what direction does the Moon seem to move in the sky during the day?

A. From east to west

B. From west to east

C. From north to south

D. From south to north

(3) How often can a full Moon be seen?

A. Once a year

B. Once each session of the year

C. About once each month

D. About once each week

(4) How many days does the Moon take to orbit the Earth?

A. 27days

B. 28 days

C. 29.5 days

D. 30 days

Q3

(1) Dave observed the night sky and noticed that the Moon appears quite large. Why does the moon appear quite large?

_____

(2) What is the name of the Moon phase shown in the diagram on the right?

_____

(3) Which of following letters is the correct order of phases of the Moon?

1. 
New Moon

2. 
Full Moon

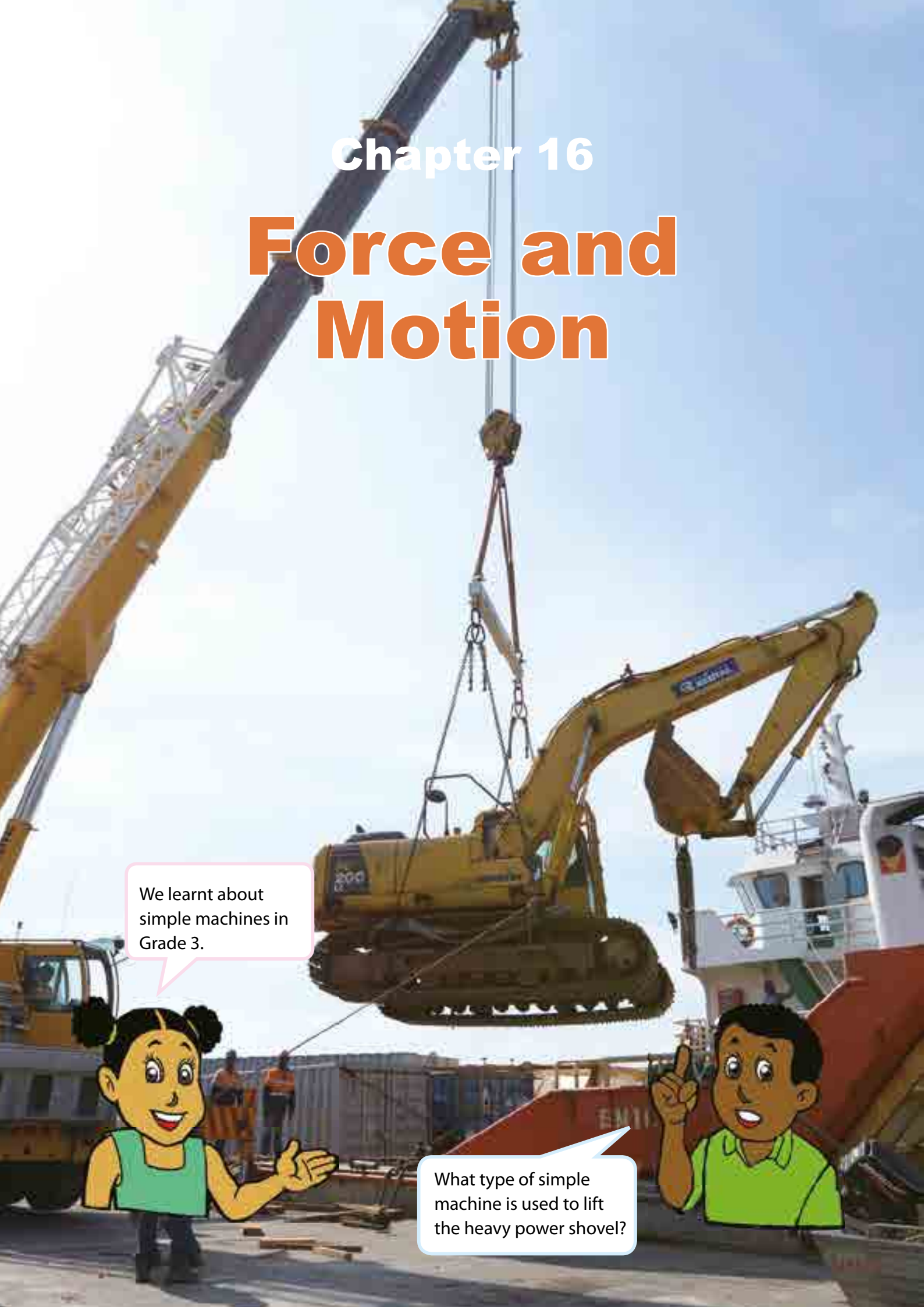
3. 
Waning Crescent

4. 
Last Quarter

A. 1 ⇒ 3 ⇒ 4 ⇒ 2
B. 1 ⇒ 4 ⇒ 2 ⇒ 3
C. 2 ⇒ 1 ⇒ 3 ⇒ 4
D. 2 ⇒ 4 ⇒ 3 ⇒ 1

Chapter 16

Force and Motion



16.1 Describing and Measuring Motion

Lesson 1: "Position and Motion of Objects"

A push and a pull is force. When we use force, we can move an object. When an object is moving, we say that the **object is in motion.**

What is the motion of an object?

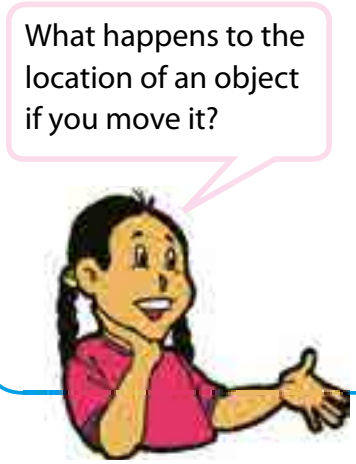
Activity : Where is the object?

What to Do:

1. Draw a table like the one shown below.

Object	Where is it?

2. Look at the picture below. Choose three kinds of objects and write their names in the table.
3. Describe the location of the objects in the table.
4. Share your ideas with your classmates. Talk about how we can describe the location of the objects.



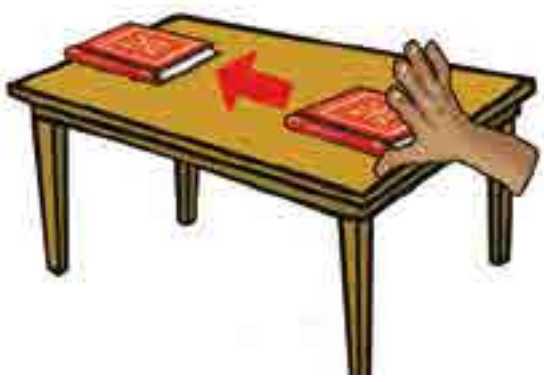
Summary

The place or location of an object is called the **position**. We can describe the position of an object as compared to other objects. For example, the position of the red book is on a desk in front of a pink wall. The position of the blue car is on the road 1m from the road sign.

Position of the objects can be described as compared to other objects.

What happens to the position of an object if it moves? The position of the object may change. The change in the position of an object is called the **motion**. An object in motion moves from one place to another.

For example, the position of a book changes from an edge to another edge of the desk when we move the book on the desk. When the car is moving, its position changes from the road sign to the traffic light. The car is in motion.



The position of the book changes when we push the book.

A car in motion changes its position from the sign to the traffic light.

Lesson 2: "Describing Motion of an Object"

When an object moves, it changes its position. The change in an object's position is called motion. A moving object is in motion.

How can we describe the motion of an object?

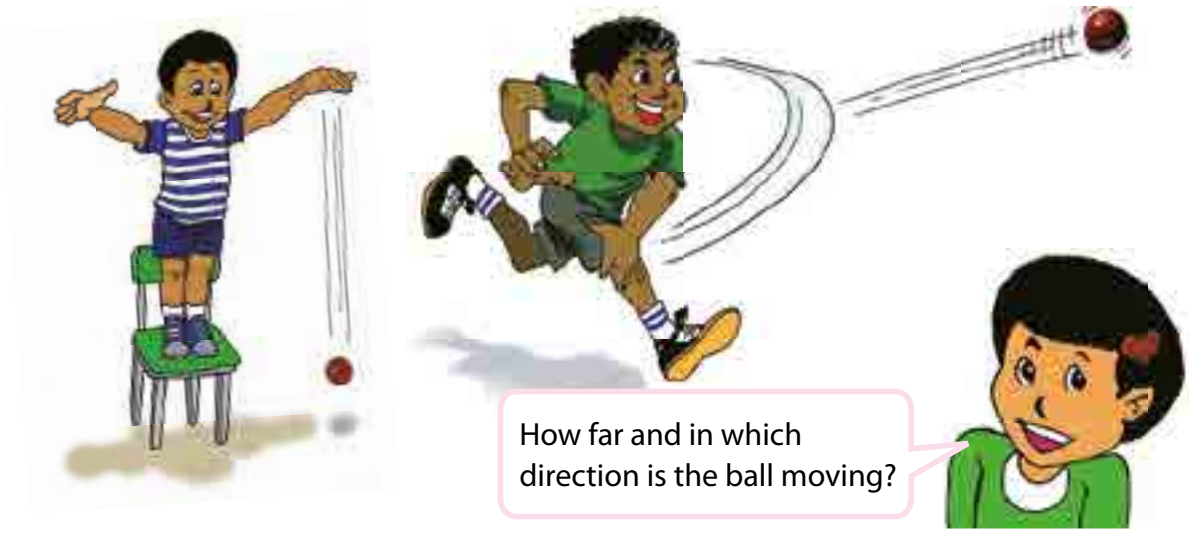
Activity : How is the object moving?

