Chapter 5. Energy

Chapter Objectives

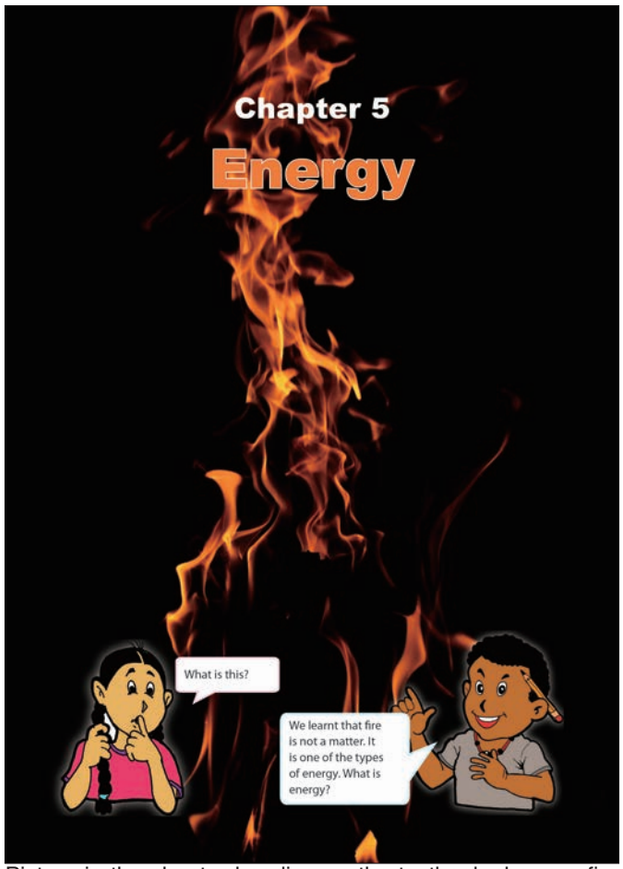
Students will be able to recognise types of energy around us as light, electrical, heat and sound energy and their uses in our lives.

Topic Objectives

5.1 Energy around Us

Students will be able to;

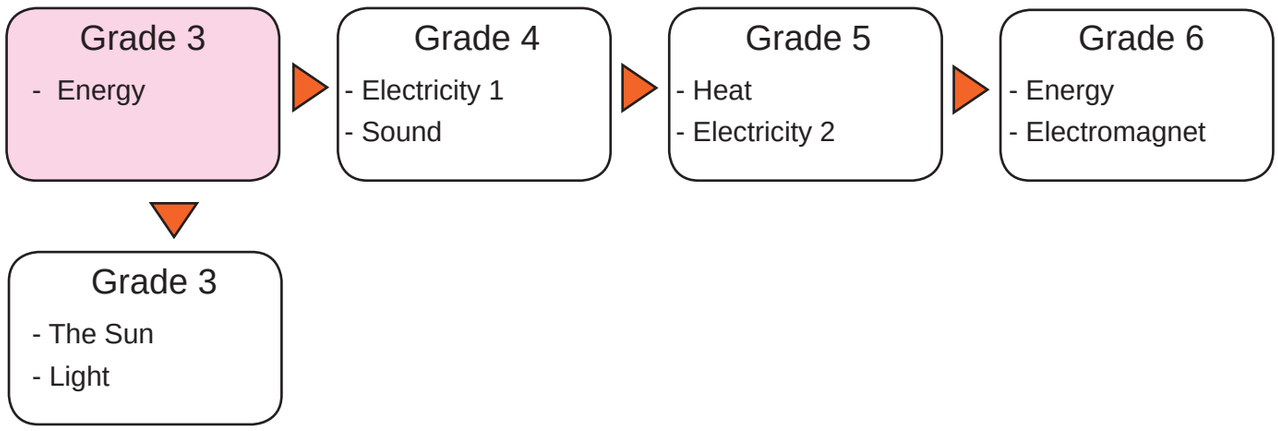
- Identify different types of energy in daily life such as light, electricity, heat and sound.
- List the uses of light, electrical, heat and sound energy in our daily lives.



Picture in the chapter heading on the textbook shows a fire from burning wood as one of the sources of heat energy.

Related Learning Contents

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



Teaching Overview

This chapter consists of 4 lessons, each lesson is a double period.

Topic	Lesson No.	Lesson Title and Key Question	Content standard in syllabus	Textbook page number
5.1 Energy around Us	1	**Energy** What is Energy?	3.2.1	109 - 110
	2	**Uses of Energy** How do we use energy in our daily life?		111 - 112
	3	Summary and Exercise		113 - 115
Chapter Test	4	Chapter Test		116 - 117

Unit	Chapter : **5. Energy**	Total lesson No: 46 / 94
Energy	Topic : **5.1. Energy around us**	Textbook page: 109 - 110

Lesson 1 / 4

Lesson Title

Energy

Preparation

- Nil

Lesson Flow

1 Introduction (5 min.)

- Encourage students to think about energy by asking this question.

Q: Have you ever heard about energy?
Q: What do you imagine what energy is?

2 Introduce the key question

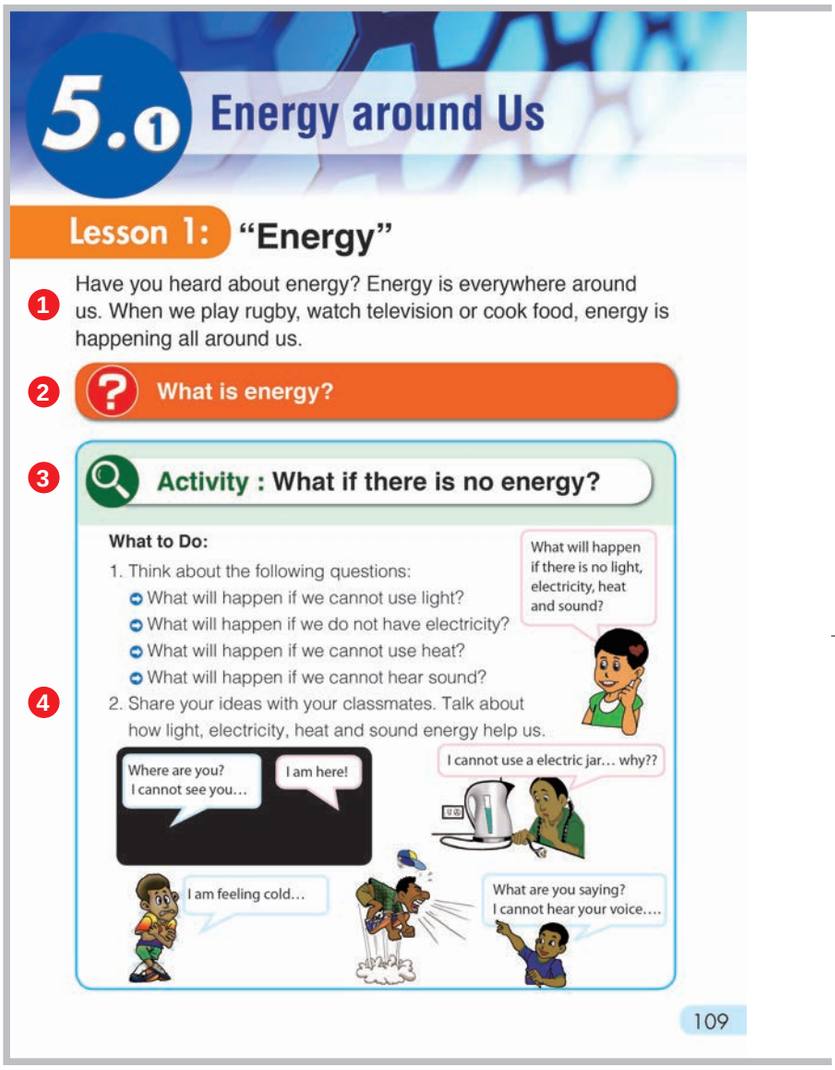
What is Energy?

3 Activity (20 min.)

- Organise students into groups.
- Explain the steps of the activity.
- Have students do the activity and ask them to record their findings in the table.
- Advise students to refer to the pictures in the activity and the character's talking for their investigation.
- After that, ask students to discuss how light, electricity, heat and sound help us based on their findings as a group.

4 Discussion (20 min.)

- Ask students to present their findings from the activity.
- Write students finding on the blackboard.
- Facilitate active student discussion. (Continue)



5.1 Energy around Us

Lesson 1: "Energy"

1 Have you heard about energy? Energy is everywhere around us. When we play rugby, watch television or cook food, energy is happening all around us.

2 What is energy?

3 Activity : What if there is no energy?

What to Do:

1. Think about the following questions:
   - What will happen if we cannot use light?
   - What will happen if we do not have electricity?
   - What will happen if we cannot use heat?
   - What will happen if we cannot hear sound?
2. Share your ideas with your classmates. Talk about how light, electricity, heat and sound energy help us.

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Teacher's Notes

Energy is a word with more than one meaning. In **science** it is mostly used to describe how much potential a physical system has to change. In physics, energy is a property of matter. It can be transferred between objects and converted in any form but it cannot be created or destroyed.

Demonstrating the definition of energy

Students use energy every day of their lives but do not realise that energy enables things to work.

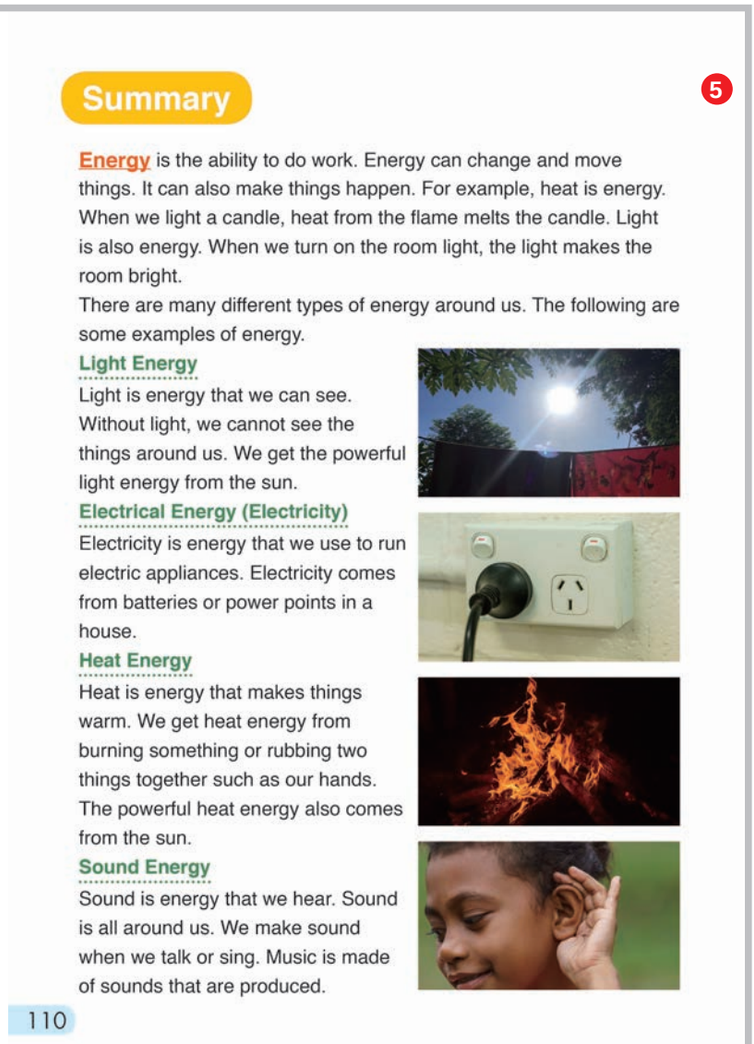
- The definition "energy is the ability to do things" could be demonstrated by using a flashlight. Students know that a flashlight only works (lights up) when it has batteries in it. Demonstrate by switching on the flashlight without the battery. At this point students will know that it needs something to make it light therefore you should ask "what does the flashlight need to make it work?" The answer would be battery obviously.
- You carefully explain that the battery has energy and that this energy enables the flashlight to do something which is to "light up" when it is switched on. Teacher should demonstrate now with the battery in the flashlight.

Lesson Objectives

Students will be able to:
- Define energy.
- Identify the different types of energy around them.

Assessment

Students are able to:
- Explain what energy can do.
- Describe how different types of energy such as light, electrical, heat and sound help people.
- Investigate the different kinds of energy with interest.



Summary

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Energy is the ability to do work. Energy can change and move things. It can also make things happen. For example, heat is energy. When we light a candle, heat from the flame melts the candle. Light is also energy. When we turn on the room light, the light makes the room bright.

There are many different types of energy around us. The following are some examples of energy.

Light Energy

Light is energy that we can see. Without light, we cannot see the things around us. We get the powerful light energy from the sun.

Electrical Energy (Electricity)

Electricity is energy that we use to run electric appliances. Electricity comes from batteries or power points in a house.

Heat Energy

Heat is energy that makes things warm. We get heat energy from burning something or rubbing two things together such as our hands. The powerful heat energy also comes from the sun.

Sound Energy

Sound is energy that we hear. Sound is all around us. We make sound when we talk or sing. Music is made of sounds that are produced.

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- Confirm the findings with students.
- **Based on their findings,** asks the following questions as discussion points.

Q:How can light help us? (Light helps us to see the things around us, etc.)

Q:How can electricity help us? (Electricity helps us run electrical appliances, move something, etc.)

Q:How can heat help us? (Heat makes things warm, cook food, etc.)

Q:How can sound help us? (Sound helps us to listen to music, talk or sing, etc.)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask the following questions as assessment:
  Q: What is energy?
  Q: What types of energy are there?
  Q: What are light, electrical, heat and sound energy?
  Q: Explain how light, electrical, heat and sound energy work.
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:

"Energy?"

Key question

What is energy? (Write students answers)

Example: heat energy

Activity

What if there is no energy?

- We wouldn't see anything without light
- We wouldn't watch television without electricity
- We wouldn't keep warm without heat
- We wouldn't hear anything or talk with each other.

Discussion

Q: How can light help us?

Light helps us to see the things around us, etc.

Q: How can electricity help us?

Electricity helps us run electric appliances, move something, etc.

Q: How can heat help us?

Heat makes things warm, cook food, etc.

Q: How can sound help us?

Sound helps us to listen to music, talk or sing, etc.

Summary

- Energy is the ability to do work.
- Energy can change and move things. It can also make things happen.
- There are different types of energy such as light, electrical, heat, and sound.
- Light is energy that we can see.
- Electricity is a form of energy that we can use to run electrical appliances.
- Heat is energy that makes things warm.
- Sound is energy that we can hear.

Unit	Chapter : **5. Energy**	Total lesson No: 47 / 94
Energy	Topic : **5.1. Energy around us**	Textbook page: 111 - 112

Lesson 2 / 4

Lesson Title

Uses of Energy

Preparation

- Nil

Lesson Flow

1 Introduction (5 min.)

- Review the previous lesson

Q: What is energy?

Q: What types of energy are there?

- Encourage students to think about the uses of energy by asking the question:

Q: We need energy for our daily lives. How do we use energy?

2 Introduce the key question

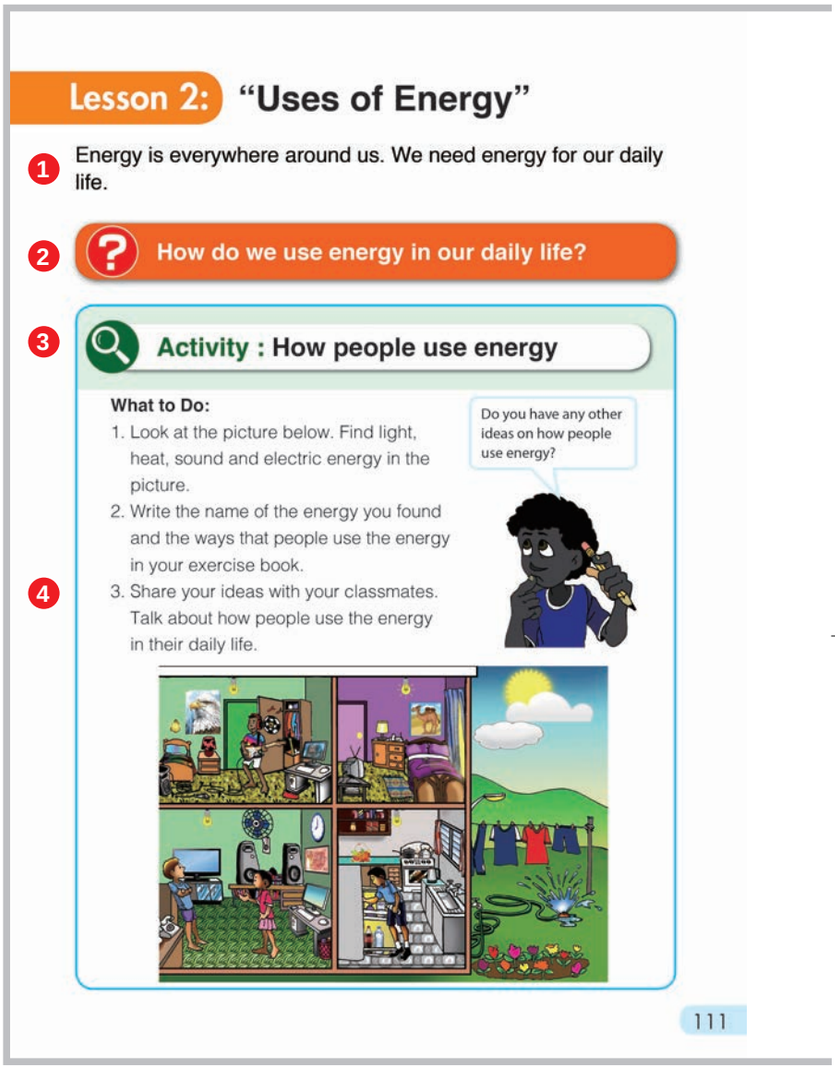
How do we use energy in our daily life?

3 Activity (20 min.)

- Organise students into some groups.
- Explain the steps of the activity.
- Have students do the activity and ask them to record their findings in the table.
- Advise students to refer to the picture in the activity and the character's talking for their investigation.
- After that, ask students to discuss how people use energy in daily life based on their findings as a group.