What to Do:

1. Draw a table like the one shown below.

Motion	Describing how the ball is moving
When you drop a ball	
When you throw a ball	

2. Go outside of the classroom.
3. Hold a ball and drop it. Observe how the ball is moving and describe the motion of the ball in the table.
4. Next, hold the ball and throw it. Observe how the ball is moving and describe the motion of the ball in the table.
5. Share your observation with your classmates. Talk about how we can describe the motion of an object.

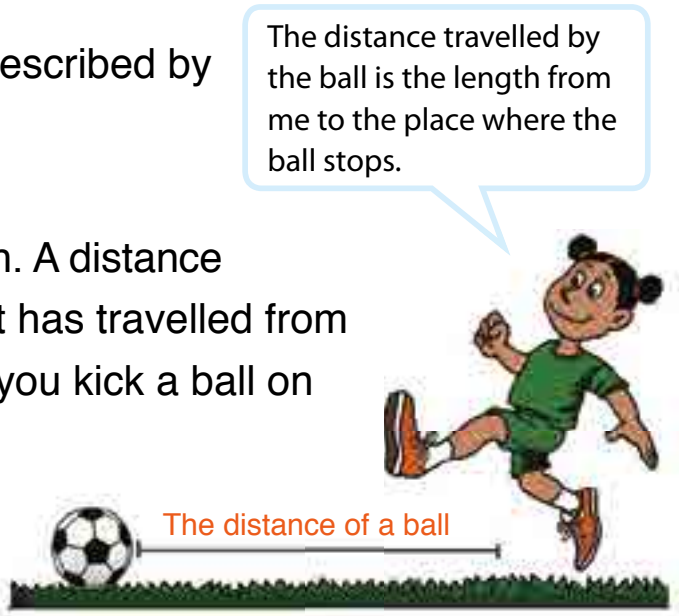


Summary

The motion of an object can be described by its distance, speed and direction.

Distance

A **distance** is the same as length. A distance is a measure of how far an object has travelled from its starting point. For example, if you kick a ball on the ground, the ball travels to one place. The distance is the length from your place to the place the ball is located.



Speed

Speed is a measure of how fast an object is moving. For example, cheetahs can run almost at a speed of 120 km/h. Pigs can run at a speed of 17.7 km/h. Cheetahs can run faster than pigs. Pigs move slower than cheetahs.

Cheetahs are the fastest animals.

Direction

A **direction** is the path that an object takes. We can find the direction of an object by comparing its current position to its earlier position. We can describe the direction using words such as straight, east, west, up, down, right or left. For example, a car is moving straight east or turning right.

A ball is bouncing on the floor. The direction of the ball always changes.

Lesson 3: "Measuring Motion of an Object"

The direction of an object can be found by comparing its positions. How can we find the distance and speed of an object?

How can we measure the distance and speed of an object?

Activity : Measuring distance and time

What We Need:

- toy car, tape, stopwatch, tape measure

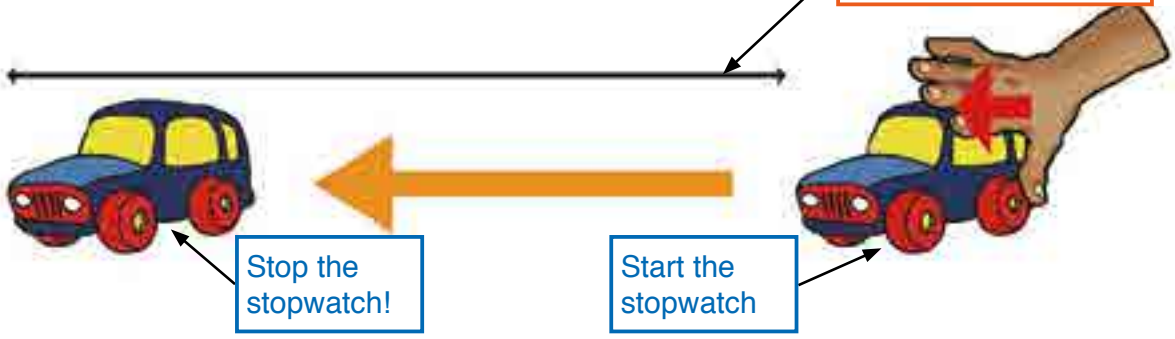



What to Do:

1. Draw a table like the one shown below.

Attempt	Time (second)	Distance (cm)
1st		
2nd		
3rd		

2. Mark a starting line on the smooth floor with tape and put a toy car on the starting line.
3. Push the car forward. Measure the time from when it starts moving to when it stops with a stopwatch. Record the time in the table.
4. Measure the distance from the starting line to the car with a tape measure. Record the distance in the table.
5. Repeat steps 2-4 three times.
6. Share your observation with your classmates.



Summary

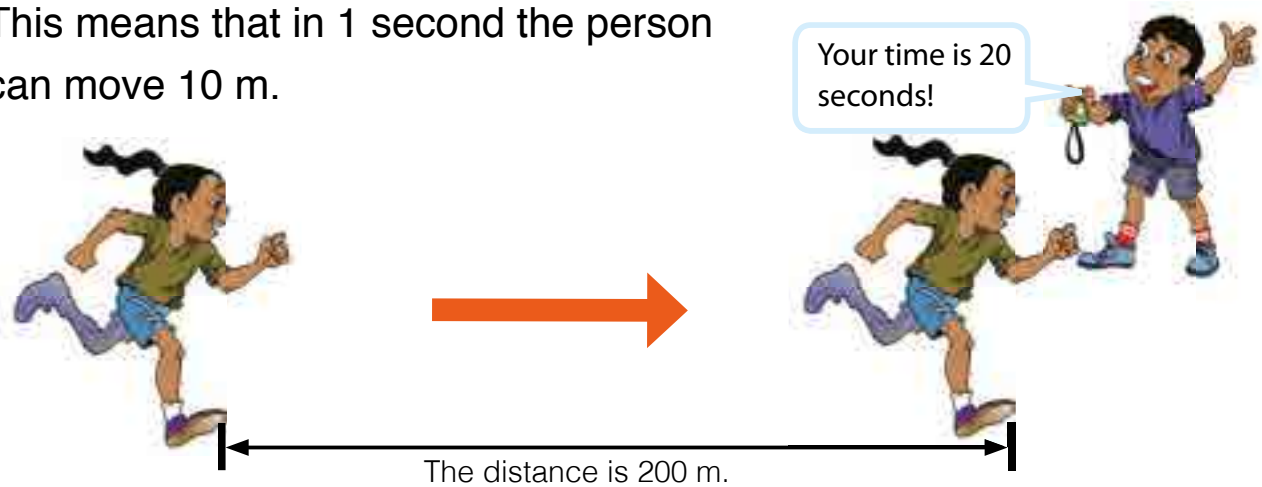
The distance and speed of an object can be measured.

Distance

Distance can be measured using a ruler, a tape measure or a measuring tape. The distance of an object is often measured in **kilometres (km)**, **metres (m)** or **centimetres (cm)**.

Speed

Speed is a measure of how far an object can go in a certain amount of time. We can find the speed of an object when the distance the object travelled is divided by the time it took to travel that distance. For example, if a person runs 200 m in 20 seconds, the speed of the person is 200 m divided by 20 seconds or 10 m in 1 second. This means that in 1 second the person can move 10 m.



She can run 200 m in 20 seconds.

Discussion

What is the speed of the toy car?

1. Calculate the speed of the toy car on the 1st, 2nd and 3rd attempts in the activity.
2. Find the average speed of the toy car.

Summary and Exercise

Summary

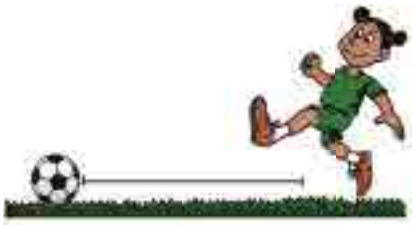
16.1 Describing and Measuring Motion

Position and Motion of Objects

- The place or location of an object is called the position.
- The change in the position of an object is called motion.

Describing Motion of an Object

- The motion of an object can be described by its:

Distance A measure of how far an object has travelled from its starting point.	
Speed A measure of how fast an object is moving.	
Direction The path that an object takes. It can be described using words such as east, west, up, down, right or left.	 The direction of the ball changes always

Measuring Motion of an Object

- Distance can be measured by using a ruler, tape measure or measuring tape. Distance is often measured in kilometres (km), metres (m), or centimetres (cm).
- Speed is a measure of how far an object can go in a certain amount of time. Speed can be found if the distance the object travelled is divided by the time it took to travel that distance.

Summary and Exercise

Exercise

16.1 Describing and Measuring Motion

Q1. Complete each sentence with the correct word.

(1) The place or location of an object is called the _____.