4 Discussion (20 min.)

- Ask students to present their findings from the activity.
- Write students finding on the blackboard.
- Facilitate active student discussion. (Continue)



Lesson 2: "Uses of Energy"

1 Energy is everywhere around us. We need energy for our daily life.

2 How do we use energy in our daily life?

3 Activity : How people use energy

What to Do:

1. Look at the picture below. Find light, heat, sound and electric energy in the picture.
2. Write the name of the energy you found and the ways that people use the energy in your exercise book.
3. Share your ideas with your classmates. Talk about how people use the energy in their daily life.

4

Do you have any other ideas on how people use energy?

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Teacher's Notes

Here are some examples to provoke students' thinking of how energy is used.

i) When we are cold what type of energy do we need to keep warm? Ask students to describe examples of how to keep warm. Possible answers: We rub of hands together, make a fire and sit next to it or wear warm thick clothing to trap our body heat.

ii) If you were walking back after a feast at night from the next village. What kind of energy would you use to make it easy for you to walk safely to your village?
Possible response: Use a solar flashlight, a mobile phone flashlight, dry cell (battery) flashlight, use a burning wood or tied coconut fronds.

iii) What kind of energy is used when a little baby wants to let the mother know that it is hungry or is uncomfortable? Possible answers: the baby will use sound energy when it cries to alert the mother.

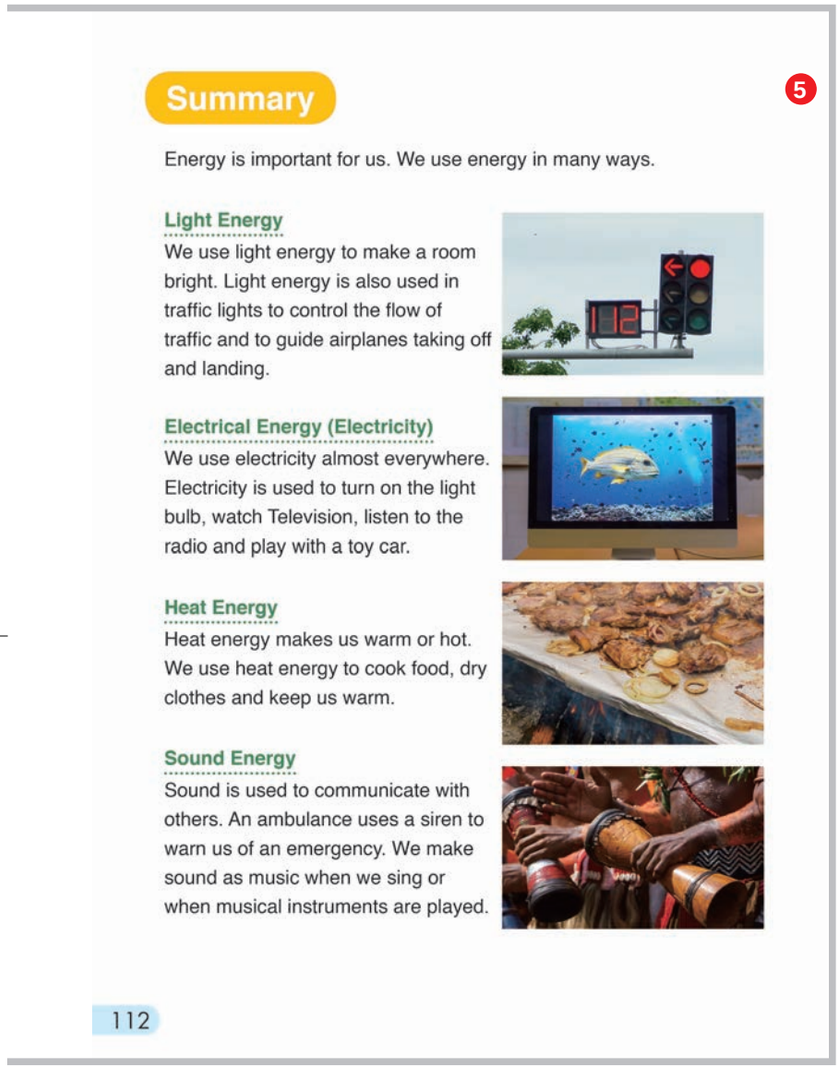
iv) What kind of energy is used to light up the street lights? Possible answer: electrical energy

Lesson Objectives

Students will be able to:
- Identify the ways to use different types of energy in daily lives.

Assessment

Students are able to:
- Explain how people use light, electrical, heat, and sound energy in their daily life.
- Investigate the uses of energy with interest.



Summary 5

Energy is important for us. We use energy in many ways.

Light Energy
We use light energy to make a room bright. Light energy is also used in traffic lights to control the flow of traffic and to guide airplanes taking off and landing.

Electrical Energy (Electricity)
We use electricity almost everywhere. Electricity is used to turn on the light bulb, watch Television, listen to the radio and play with a toy car.

Heat Energy
Heat energy makes us warm or hot. We use heat energy to cook food, dry clothes and keep us warm.

Sound Energy
Sound is used to communicate with others. An ambulance uses a siren to warn us of an emergency. We make sound as music when we sing or when musical instruments are played.

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- Confirm the findings with students.
- **Based on their findings,** asks the following questions as discussion points.

Q:How do we use light energy? (To make a room bright, to control the flow of traffic and to guide airplanes taking off and landing, etc.)

Q:How do we use electrical energy? (To turn on the light bulb, watch television, listen to the radio, and play with a toy car, etc.)

Q:How do we use heat energy? (To cook food, dry clothes and keep warm, etc)

Q:How do we use sound energy? (to communicate with others, use a siren to warn us of an emergency, make sound for music, etc.)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask the following questions as assessment:
  Q: How do we use light, electrical, heat and sound energy in daily life?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:
"Uses of energy"

Key question
How do we use energy in our daily life?

Activity
How people use energy?
Ligth energy: To make room bright
Sound energy: To play a guitar
Heat energy: To cook food
Electrical energy: To watch television, etc

Discussion
Q: How do we use light energy?
To make a room bright, to control the flow of traffic and to guide airplanes taking off and landing, etc
Q: How do we use electrical energy?
To turn on the light bulb, watch televison, listen to the radio, and play with a toy car, etc
Q: How do we use heat energy?
To cook food, dry clothes and keep warm, etc
Q: How do we use sound energy?
To communicate with others, use a siren to warn us of an emergency, make sound for music, etc

Summary
- We use energy in many ways:

1. Light energy:
To make a room bright, control the flow of traffic and guide airplanes taking off and landing, etc
2. Electrical energy:
To turn on the light bulb, watch television, listen to the radio, and play with a toy car, etc
3. Heat energy:
To cook food, dry clothes and keep warm, etc
4. Sound energy:
To communicate with others, make sound for music, etc

Unit	Chapter : **5. Energy**	Total lesson No: 48 / 94
Energy	Topic : **5.1. Energy around Us**	Textbook page: 113 - 115

Lesson 3 / 4

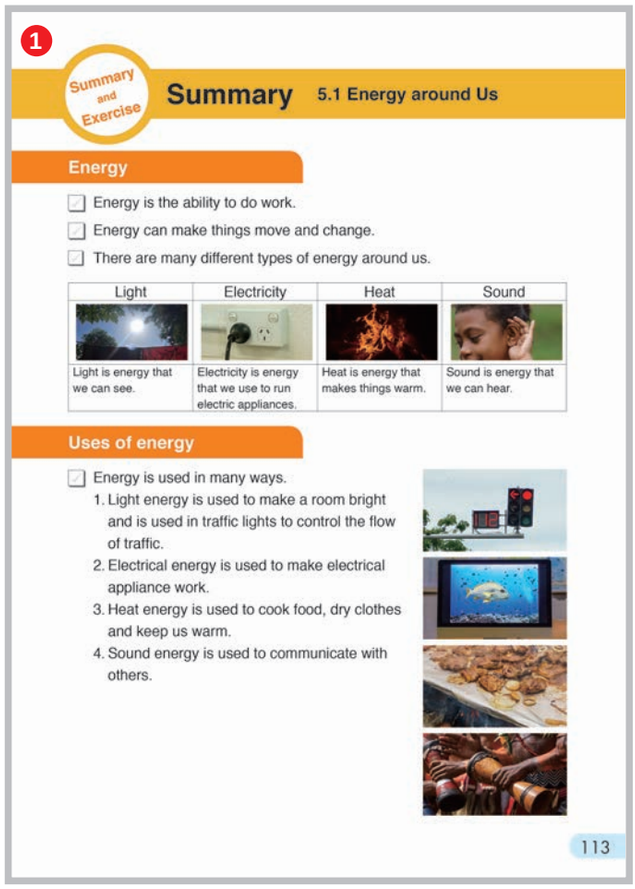
Lesson Title

Summary and Exercise

Tips of lesson

1 Summary (15 min.)

- Recap main learning contents covered in the topic on energy.
- Ask the students questions and verify student's understanding. Explain and correct the learning contents again if they still have some misconceptions.
- Provoke students to give examples of different forms of energy.
- Ask students to describe some examples of how energy is used in their life.



1

Summary and Exercise **Summary** 5.1 Energy around Us

Energy

- Energy is the ability to do work.
- Energy can make things move and change.
- There are many different types of energy around us.

Light	Electricity	Heat	Sound
Light is energy that we can see.	Electricity is energy that we use to run electric appliances.	Heat is energy that makes things warm.	Sound is energy that we can hear.

Uses of energy

- Energy is used in many ways.
  1. Light energy is used to make a room bright and is used in traffic lights to control the flow of traffic.
  2. Electrical energy is used to make electrical appliance work.
  3. Heat energy is used to cook food, dry clothes and keep us warm.
  4. Sound energy is used to communicate with others.

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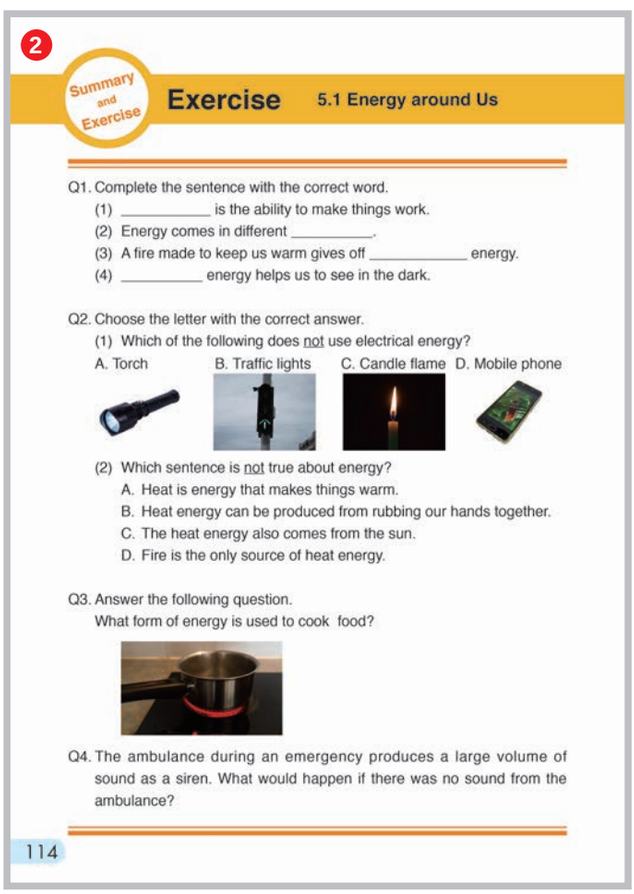
2 Exercise & Explanation (35 min.)

- Allow enough time for students to answer the question in their own understanding.
- After the exercise, give the answers to the questions and explain how to solve the questions of the exercise based on student's answers and thoughts



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Summary and Exercise **Exercise** 5.1 Energy around Us

Q1. Complete the sentence with the correct word.
(1) _____ is the ability to make things work.
(2) Energy comes in different _____.
(3) A fire made to keep us warm gives off _____ energy.
(4) _____ energy helps us to see in the dark.

Q2. Choose the letter with the correct answer.
(1) Which of the following does not use electrical energy?
A. Torch B. Traffic lights C. Candle flame D. Mobile phone

(2) Which sentence is not true about energy?
A. Heat is energy that makes things warm.
B. Heat energy can be produced from rubbing our hands together.
C. The heat energy also comes from the sun.
D. Fire is the only source of heat energy.

Q3. Answer the following question.
What form of energy is used to cook food?

Q4. The ambulance during an emergency produces a large volume of sound as a siren. What would happen if there was no sound from the ambulance?

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Exercise answers

Q1.

(1) **Energy**

(2) **Forms**

Light, electricity, heat and sound energy are learnt but there are also other forms energy that will be learnt in higher grades.

(3) **Heat**

Heat and light are given off from fire, but heat is needed for warmth.

(4) **Light**

Students may state device that gives light but emphasise that the energy that is used is light energy.

Q2.

(1) **C**

The candle frame does not use electrical energy. Students may state that flashlight does not use electricity but it does. Energy from the dry cell is changed to electrical energy which then converts to light energy.

(2) **D**

Make students understand that there are many sources of heat and fire is one of them.

Q3. **Heat and electrical energy**

In case students state light, accept the answers. Explain that the food cooks from heat from the stove element that uses electrical energy.

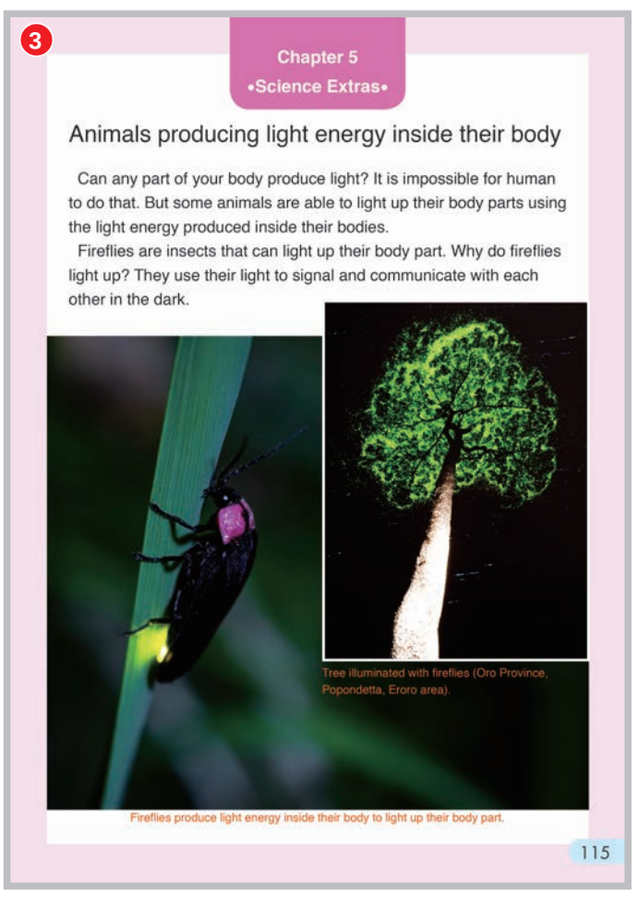
Q4. Sample of the answer

An ambulance uses the siren to warn drivers and people to get out of the way. If there was no sound the other drivers would not know and not make way for the ambulance.

Explanation of Science Extras

3 Science Extras (10 min.)

- Give opportunities to students to closely observe the nature and its phenomena in the world.
- Allow students to ask questions that demonstrate curiosity about the content in the science extras.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Chapter 5
•Science Extras•

Animals producing light energy inside their body

Can any part of your body produce light? It is impossible for human to do that. But some animals are able to light up their body parts using the light energy produced inside their bodies.

Fireflies are insects that can light up their body part. Why do fireflies light up? They use their light to signal and communicate with each other in the dark.

Tree illuminated with fireflies (Oro Province, Popondetta, Eroro area).

Fireflies produce light energy inside their body to light up their body part.

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Lesson
4 / 4

Lesson Title

Chapter Test

Answer of the Chapter Test

Chapter Test

5. Energy

Q1 Complete each sentence with the correct word.

(1) The ability to do work is called _____energy_____.
(2) The type of energy used to make food warm is _____heat_____.
(3) Animals use _____sound_____ to communicate with each other.
(4) We can use _____electricity_____ to run electric appliances.
(5) _____Light_____ is energy that we can see.

Q2 Choose the letter with the correct answer.

(1) What type of energy lights up a light bulb?
(A.) Electricity
B. Heat
C. Sun
D. Sound

(2) Which list contains only types of energy?
A. electricity, heat, colour, sound
B. sound, heat, smell, electricity
(C.) heat, light, sound, electricity
D. light, heat, electricity, thought

(3) Which is <u>not</u> an example of sound energy being produced?
A. Knocking on the door
B. Wind blowing on the trees
(C.) A candle burning
D. A car engine roaring

(4) What kind of energy is produced when a candle is lit?
A. heat and sound
B. sound and electricity
C. electricity and heat
(D.) heat and light

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Q3

(1) Identify types of energy that the sun provides to us.

Light and heat energy

(2) Write two examples of how to get electricity in our daily life.

(i) By battery

(ii) From the outlet, etc

(3) Explain two ways we can get heat energy.

(i) By burning things

(ii) By rubbing our hands together, By the Sunlight, etc

Q4

(1) What would happen if there was no light energy in the world?

(example) Our surrounding would be dark and we would not see anything.

(2) The picture shows a storm. What types of energy are produced during a thunder storm? Write your answer with a reason.

(example) Light energy is produced because we can see the flushlight when the lightning appears. In addition, sound energy is also produced because we can hear loud sound after the lightning.

Strand : EARTH AND SPACE
Unit : SPACE

Chapter 6. The Sun

Chapter Objectives

Students will be able to understand the properties of the Sun, and the difference between the temperature of a sunny and shady place by measuring their temperatures using a thermometer.

Students will be able to also explain the movement of the Sun in the sky.

Picture in the chapter heading in the textbook shows the sun in the sky at its lowest position.