(2) The measure of how far an object has travelled from its starting point is called _____.

(3) _____ is the path that an object takes.

(4) The measure of how fast an object is moving is called _____.

Q2. Choose the letter with the correct answer.

(1) Which of the following is a correct explanation about motion?

A. It is the change in the position of an object.

B. It is the change in the size of an object.

C. It is the change in the colour of an object.

D. It is the change in the shape of an object.

(2) Which of the following is used to measure distance?

A. Stop watch

B. Thermometer

C. Tape measure

D. Compass

Q3. Answer the following question below.

Study the picture on the right.

What causes the moving object to change direction?

Q4. Amy and Ellie left school at the same time and went back to their homes on foot. Amy lives further away than Ellie, but they arrived at their homes at about the same time. Whose walking speed is faster than the other? Write your answer with reasons.

16.2 Machine and Its Work

Lesson 1: "Six Simple Machines"

We use different types of simple machines in daily life. Hammer, ramp, knife and doorknob are examples of simple machines.

What types of simple machines are there?

Activity : Grouping simple machines

What to Do:

1. Draw a table like the one shown on the right.
2. Look at the pictures below.
3. Compare the simple machines and group them into six groups according to how they work and look.
4. Share your ideas with your classmates. Talk about the way you grouped the simple machines.

Group	Simple machines	How do you group them?
1		
2		
3		
4		
5		
6		










Summary

A tool or device that can make work easier is called a **simple machine**. The word **work** has a special meaning in science. Work is the movement of an object by using a force. A simple machine can move an object easily when a force is applied to the simple machine. There are six types of simple machines such as **lever**, **pulley**, **inclined plane**, **wheel and axle**, **wedge** and **screw**.

The pictures below show examples of each type of simple machine.

Lever

Pulley

Inclined Plane

Wedge

Wheel and Axle

Screw

Lesson 2: "Lever"

Lever is one of the simple machines. We use levers everywhere in daily life. A hammer is an example of a lever.

How does a lever make work easier?

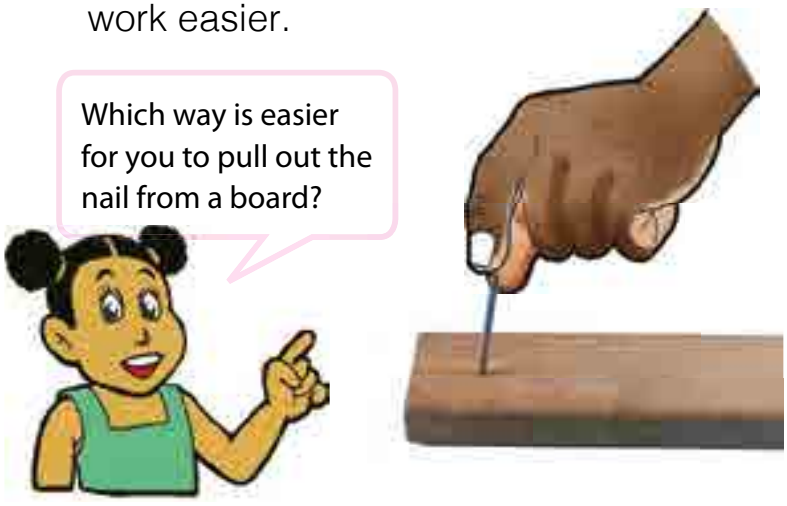
Activity : How a hammer works

What We Need:

- hammer with claw, nails, and wooden board

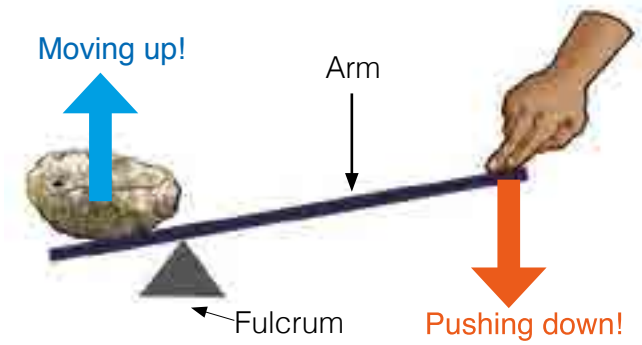
What to Do:

1. Use a hammer to drive a nail into a wooden board.
2. Try to pull out the nail from the board using your hand.
3. Try to pull out the nail from the board using the claw of the hammer.
4. Compare which way is easier to pull out the nail.
5. Share your findings with your classmates. Talk about how a hammer helps us make work easier.



Summary

A **lever** is a simple machine made up of an arm and a fulcrum. A lever makes it easier to lift and move objects.
A bottle opener, shovel and scissors are examples of levers.



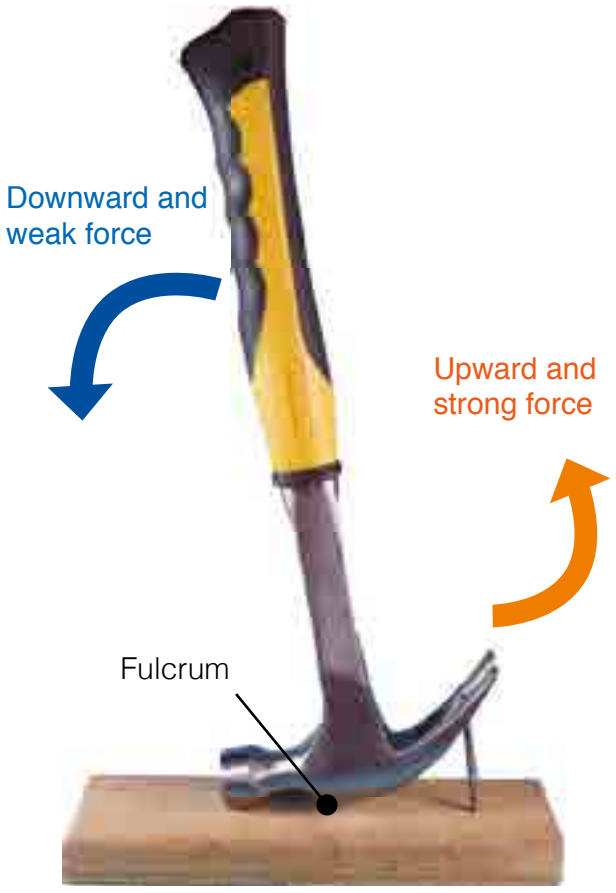
A Simple Machine: Lever


Flip top


Shovel


Scissors

We can pull out a nail from the wood easily using a hammer than using our fingers. When we use a hammer, we apply a weak force to the handle of the hammer. The hammer changes the weak force to a strong force on the nail. The hammer also changes the direction of the force from downward to upward. A lever can change the strength and the direction of a force. The changes in the strength and the direction of the force make it easier to remove the nail.



A lever changes the strength and the direction of a force.

Lesson 3: "Inclined Plane"

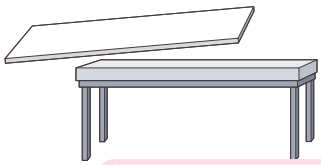
An inclined plane is one of the simple machines. Inclined planes help us to move an object.

How does an inclined plane make work easier?

Activity : Which is easier?

What We Need:

- string, flat board, tape measure, book, bench



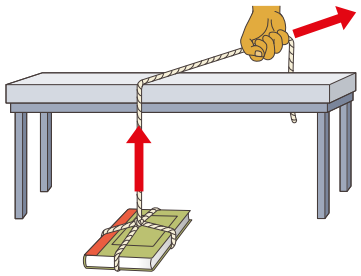
A slanted board plays the role of an inclined plane!

What to Do:

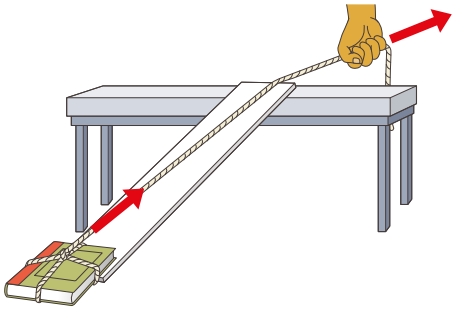
1. Draw a table like the one shown below.

	How far did you pull? (cm)	Which method did you need more or less force?
Without a board		
With a board		

2. Tie a string around a book.
3. Set the string like the picture shown on the right, and pull the book to the top of the bench.



4. Measure the distance you lifted the book, and record the distance in the table.
5. Repeat steps 3 and 4 by using a board as shown on the right.



6. Compare the two methods you lifted the book. Record which methods needed more or less force to lift the book in the table.
7. Share your findings with your classmates. Talk about how inclined plane helps us make work easier.