Topic Objectives

6.1 Properties of the Sun

Students will be able to;

- Recognise that the Sun is a big burning ball of hot gases that gives off energy.
- Identify the temperatures of the ground that are different between a sunny place and a shady place.
- Explain the importance of the Sun for living things on the Earth.

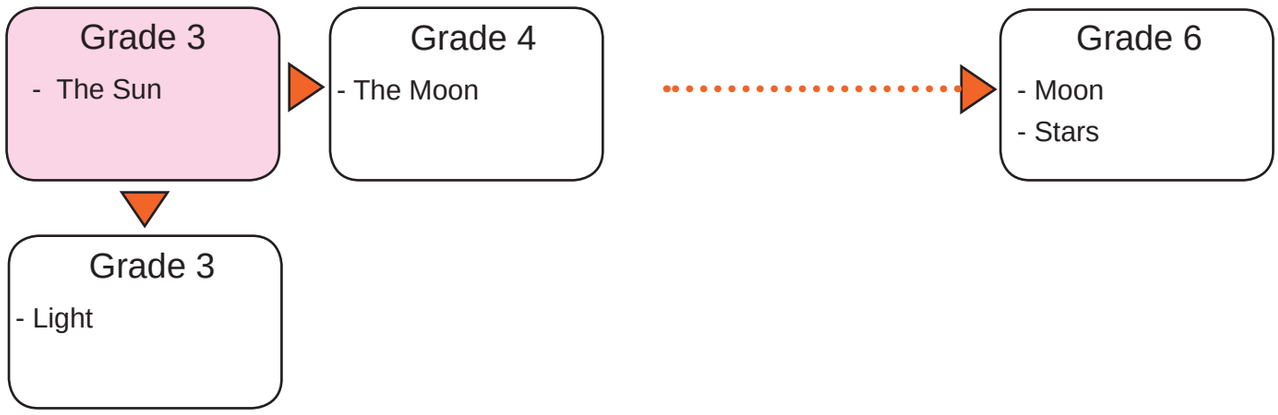
6.2 Movement of the Sun

Students will be able to;

- Recognise that the position of the Sun is opposite to the direction of the shadow.
- Describe that the Sun rises into the sky in the East, moves across the sky and sets in the West.
- Explain that the part of the Earth that is facing the Sun has day while the part of the Earth that is facing away from the Sun has night.

Related Learning Contents

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



Teaching Overview

This chapter consists of 8 lessons, each lesson is a double period.

Topic	Lesson No.	Lesson Title and Key Question	Content standard in syllabus	Textbook page number
6.1 Properties of the Sun	1	**The Sun in the Sky** What is the Sun?	3.3.5	119 - 120
	2	**Sunny Place and Shady Place** How is a sunny place and a shady place different?		121 - 122
	3	Summary and Exercise		123 - 124
6.2 Movement of the Sun	4	**Sun and Shadow** What is the relationship between the Sun and a shadow?		125 - 126
	5	**Movement of the Sun** How does the Sun move in the sky?		127 - 128
	6	**Day and Night** What causes day and night?		129 - 130
	7	Summary and Exercise		131 - 133
Chapter Test	8	Chapter Test		134 - 135

Unit	Chapter : **6. The Sun**	Total lesson No: 50 / 94
Space	Topic : **6.1. Properties of the Sun**	Textbook page: 119 - 120

Lesson 1 / 8

Lesson Title

The Sun in the Sky

Preparation

- Nil

Lesson Flow

1 Introduction (10 min.)

- Encourage students to think about the Sun by asking this question;

Q:What do you find when you look at the sky in the daytime?

Q:We find the Sun in the sky, but what do you know about the Sun?

2 Introduce the key question

What is the Sun?

3 Activity (20 min.)

This is an individual activity for students

- Organise students into groups.
- Explain the steps of the activity.
- Ask students to draw the table in their exercise books.
- Have students do the activity and ask them to record their findings in the table.
- Advise students to refer to the character's talking for their investigation.
- After that, ask students to discuss what they know about the Sun and how the Sun helps our earth based on their findings as a group.

4 Discussion for findings (20 min.)

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

6.1 Properties of the Sun

Lesson 1: "The Sun in the Sky"

1 When we look at the sky in the daytime, we find the Sun in the sky. But what is the Sun? Do you know the Sun?

2 What is the Sun?

3 Activity : What do you know about the Sun?

What to Do:

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

What do you know about the Sun?	What if there is no Sun?

2. Think about the following questions and write your ideas in the table.
   - What do you know about the Sun?
   - If it were not for the Sun, what would happen to our Earth?

When it is a sunny day, what do people or animals do?

4 3. Share your ideas with your classmates. Talk about what you know about the Sun and how the Sun helps our earth.

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Teacher's Notes

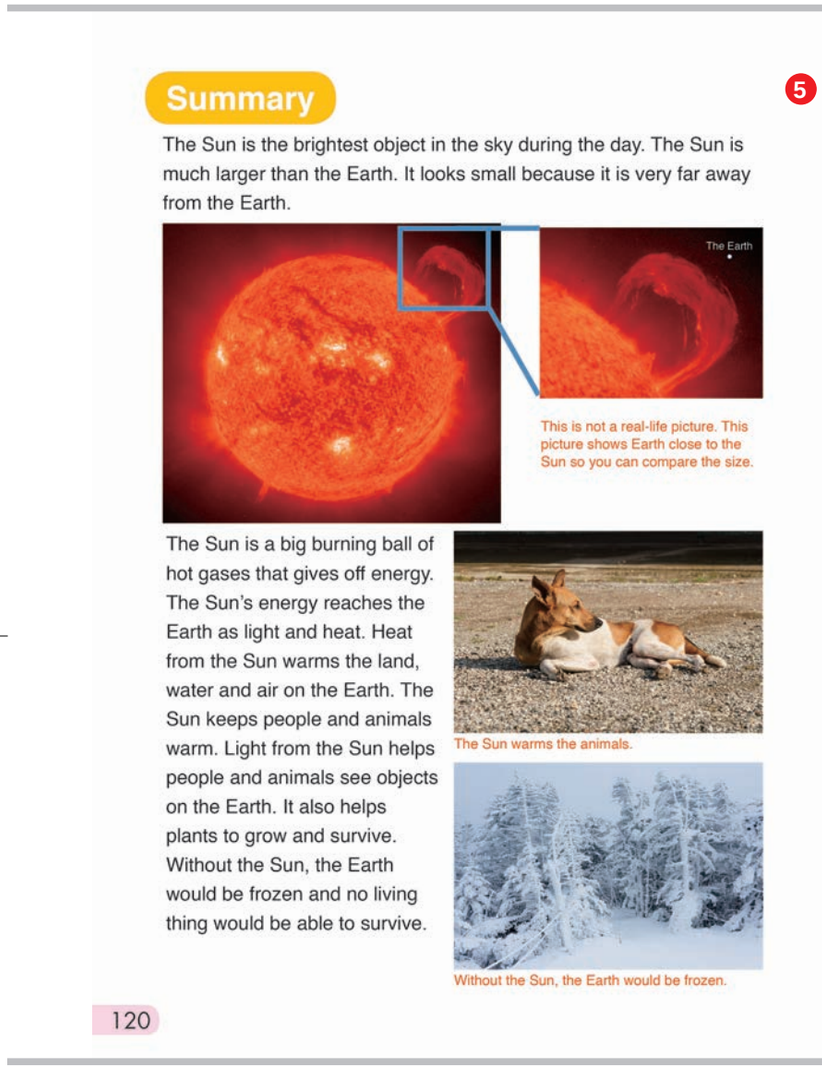
- The sun is very important to the Earth. We can not live on Earth without the sun. It is the largest supplier of energy to the Earth's surface. The sun provides solar energy in the forms of light and heat energy. The sun's energy warms the Earth, heating the surfaces (land and oceans) and the atmosphere. Parts of the Earth absorb the sun's energy differently.
- The sun provides all the necessary energy for a plant to perform photosynthesis and make food that we eventually use by eating a plant directly or by eating an animal that ate the plant directly.
- The sun can influence the Earth's environment in a variety of ways. Climate is affected by how much energy the sun gives off and how much energy is absorbed and retained by the land.

Lesson Objectives

Students will be able to:
- Understand the properties of the Sun.
- Describe the effects of the Sun on our Earth and living things.

Assessment

Students are able to:
- Discuss what they know about the Sun with their classmates.
- Explain how the Sun helps our Earth and living things on the Earth.
- Investigate the properties of the Sun with interest.



Summary 5

The Sun is the brightest object in the sky during the day. The Sun is much larger than the Earth. It looks small because it is very far away from the Earth.

This is not a real-life picture. This picture shows Earth close to the Sun so you can compare the size.

The Sun is a big burning ball of hot gases that gives off energy. The Sun's energy reaches the Earth as light and heat. Heat from the Sun warms the land, water and air on the Earth. The Sun keeps people and animals warm. Light from the Sun helps people and animals see objects on the Earth. It also helps plants to grow and survive. Without the Sun, the Earth would be frozen and no living thing would be able to survive.

The Sun warms the animals.

Without the Sun, the Earth would be frozen.

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- Write students finding on the blackboard.
- Facilitate students to take part in the discussion actively.
- Confirm the findings with students.
- **Based on their findings,** teacher asks questions as discussion points.

Q:What do you know about the Sun? (It depends on students' findings. e.g. It's big, it's bright, we feel warm, etc.)

Q:What would happen to our Earth if it was not for the Sun? (We cannot see anything around us, we cannot dry clothes, everything would be frozen, etc.)

Q:Why do you think so? (The Sun gives light and heat, etc.)

Q:How does the Sun help our Earth and living things on the Earth? (The Sun keeps living things warm. The Sun helps us see objects on Earth, etc.)

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the board.
- Ask the following questions as assessment:
  Q:What kinds of energy does the Sun give off?
  Q:How does the Sun help our Earth and living things on the Earth?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:
"The Sun in the Sky."

Key question
What is the Sun?
Activity: What do you know about the Sun?.

What do you know?	What if there is no Sun?
It's bright	We cannot see anything
We feel warm	We cannot dry clothes
We can see it in the daytime	

Discussion
Q: What do you know about the Sun?
It depends on students' findings. e.g. it's bright, we feel warm, etc.
Q: What would happen to our Earth if it was not for the Sun?
We cannot see anything around us, we cannot dry clothes, everything would be frozen, etc.
Q: Why do you think so?
The Sun gives light and heat, etc.
Q: How does the Sun help our Earth and living things on the Earth?
The Sun keeps living things warm. The Sun helps us see objects on Earth, etc.

Summary
- The Sun is a big burning ball of hot gases.
- The Sun gives off light and heat energy.
- Heat from the Sun warms the Earth, people and animals.
- Light from the Sun helps people and animals see objects on Earth.
- It also helps plants to grow and survive.

Unit	Chapter : **6. The Sun**	Total lesson No: 51 / 94
Space	Topic : **6.1. Properties of the Sun**	Textbook page: 121 - 122

Lesson 2 / 8

Lesson Title

Sunny Place and Shady place

Preparation

- Select sunny day for this lesson
- Thermometer
- Carton

Lesson Flow

1 Introduction (5 min.)

- Before this lesson, "How to Use a Thermometer" in "Science Toolbox" shown as appendix must be taught.
- Review the last lesson:

Q:What kinds of energy does the Sun give off?

- Encourage students to think about a sunny and shady place by asking:

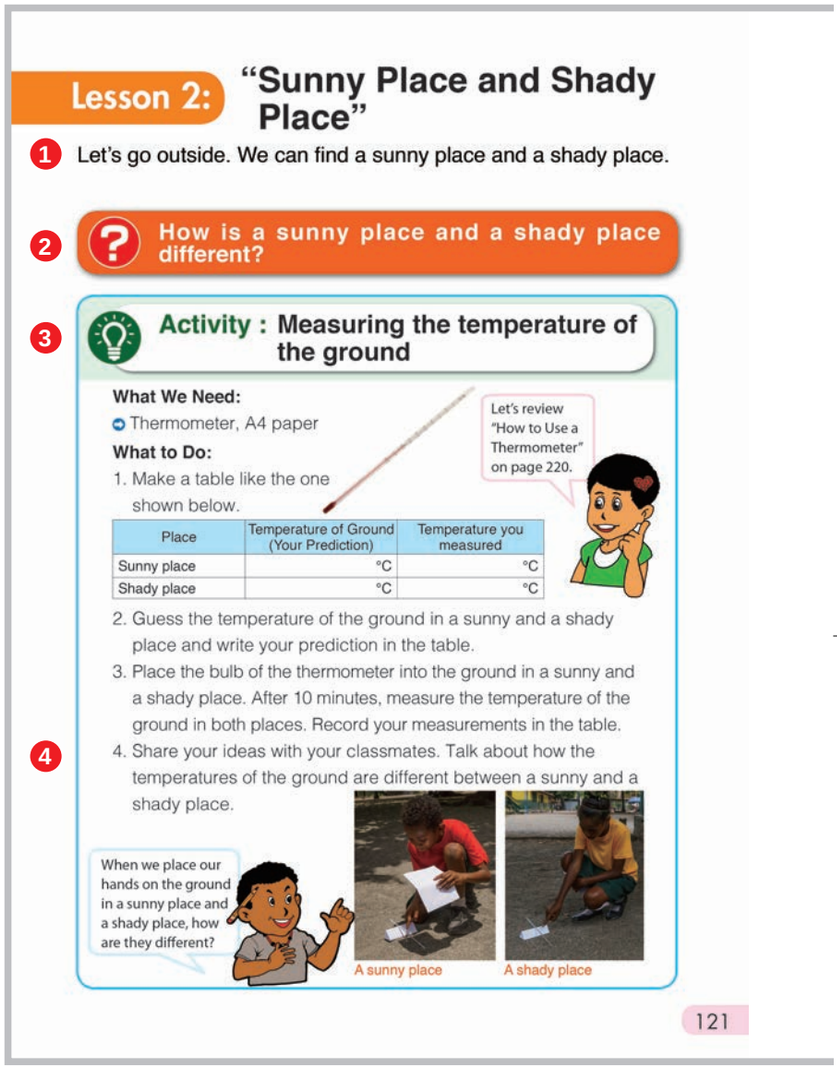
Q:We can find the sunny and shady place. What is the difference between a sunny place and a shady place?

2 Introduce the key question

How is a sunny place and a shady place different?

3 Activity (30 min.)

- Review how to use a thermometer. (Refer to "Science Toolbox: Thermometer" in the textbook)
- Organise students into some groups.
- Explain the steps of the activity.
- Ask students to make a table in their exercise book.
- Let students predict the results of this activity, and write their prediction in the table.
- Go outside and have students do the activity.Assist students to measure the temperature of the ground.
- Ask students to discuss how the temperatures of the ground are different between a sunny place and a shady place based on their results.



Lesson 2: "Sunny Place and Shady Place"

1 Let's go outside. We can find a sunny place and a shady place.

2 How is a sunny place and a shady place different?

3 Activity : Measuring the temperature of the ground

What We Need:
Thermometer, A4 paper

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

Place	Temperature of Ground (Your Prediction)	Temperature you measured
Sunny place	°C	°C
Shady place	°C	°C

Let's review "How to Use a Thermometer" on page 220.

2. Guess the temperature of the ground in a sunny and a shady place and write your prediction in the table.
3. Place the bulb of the thermometer into the ground in a sunny and a shady place. After 10 minutes, measure the temperature of the ground in both places. Record your measurements in the table.
4. Share your ideas with your classmates. Talk about how the temperatures of the ground are different between a sunny and a shady place.

4

When we place our hands on the ground in a sunny place and a shady place, how are they different?

A sunny place A shady place

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Teacher's Notes

- This activity should be done on a bright sunny day for good results.

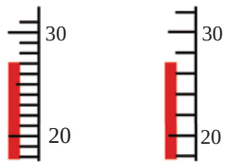
How to measure ground temperature using a thermometer

- Make a 1 cm deep hole in the ground.
- Put the tip of thermometer into the ground, and put a little soil on it.
- Look how high the coloured liquid is. What number is the closest? That is the temperature of the ground.

Safety

- At the time of measurement, the teacher must pay attention to the children so that they will not beat a thermometer against a hard object or dig up the soil with the thermometer when they put it in the ground.
- Remind students never to look at the sun directly. If one looks at the Sun directly, he/she would get permanent damage to their eyes.

Thermometers have different scales. To determine the temperature, you must know the scale interval before the measurement. The intervals are usually 1 or 2. See below for examples.

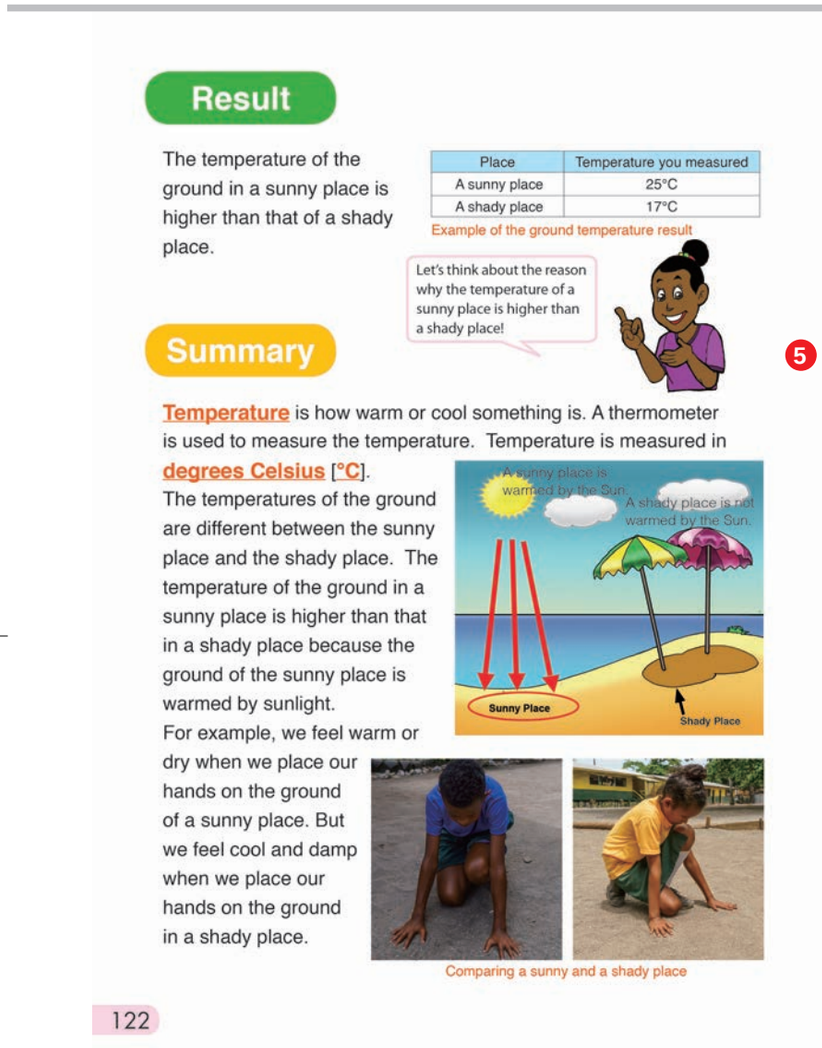


Lesson Objectives

Students will be able to:
- Understand what causes the changes in the temperature of a sunny and shady place.
- Observe the different temperatures between a sunny and shady place by using a thermometer.