Result

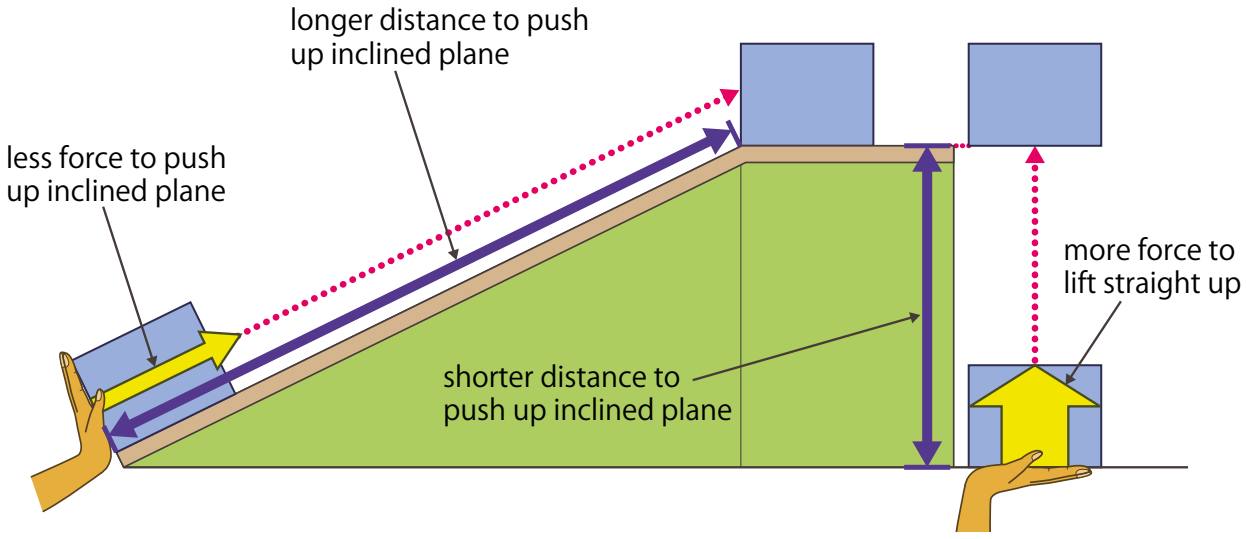
Without a board, we used more force but we moved the book a shorter distance. When we pulled the book up the slanted board or inclined plane, we used less force and the book was moved a longer distance.

	How far did you pull? (cm)	Which method did you need more or less force?
Without a board	e.g. 60 cm	e.g. More force without a board
With a board	e.g. 120 cm	e.g. Less force with a board

Summary

Inclined Plane

An inclined plane is a simple machine made up of a slanted surface. An inclined plane decreases the force and increases the distance to move an object to a higher position. When a heavy object is lifted straight up to a higher position, we use a stronger force but we move the object a shorter distance. By pushing the object up an inclined plane to a higher position, we need less force but the object must be moved over a longer distance. Ladders, stairs and a wheelchair ramp are examples of an inclined plane.



An inclined plane makes it easier to move a box.

Lesson 4: "Pulleys"

Pulleys are found around us. We use pulleys in many ways.

How does a pulley make work easier?

Activity : Lifting up a bottle

What We Need:

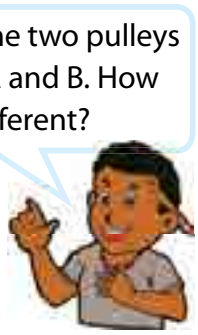
- two pulleys, string, a bottle of water, ruler

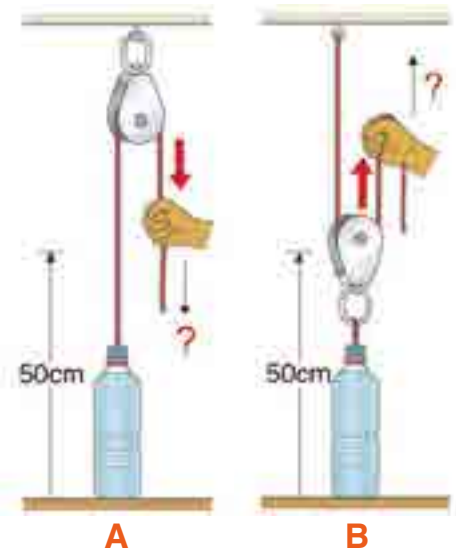
What to Do:

1. Draw a table like the one shown below in your exercise book.

	Distance of the string you pulled (cm)	Which method do you need less force?
A		
B		

2. Tie one end of a string around a bottle and put the bottle on the floor.
3. Set the pulley and the string as shown in picture "A".
4. Lift the bottle 50 cm off the ground by pulling the other end of the string.
5. After lifting the bottle, measure how far you pulled the string to lift the bottle 50 cm off the ground, and record it in the table.
6. Set a pulley and a string like the one in picture "B". Repeat steps 4 and 5.
7. Compare the two methods you lifted the bottle and record which method you use less force to lift the bottle in the table.
8. Share your ideas with your classmates. Talk about how a pulley works.



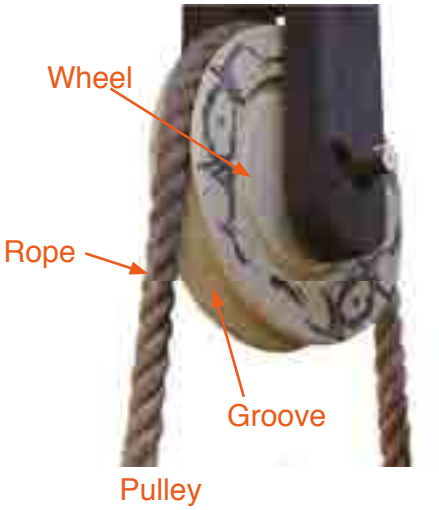


Result

When we lift the bottle with pulley B, we used less force but we must pull the string a longer distance than pulley A.

	Distance of the string you pulled (cm)	Which method do you need less force?
A	e.g. 50 cm	e.g. We needed more force
B	e.g. 100 cm	e.g. We needed less force

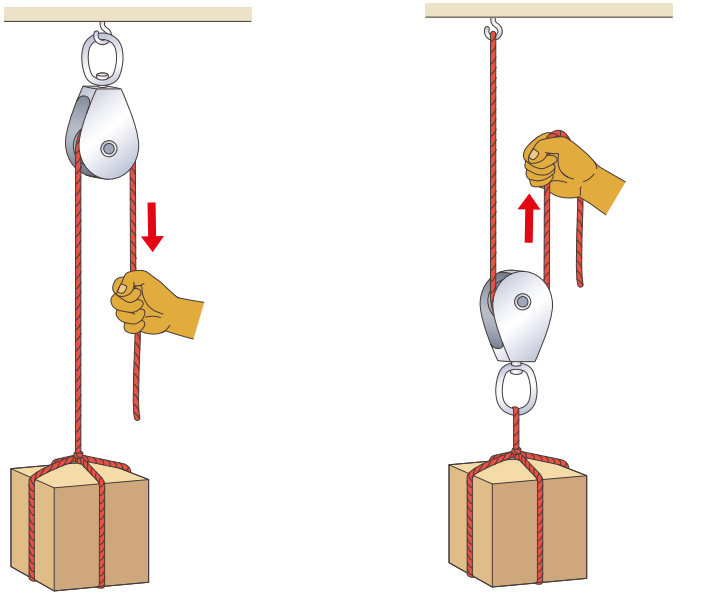
Summary



A pulley is a simple machine which is useful to lift or lower an object. A pulley consists of a wheel with a groove through which a string or rope runs. There are two main types of pulleys; **fixed pulleys** and **movable pulleys**.

A fixed pulley is fixed in one place and cannot be moved. The fixed pulley changes the direction of the force but it does not change the amount of the force needed to lift the object. An object moves in the same distance as we pull the rope.

A movable pulley is a pulley that is free to move up and down. The movable pulley allows us to use less force to lift an object but we must pull the rope a longer distance than the object moves.



Fixed pulley and movable Pulley

Lesson 5: "Wheel and Axle"

A wheel and axle is one of the simple machines. It consists of two circular objects of different sizes attached to each other.

How does a wheel and axel work?

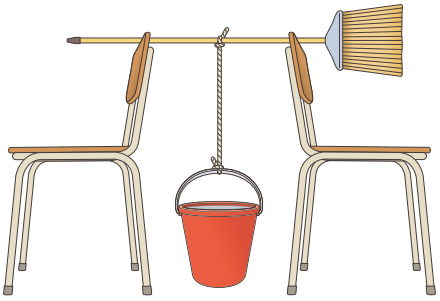
Activity : Turning a broom

What We Need:

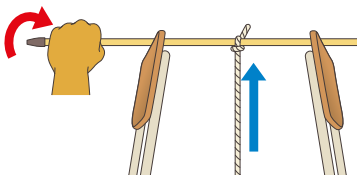
- two chairs, broom, rope, bucket with a handle, stones

What to Do:

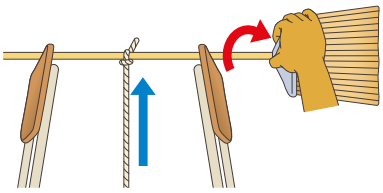
1. Place the two chairs back-to-back with some space between them and place a broom over the chairs as shown on the right.



2. Tie a 1m piece of rope to the handle of the bucket and the centre of the broom stick. Put some stones into the bucket.
3. Hold the end of the broom handle and turn its handle to raise the bucket higher.