Assessment

Students are able to:
- Describe the ground of a sunny place that is warmed by the sunlight
- Compare the temperature between a sunny and shady place.
- Show responsibility in group activity.



Result

The temperature of the ground in a sunny place is higher than that of a shady place.

Place	Temperature you measured
A sunny place	25°C
A shady place	17°C

Example of the ground temperature result

Let's think about the reason why the temperature of a sunny place is higher than a shady place!

Summary

Temperature is how warm or cool something is. A thermometer is used to measure the temperature. Temperature is measured in **degrees Celsius** [**°C**].

The temperatures of the ground are different between the sunny place and the shady place. The temperature of the ground in a sunny place is higher than that in a shady place because the ground of the sunny place is warmed by sunlight.

For example, we feel warm or dry when we place our hands on the ground of a sunny place. But we feel cool and damp when we place our hands on the ground in a shady place.

Comparing a sunny and a shady place

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5

4 Discussion for findings (15 min.)

- Ask students to present their results from the activity.
- Write down their results in a table on a black board.
- Confirm the results with students.
- Based on their results, ask the following questions.

Q:What do you find from the results in the table? (The temperature of the ground in a sunny place is higher than that of a shady place.)

Q:Why do you think that the temperature of a sunny place is higher than a shady place? (The ground of a sunny place is warmed by sunlight, but sunlight cannot reach the ground of a shady place.)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask the following questions as assessment:
  Q:What is a temperature?
  Q:What is the unit of measurement for temperature?
  Q:Why is the temperature of a sunny place higher than a shady place?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:

"Sunny and Shady place"

Key question

How is a sunny and a shady place different?

Activity: Measuring the temperature of the ground

Place	Temperature (prediction)	Temperature you measured
A sunny place	40 °C	25 °C
A shady place	10 °C	17 °C

(Result depends on the time and place)

Discussion

1. What do you find from the results in the table? The temperature of the ground in a sunny place is higher than that of a shady place.
2. Why do you think that the temperature of a sunny place is higher than a shady place? The ground of a sunny place is warmed by sunlight, but sunlight cannot reach the ground of a shady place.

Summary

- A thermometer is used to measure a temperature.
- A temperature is how warm or cool something is.
- Temperature is measured in degrees Celsius (°C).
- Temperature in a sunny place is higher than temperature in a shady place.
- Sunny place is warmed by sunlight.

Unit	Chapter : **6. The Sun**	Total lesson No: 52 / 94
Space	Topic : **6.1. Properties of the Sun**	Textbook page: 123 - 124

Lesson 3 / 8

Lesson Title

Summary and Exercise

Tips of lesson

1 Summary (20 min.)

- Recap main learning contents in this topic
- Ask some questions to verify students' understanding. Explain and correct learning contents again if they still have misconceptions.
- Have students to give examples of the forms of energy produced by the sun.
- Provoke students to describe how living things rely on the sun as the major source of energy.
- Ask students what kind of place would give a higher temperature.

1

Summary and Exercise

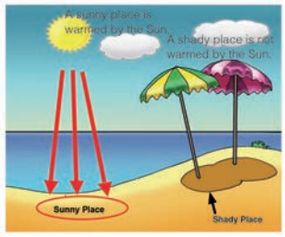
Summary 6.1 Properties of the Sun

The Sun in the Sky

- The Sun is the brightest object in the sky during the day. The Sun is much larger than the Earth but looks smaller because it is very far away from us.
- The Sun gives off energy in the form of heat and light. The Sun is the major source of energy.

Sunny and Shady places

- Temperature is how warm or cool something is.
- A thermometer is used to measure temperature.
- Temperature is measured in degrees Celsius [°C].
- The temperature of the ground in a sunny place is higher than that of a shady place because the ground of the sunny place is warmed by sunlight.



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2 Exercise & Explanation (30 min.)

- Allow students to try answering questions individually with enough time to response.
- After the test, give the answer to the questions and explain how to solve the questions with asking student's answers and thoughts.
- Guide students well to understand the main ideas or concepts in response to their answers.
- If the concept is still difficult for the students to understand then do the experiments again or demonstrate if necessary.

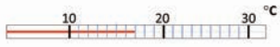
2

Summary and Exercise

Exercise 6.1 Properties of the Sun

Q1. Complete each sentence with the correct word.
(1) The_____ is the brightest object in the sky during the day.
(2) The Sun is a burning ball of hot gases that gives off _____.
(3) The Sun's energy reaches the Earth as light and _____.
(4) _____ from the Sun helps people and animals to see.
(5) Plants use light from the Sun to make _____ and grow.

Q2. Choose the letter with the correct answer.
(1) What is the temperature reading shown on the thermometer below?



A. 18°C B. 20°C C. 17°C D. 19°C
(2) Why is the temperature of the sunny place higher than the shady place?
A. The sunny place is not warmed by sunlight
B. The sunny place is warmed by sunlight
C. The shady place is warmed by sunlight
D. Both the sunny and shady places are warmed by sunlight

Q3. Answer the following questions.
(1) The Sun is much larger than the earth. Why does the Sun looks smaller?
(2) How do living things use the sun's energy?

Q4. If there is no Sun what will happen to living things on Earth? Share your ideas and reasons.

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Exercise answers

Q1.

(1) **Sun**

The Sun makes the sky so bright during the day that some objects in the sky are not seen like stars.

(2) **energy**

(3) **heat**

(4) **Light**

(5) **food**

Q2.

(1) **C**

Explain how to read the temperature from the thermometer by first identifying the scale division of each interval. The scale for each interval is counting by one and the unit to measure temperature is in degrees Celsius (°C)

(2) **B**

Because there is direct sunlight to the sunny place without a shade to block it. The sunny place is warmed by the Sun.

Q3. Sample of answer

(1) **The Sun looks smaller because it is very far away from the earth.**

Provoke students to think about the distance the earth is from the Sun.

(2) **The Sun keeps animals warm./Light from the Sun helps animals to see objects./The sunlight helps plants to grow.etc.**

Q4. Sample of answer

If there is no Sun the following things would happen:

- **There will be darkness everywhere**
- **The earth will be so cold**
- **Plants and animals will certainly die.**
- **There will be no life on earth**

Explain that the sun is the source of all energy, heat and light. Plants need sunlight to make food and grow. Sunlight is also vital for all animals to help them see and keep warm.

Unit	Chapter : **6. The Sun**	Total lesson No: 53 / 94
Space	Topic : **6.2. Movement of the Sun**	Textbook page p. 125 - 126

Lesson 4 / 8

Lesson Title

Sun and Shadow

Preparation

- Select sunny day for this lesson
- Object to be observed

Lesson Flow

1 Introduction (10 min.)

- Review the previous lesson:

Q:Why is the temperature of a sunny place higher than a shady place?

- Encourage students to think about the relationship between Sun and shadow by asking:

Q:We can find shadow on the ground on sunny day. Where can we find shadow? How is the shadow made?

2 Introduce the key question

What is the relationship between the sun and a shadow?

3 Activity (20 min.)

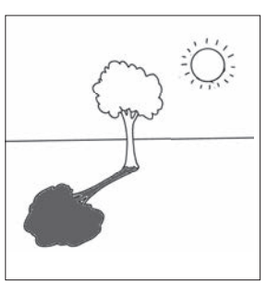
- Organise students into some groups.
- Explain the steps of the activity.
- Instruct students not to look directly at the Sun during the activity.
- Go outside and have students do the activity.
- Ask students to record their findings in their exercise book.
- After that, ask students to discuss the relationship between the direction of a shadow and the position of the Sun based on their results as a group.

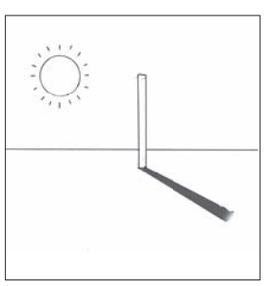
Discussion for findings (20 min.)