4. Hold the head of the broom and turn the broom handle to raise the bucket higher.

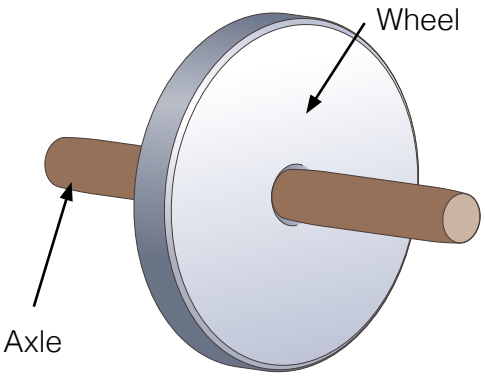


5. Compare which part of the broom makes it easier to lift the bucket.
6. Share your ideas with your classmates. Talk about how wheel and axle works.

The broom handle represents an axle, and the head of the broom represents a wheel!

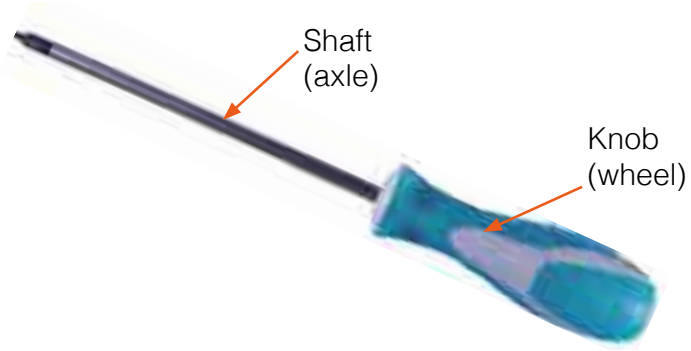
Summary

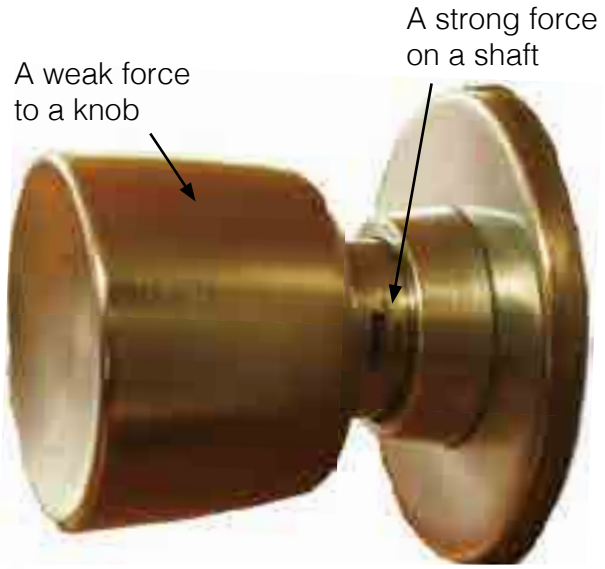
A **wheel and axle** is a simple machine made up of two parts; a wheel and an axle. The **wheel** is a round disk. The **axle** is a rod that runs through the centre of the wheel. When the wheel is turned, the axle is also turned.



Wheel and Axle

The wheel and axle makes work easier by increasing the strength of the force. A doorknob is one example of a wheel and axle. The knob is the wheel and the shaft is the axle. When we turn the knob with a weak force, it changes to a strong force on the shaft. Then we can open and close doors easily.



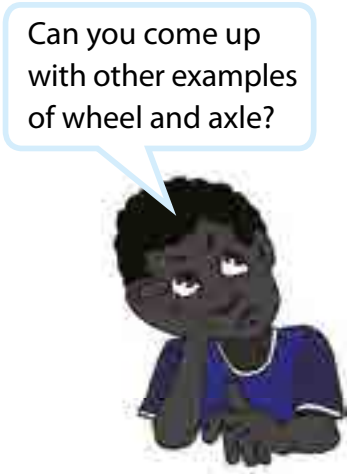


A wheel and Axle can change the strength of the force.

A wheel and axle is used in many ways. Screwdrivers and faucets are examples of devices that use wheel and axle.


Faucet


Screwdriver



Lesson 6: "Wedge"

A wedge is one of the simple machines. It is V-shaped like a knife. We use a wedge in many ways.

How does a wedge make work easier?

Activity : Splitting clay

What We Need:

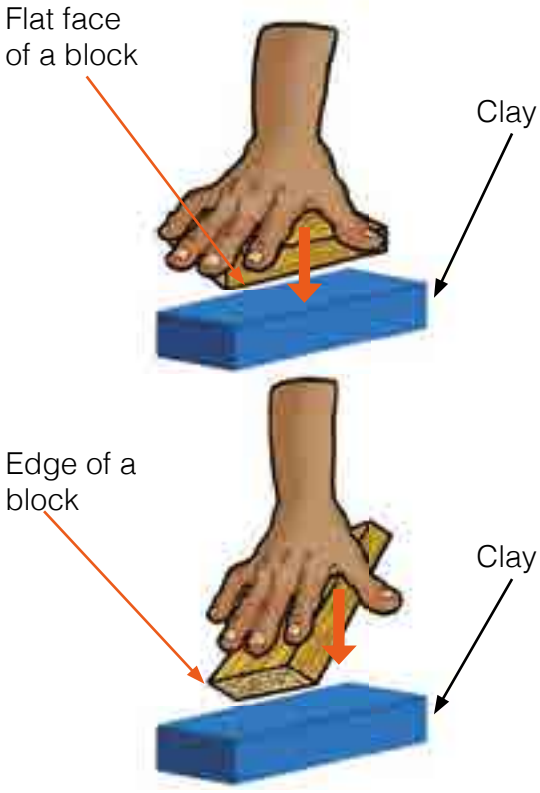
- rectangular block, clay

What to Do:

1. Draw a table like the one shown below in your exercise book.

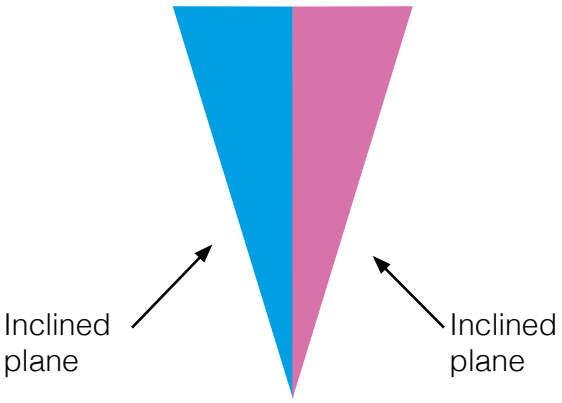
Which way can you split the clay easily?	How does a wedge work?

2. Place clay on a table.
3. Place the flat part of a rectangular block on the clay. Push it down and try to split the clay.
4. Place the edge of a rectangular block on the clay. Push it down and try to split the clay.
5. Record which way is easier to split the clay in the table.
6. Share your findings with your classmates. Talk about how a wedge works.

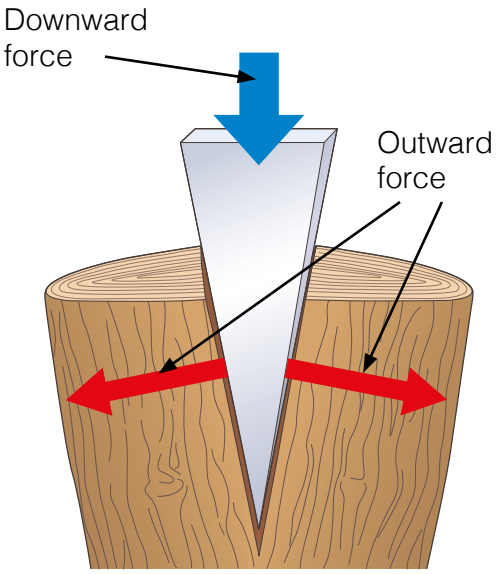


Summary

A **wedge** is a simple machine made up of two inclined planes back to back. These planes meet and form a sharp edge. This edge can cut or split objects apart. Wedges change the direction of the force. When we push down on a wedge, we apply a downward force. The wedge changes the downward force to an outward force. This helps to cut or split objects into two pieces. Wedges are used in many ways. Knives, axes, doorstops and nails are examples of wedges.



Wedge



A wedge changes a downward force to an outward force.


Splitting a log with an axe


Cutting an apple with a knife


Holding back a door with a doorstop

Lesson 7: "Screw"

A screw is a simple machine. We can understand the screw by wrapping the paper around a pencil. The spiral shaped is a screw.

How does a screw work?

Activity : Turning a screw

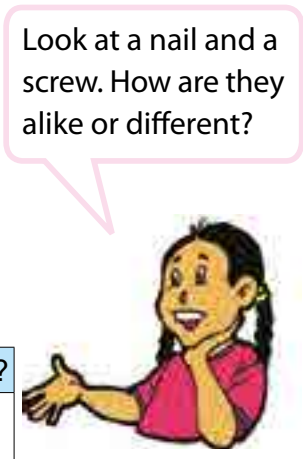
What We Need:

- nail, screw, hammer, screwdriver, a piece of wood

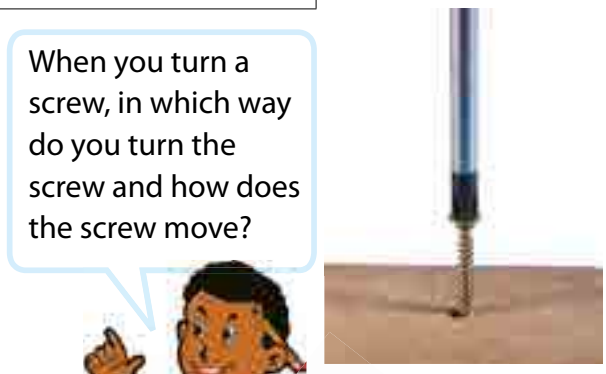
What to Do:

1. Draw a table like the one shown below.

How did the screw move?	Which is harder to get out of the wood?

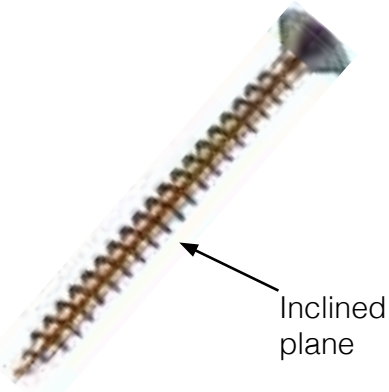


2. Turn a screw into a wood with a screwdriver paying attention to how the screw moves. Leave some part of the screw above the surface of the wood.
3. Hammer a nail into a wood with a hammer. Leave some part of the nail above the surface of the wood.
4. Pull the screw and the nail out of the wood with the claw of the hammer.
5. Record your findings in the table.
6. Share your findings with your classmates. Talk about how a screw works.



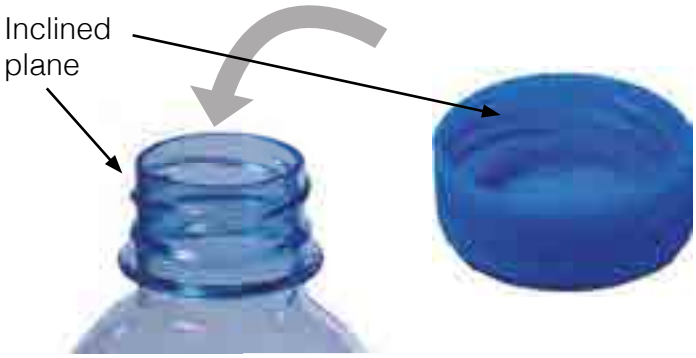
Summary

A **screw** is a simple machine made up of an inclined plane wrapped around a cylinder or a cone.



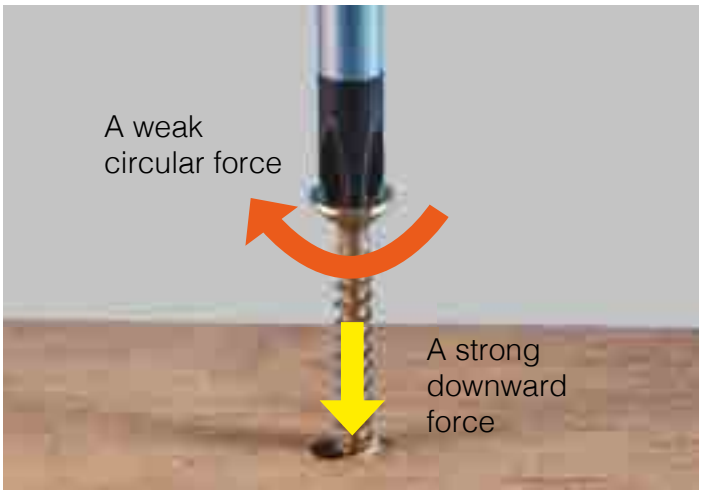
Screw

Screws are used to hold objects together. The top of a plastic bottle has an inclined plane and a bottle cap has a matching inclined plane on the inside. When we turn the bottle cap, the inclined planes help it to hold the bottle and the cap better.



Inclined plane helps it to hold or tighten the plastic bottle.

Screws can change a weak force to a strong downward or upward force. When we turn a screw with a screwdriver, we apply a weak force. The weak force applied to the screw changes to a strong downward force to move the screw into a wooden board.



Screws can change a weak force to a strong downward or upward force.

The screws are used in many ways. Examples of screws include bolts, screws, bottle caps, light bulbs and car jacks.


Bolt


Car jack


Light bulb

Summary and Exercise

Summary 16.2 Machine and Its Work

Six Simple Machines

- Work is the movement of an object by using a force.
- There are six types of simple machines that can make work easier.

Lever A lever is made up of an arm and a fulcrum. It is easier to lift and move objects with a lever.	
Inclined Plane An inclined plane is made up of a slanted surface. It decreases a force to move an object to a higher position but increases the distance.	
Pulleys A pulley consists of a wheel with a groove. It is useful to lift or lower an object. There are two main types of pulleys, fixed pulley and movable pulley.	
Wheel and Axle A wheel and axle is made up of two parts; a wheel and an axle. When we turn the wheel with a weak force, it changes to a strong force on the axle.	
Wedge A wedge is made up of two inclined planes back to back. These planes meet and form a sharp edge. This edge can cut or split objects apart.	
Screw A screw is made up of an inclined plane wrapped around a cylinder or a cone. They are used to hold objects together.	

Summary and Exercise

Exercise 16.2 Machine and Its Work

Q1. Complete each sentence with the correct word.

(1) A simple _____ is a tool that can make work easier.

(2) Work is the movement of an object by using a _____.

(3) A _____ is made up of an arm and a fulcrum.

(4) A _____ is made up of two inclined planes back to back.

(5) A _____ is made up of an inclined plane wrapped around a cylinder or a cone.

Q2. Choose the letter with the correct answer.

(1) Which of these shows a Wheel and Axle?

A. Scissor B. Hammer C. Door knob D. Slope




(2) Which simple machine has two inclined planes placed together and it is used to help cut objects?

A. Lever B. Wedge C. Screw D. Pulley

Q3. Answer the question below.

What type of simple machines are shown in the pictures?

					
1.	2.	3.	4.	5.	6.

Q4. Explain the difference between a fixed pulley and a movable pulley.


Speed of animals

What animal is the fastest on the land? The cheetah is the fastest land animal in the world. It runs much faster than every other land animal alive today. The fastest human in the world recorded about 9.6 seconds to run 100 metres, while the cheetah can run the same distance in only 3.2 seconds in the same distance.

Cheetahs live in Africa

Different animals move at different speed

Chapter Test

16. Force and Motion

Q1

Complete each sentence with the correct word.

(1) An object's _____ is its location or place.

(2) The measure of how fast an object is moving is its _____.

(3) A simple machine is a tool that can make _____ easier.

Q2

Choose the letter with the correct answer.

(1) Which of these tools is a type of screw?

A. Flagpole
B. Doorknob
C. Scissor
D. Jar lid

(2) Which one of these would be best to use to move a box out of the truck?

A. A pulley
B. A lever
C. A wheel and axle
D. An inclined plane

(3) Which of the following describes the change in the position of an object?

A. Force
B. Motion
C. Distance
D. Direction

(4) Which of the following defines the path that an object takes?

A. Direction
B. Motion
C. Distance
D. Force

Q3

(1) What is a type of simple machine often used to hold things together?

_____

(2) A doorknob is an example of what kind of simple machine?

_____

(3) Label the simple machine found in each picture below.

		
A	B	C

(4) What are the three things that describe the motion of an object?

_____

Q4

(1) How does a pulley make work easier?

_____

_____

(2) Ellanie wants to move a clock face from her room to the living room. What happens to the position of the clock face if she moves it?

_____

_____

Science Tool Box

1. How to use a Thermometer
2. How to use a Compass
3. How to use a measuring cylinder

I would like to use these science tools in the lesson!

Let's check and learn how to use the science tools here.

Compass

Measuring cylinder

Thermometer

How to use a Thermometer

1. What is a thermometer?

A thermometer is an instrument we use to measure temperature. A thermometer consists of a glass tube with marks on it. When the liquid in the glass tube is heated, it expands and begins to rise up the tube. Temperature is measured in degree Celsius [°C].

2. Measuring temperature

STEP 1:

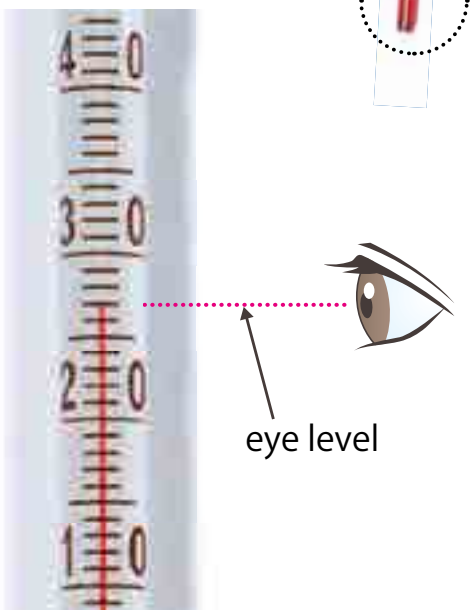
Place the bulb in the place where you want to measure the temperature. Make sure that there are no bright lights or direct sunlight shining on the bulb.

STEP 2:

Wait for a few minutes until the liquid in the tube stops moving. Position your eyes at the same level with the top of the liquid in the tube.

STEP 3:

Read the scale line that is closest to the top of the liquid. The thermometer as shown on the right shows 27 °C.



How to use a Compass

Compass

1. What is a compass?

A compass is an instrument you use for finding directions (North, South, East and West). It has a dial and a magnetic needle that always points to the north/south. This helps you to locate your position on a map and to set the direction you wish to travel.

2. Finding directions

STEP 1:

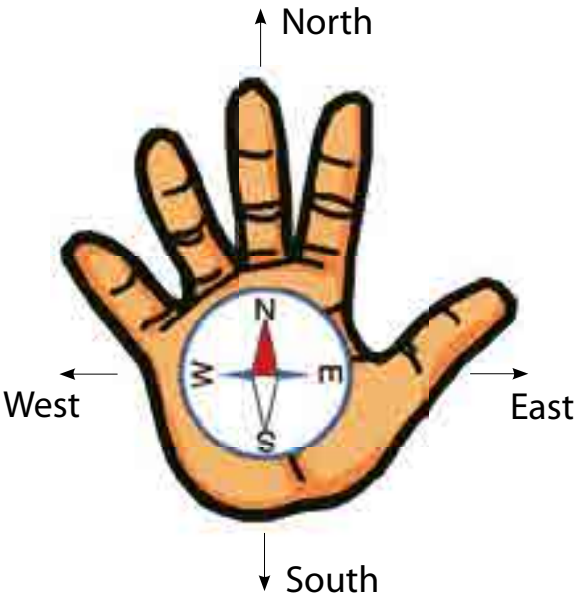
When you want to face North, place the compass flat on your palm and hold your palm in front of your chest as shown in the picture on the right.

STEP 2:

Turn your body until the magnetic needle comes to the North sign on the dial. When the needle overlaps the North sign on the dial, you are facing North.

STEP 3:

Find other directions when you are facing North. Your right side points to East and left side points to West, and your back is facing the South when you are facing North.



How to use a measuring cylinder

1. What is a measuring cylinder?

Measuring cylinder, beaker and measuring jar are used to measure the volume of water.

Volume of water is often measured in millilitre (mL) or in litre (L).

2. Measuring Volume of Water

STEP 1:

Pour some water into a measuring container.

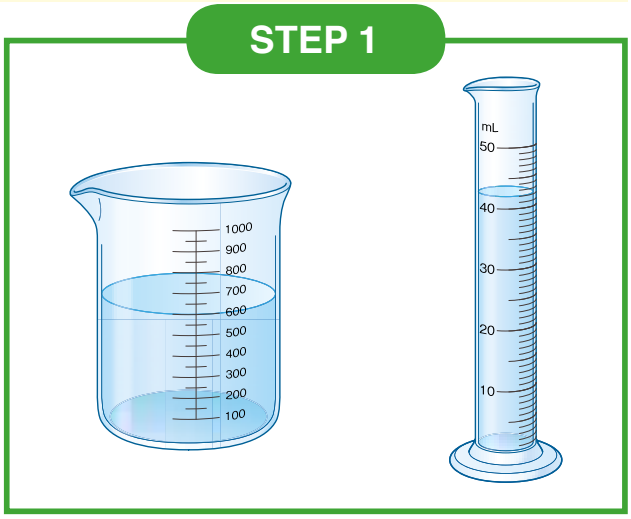
STEP 2:

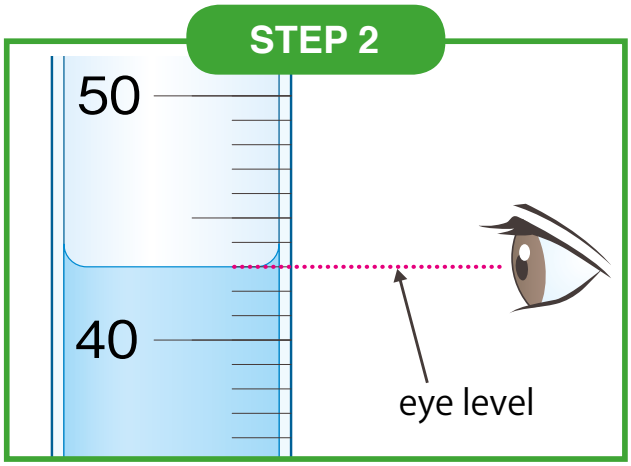
Position your eyes at the level with the top of the water. Read the scale line that is closest to the surface of the water.

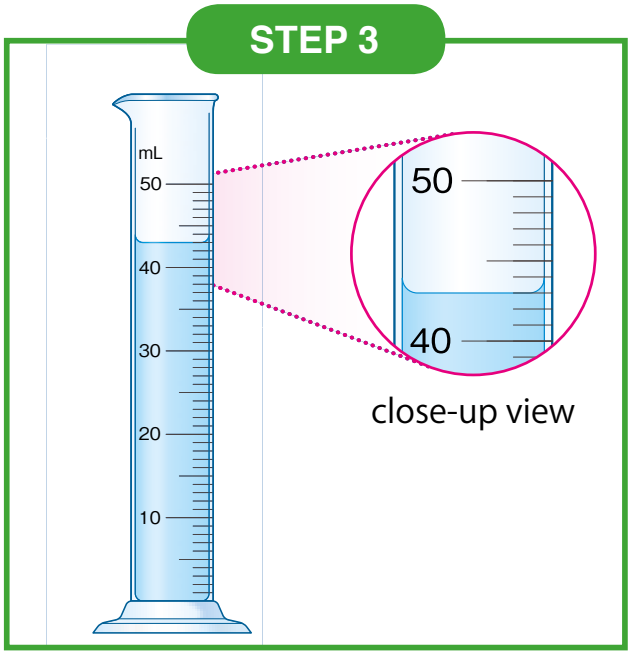
If the surface of the water is curved up on the sides, look at the lowest point of the curved water surface.

STEP 3:

Read the measurement on the scale. The volume of water in the figure on the right is 43 mL.







Answer of Exercise

Chapter 1, Topic 1, Page 18

Q1 (1) energy (2) oxygen (3) shelter (4) food (5) food

Q2. (1) D (2) A

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.

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 cotton and animal furs.

Chapter 3, Topic 1, Page 36

Q1. (1) pottery (2) pollution (3) landfill (4) compost

Q2. (1) D (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 burry rubbish (2) (Example of the answer) Waste disposal on the soil / To many uses of fertilizer or insecticides in agriculture / Harmful materials left behind in soil after mining of natural resource.

Q4. (Example of answer) Soil pollution can be prevented by: picking up trash or rubbish / putting trash or rubbish in correct places / using the 3R's (reduce, reuse and recycle) / using compost instead of fertilizers, etc.

Chapter 5, Topic 1, Page 54

Q1. (1) Air (2) Wind (3) compressed (4) volume

Q2. (1) C (2) C

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

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

Chapter 6, Topic 1, Page 66

Q1. (1) Temperature (2) Clouds (3) Precipitation (4) Wind

Q2. (1) D (2) D

Q3. (1) Thermometer (2) temperature (3) It is used to measure strength and direction of wind.

Q4. (Example of the answer) On a sunny day people can go swimming, go to the market or garden, and play outdoor sports and so on / On a rainy day people use umbrella to cover themselves from getting wet, stay indoors and so on / On a cold day people wear warm clothes and sit by a fire place to keep warm and so on.

Chapter 8, Topic 1, Page 80

Q1. (1) electricity (2) Thomas Edison (3) electricity (4) outlet (5) battery

Q2. (1) D (2) B

Q3. (1) The cord of the TV has to be connected to the outlet (2) Because it uses dry cells/ battery as a power source.

Q4. (Example of the answer) No dry cells(battery) inside / Flat dry cells (battery)

Chapter 8, Topic 2, Page 90

Q1. (1) electricity(2) negative (3) metal (4) conductors (5) insulator

Q2. (1) D (2) B

Q3. (1) Bulb socket (2) Bulb (3) Wires (4) Battery (5) Switch

Q4. (Example of the answer) The rubber is an insulator. It prevents the electric current from flowing through our body and getting electric shocks.

Chapter 2,4,7,9, Page 100

Q1. (1) seed (2) Plant (3) Fruits (4) Life cycle

Q2. (1) A (2) D

Q3.

	Peanut	Water melon
Colour	Brown	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 the seeds.

Chapter 10, Topic 1, Page 114

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 small shape called seeds or eggs. They gradu-

ally grow by changing shapes and finally reproduce their seeds or eggs and continue life cycle of next generations.

Chapter 11, Topic 1, Page 128

Q1. (1) vibrate (2) Vibration (3) Volume (4) medium (5) pitch

Q2. (1) B (2) D

Q3. Sound

Q4. (Example of the Answer) Because there is not enough medium which the vibrations of their small voice travels through.

Chapter 12, Topic 1, Page 142

Q1. (1) physical properties (2) new (3) five

Q2. (1) C (2) C

Q3. A chemical change

Q4 (Example of the answer) By folding the coloured A4 paper to make the paper plane.

Chapter 12, Topic 2, Page 154

Q1. (1) states (2) Melting (3)Water vapour

Q2. (1) A (2) B

Q3. 100 °C

Q4 Tiny water droplets would be formed on the surface of the mirror.

Chapter 13, Topic 1, Page 168

Q1. (1) source (2) man-made (3) condensation

Q2. (1) B (2) A

Q3. (Example of the answer) Rivers, lakes, streams, ponds and springs, etc.

Q4.(Example of the answer) 1) Evaporation: Heat from the Sun cause water in ocean to change to water vapour. 2) Condensation: The water vapour in the air cools and change to tiny droplets that form clouds. 3) Precipitation: The droplets in clouds become larger and fall down as rain.

Chapter 13, Topic 2, Page 176

Q1. (1) water (2) oil (3) trash (or rubbish) (4) electricity

Q2. (1) A (2) C

Q3. (1) We use water to drink and water plants., etc. (2) Avoid throwing trash, avoid throwing oils down the drain, etc.

Q4. We will absorb the harmful materials if we eat polluted fish.

Chapter 14, Topic 1, Page 192

Q1 (1) bones (2) joints (3) with (4) without

Q2 (1) A (2) C

Q3 (1) Tendons (2) Triceps (3) Biceps (4) Muscle Y contract and muscle X relax

Q4 (Example of the answer) If there is no bones in our body, we cannot keep our body shape. We cannot stand and even cannot move. Our organs inside the body are not protected and face the dangerous situation. As a result, we simply die.

Chapter 15, Topic 1, Page 204

Q1. (1) moon (2) phases (3) east / west

Q2. (1) B (2) C

Q3. (1) Waning Crescent (2) It reflects light from the Sun.(3) 29.5 days

Q4. Both the Moon and the Sun rise into the sky in the east, moves across the sky at highest position and sets in the west.

Chapter 16, Topic 1, Page 216

Q1. (1) position (2) Distance (3) direction (4) Speed

Q2. (1) A (2) C

Q3. (1) Force

Q4. (Example of the answer) Walking speed of Amy is faster than that of Ellie. Amy travelled longer distance than Elli, while their time to travel are same. It means Amy can walk faster than Ellie.

Chapter 16, Topic 2, Page 232

Q1. (1) machine (2) force (3) lever (4) wedge (5) screw

Q2. (1) C (2) B

Q3. (1) Lever (2) Screw (3) Inclined plane (4) Pulley (5) Wheel and axle (6) Wedge

Q4. (Example of the answer) Fixed pulley is fixed in one place and cannot be moved. It changes the direction of the force but it does not change the amount of force needed to lift the object. / A movable pulley is a pulley that is free to move up and down. It lets us use less force to lift an object but we must pull the rope a longer distance than the object moved.

Glossary

Anther is the part of a male flower which contains pollen. 72
Battery is a device that makes it easy to carry electricity any where you go. 78
Boiling of water means that large bubbles are formed in the water actively. 78
Boiling point of water is the point at which the water boils actively, which is 100°C 146
Bones support our body and give the body shape. 182
Chemical change is a change in matter in which new kind of matter is formed. 138
Chemical property is the ability to change into new matter that has different properties. 138
Chrysalis is a special case which a pupa makes to protect itself. 106
Compost is a mixture of naturally decaying matter such as plants and animals. 34
Condensation is a change of state from air to liquid. 164
Conductor is a material that electric current easily flows through. 86
Crater is a round hole in the surface of the moon. 198
Direction is the path that an object takes. Direction is expected by comparing its current position to its past position. 212
Distance is a measure of how far an object has travelled from its starting point. 212
Electric circuit is the circle of a pathway that electricity flows. 82
Electric current is the flow of electricity. 84
Evaporation is a change of state from liquid to gas. 162
Fruit comes from flowers and they contain seeds. 96
Gas of water is the invisible form of water. 152
Inclined plane is one of the simple machines that uses slanted surface to move objects from a lower position to a higher position with less force. 218
Insulator is a material that electric current does not flow through easily. 86
Joint is the body part where two bones join together. 184
Landfill is an area where garbage is an area where garbage is thrown. 28
Larva is called a caterpillar, hatches from an egg. 106
Lever is a simple machine made up of an arm and a fulcrum. 218,220
Life cycle is the series of changes that a plant goes through during its life. 24
Liquid water means water that we are most familiar with at room temperature. 152
Medium is a matter that transports sound. 122
Melting means changing a form from solid to liquid. 150
Melting point of water is the point at which the ice starts to melt, which is 0°C. 150
Metal is a material such as iron and aluminum. 86
Motion is the change in the position of an object. An object in motion moves from one place to another. 210
Muscle is under our skin and covers our bones. We use our muscles when we play and work. 188
Nymph is the young insect in the stage before the adult insect. 106
Oxygen is one of the gases in the air. 12
Petal is the bright colourful parts of a flower. 72
Phases of the moon mean a series of changing shapes of the bright part of the moon that we can see. 202
Physical change is a change in physical properties of matter. It may make the matter look different, but it does not change the material of matter itself. 136

Physical property is a characteristic of matter that can be measured or observed with the five senses without changing the matter itself. 134
Pistil is a female part of a flower. 72
Pitch means how high or low a sound is. 126
Pollen is a fine powder produced by flowers, which is carried by the wind or by insects to other flowers. 72
Position is the place or location of an object. 210
Precipitation is any form of water that falls from clouds such as rain, snow, and hail. 62,166
Pulley is a wheel to lift or lower an object easily. 218
Pupa is one of stage in the life cycle before an insect becomes adult, when it is protected by a special case. 106
Screw is a simple machine made up of an inclined plane wrapped around a cylinder or cone to change a weak force to a strong downward or upward force. 218,230
Seed is the part produced by plants from which a new plant grows. 24
Seedling is a young plant that grows from a seed. 42
Shelter is a place where animals can be safe. 12
Simple machine is a tool or device that can make work easier. 218
Soil pollution is the addition of harmful materials to the soil. 29
Solid of water means iced water. 152
Sound is a form of energy that you can hear. 120
Speed is a measure of how fast an object is moving. 212,214
Stamen is a male part of a flower. 72
Steam are the visible tiny water droplets floating in the air when water is boiling. 148
Stigma is the top of the centre part of a flower that receives the pollen. 72
Tadpole is the stage of the frog when the frog eggs hatches. 108
Thermometer is a tool to measure temperature 62
Three R's means "Reduce", "Reuse things", and "Recycle things". 34
Vibration is a quick movement back and forth. 120
Volume is the amount of a space in a container. Or it means the amount of sound, such as soft or loud. 48
Volume of sound is how soft or loud. 124
Water cycle is the movement of water between the air and the Earth as water changes its state. 166
Water pollution is the addition of harmful things to water. Waste, sewage, oil, and detergent spilled in water can be harmful things. 172
Water vapour is gaseous state of water. 148
Weather is the conditions of the air and the sky at a particular time and place. 60
Wedge is a simple machine made up of two inclined planes back to back to form a sharp edges. 218,228
Wheel and axle is one of the simple machines to make work easier by increasing the strength of the force. 228,226
Wind is moving air. 46,62
Work in science means the movement of an object by using force. 218

Animals of PNG


Whale shark
Yellowfin tuna
Green tree python
Red-knobbed imperial pigeon
Rhinoceros beetle
Skipjack tuna
Coconut crab
Lacey scorpionfish
Map puffer
Bottlenose dolphin
Queen alexandra's birdwing
Clownfish
Saltwater crocodile
Dugong

continued

● Mammals ▲ Birds ■ Reptiles ◆ Amphibians
◉ Fish ★ Insects ◎ Others

Animals in Land and River


● Short-beaked echidna


● New Guinea quoll


● Sugar glider


● Chestnut tree mouse


▲ Fawn breasted bowerbird


▲ Papuan frogmouth


▲ Azure kingfisher


▲ Grey crow


■ Slender emo skink


■ Ground gecko


■ Papuan tree dragon


■ Slatey-grey snake


◆ Striped rocket frog


◆ Brown river tree frog


★ Longhorn beetle


★ Rainbow ant


★ New Guinea birdwing


★ Katydid


◎ New Guinea tarantula

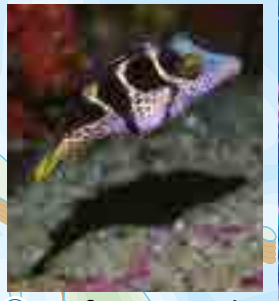

◎ Freshwater crab

Animals of PNG

Animals in Ocean

False killer whale

Leatherback turtle



Pacific crown toby

Blue-girdled angelfish

Teira batfish

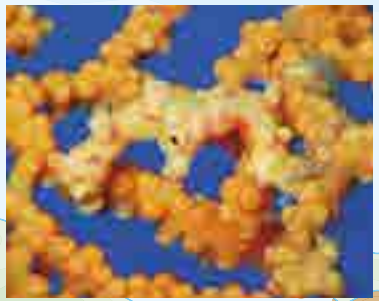
Yellow and blueback fusilier

Purple anthias

Grey reef shark

Manta ray

Blackfin barracuda



Denise's pygmy seahorse

Ornate ghost pipefish

Cuttlefish

Nudibranch

Painted spiny lobster

Squat shrimp

Giant clam

Cushion seastar

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