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

Teacher's Notes

- **What is a shadow?** A shadow is created by the absence of light falling on a particular place. Light travels in a straight line. So, an object coming in the way of light blocks it and doesn't allow to fall on a surface behind it. When the position of source of light or the object obstructing the path of light is changed, the shadow's position will change.
- **Due to change in the position of the sun,** the direction of the rays falling on you changes and therefore the direction of your shadow will also change.





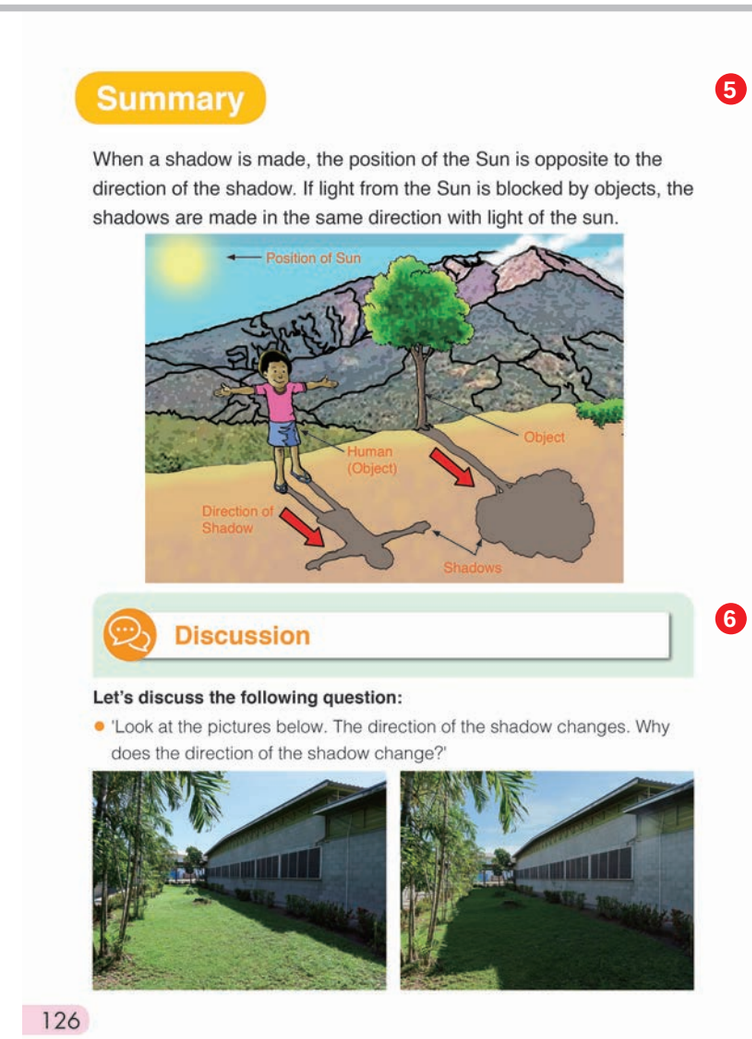
Be sure to let student NOT to watch the Sun directly.

Lesson Objectives

Students will be able to:
- Relate the direction of a shadow to the position of the Sun.
- Observe the direction of the shadow and the position of the Sun.

Assessment

Students are able to:
- Explain the relationship between the direction of the shadow and the position of the Sun.
- Investigate the Sun and shadow with interest.



Summary

When a shadow is made, the position of the Sun is opposite to the direction of the shadow. If light from the Sun is blocked by objects, the shadows are made in the same direction with light of the sun.

Position of Sun
Human (Object)
Object
Direction of Shadow
Shadows

Discussion

Let's discuss the following question:

- 'Look at the pictures below. The direction of the shadow changes. Why does the direction of the shadow change?'

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- Write down their results in a table on a black board.
- Confirm the results with students.
- **Based on their findings,** ask the following questions.

Q:In which direction are the shadows of objects made? (The shadows of objects are made in the same direction, etc.)

Q:What relationship do you find between the direction of a shadow and the position of the Sun? (The position of the Sun is opposite to the direction of the shadow, etc.)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask the following questions:
  Q: What is the relationship between the Sun and a shadow?
- Ask students to copy the notes on the blackboard into their exercise books.

6 Further Discussion (5 min.)

- Let students think about the questions in 'Discussion' in a group.
- Ask each group to present their answers and confirm them with students.
- Conclude the further discussion.

Sample Blackboard Plan

Title:

"Sun and Shadow"

Key question

What is the relationship between the Sun and a shadow?

Activity: Observing sun and shadow

Where did you find shadows?

On the ground, sunny place, etc

Is the direction of shadows of objects the same or not?

The direction of shadows is all same, etc.

Where did you find the Sun?

Behind the object, opposite to the shadow, etc

Discussion

Q: In which direction are the shadows of objects made?

The shadows of objects are made in the same direction, etc

Q. Where is the position of the Sun when a shadow is made?

It is opposite to the direction of the shadow.

Q: What relationship do you find between the direction of a shadow and the position of the Sun?

The position of the Sun is opposite to the direction of the shadow, etc

Summary

- When a shadow is made, the position of the Sun is opposite to the direction of the shadow.

Further Discussion

Q: Why does the direction of the shadows change?

(Write down students answers here.)

- When the Sun changes its position, the direction of the shadow also changes.

Unit	Chapter : **6. The Sun**	Total lesson No: 54 / 94
Space	Topic : **6.2. Movement of the Sun**	Textbook page: 127 - 128

Lesson 5 / 8

Lesson Title

Movement of the Sun

Preparation

- A compass, a stick, a tape measure or a ruler

Lesson Flow

1 Introduction (10 min.)

- Before this lesson, "How to Use a Compass" in "Science Toolbox" must be taught.
- Review the last lesson:

Q:What is the relationship between the position of the Sun and the direction of a shadow?

- Encourage students to think about the movement of the Sun by asking:

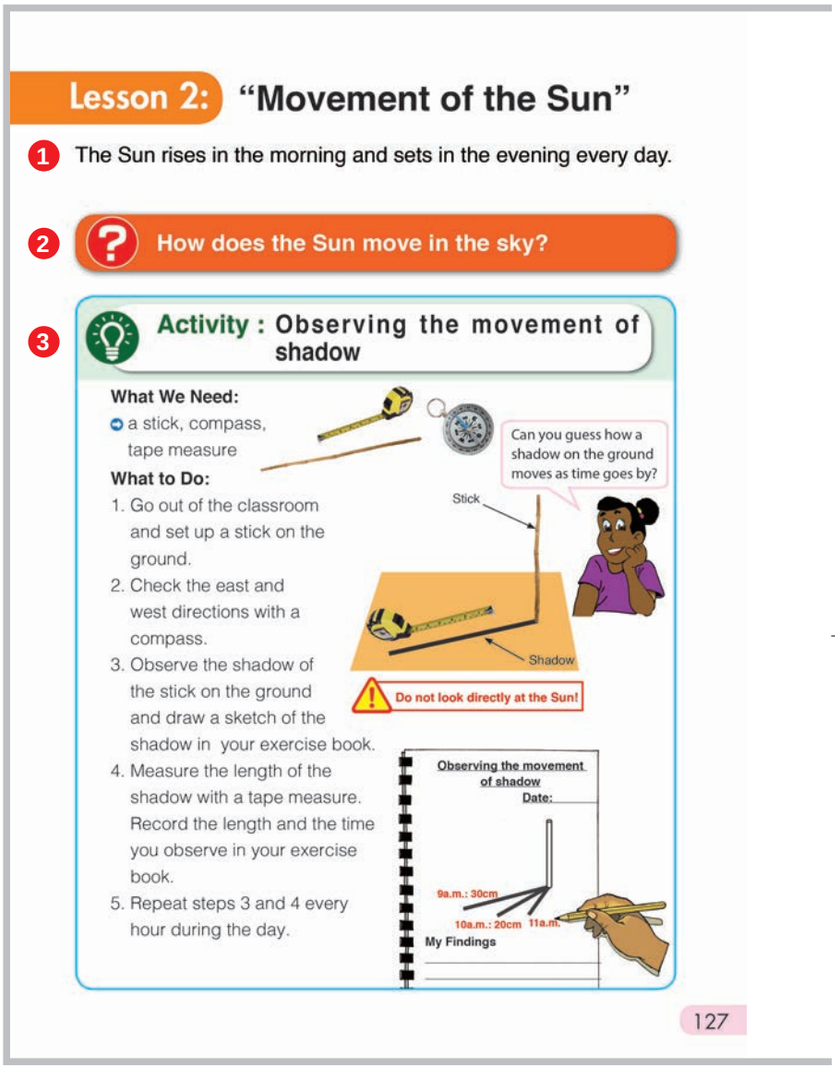
Q:The Sun rises and sets every day. How does the Sun move?

2 Introduce the key question

How does the Sun move in the sky?

3 Activity (20 min.)

- Review how to use a compass. (Refer to 'Science Toolbox: Compass' in the textbook)
- Organise students into some groups.
- Explain the steps of the activity.
- Remind students not to look directly at the sun.
- Go out of classroom and set up a stick on the ground with students.
- Let students check the direction of east and west with a compass and record it.
- Have students do the activity and ask them to record their observations in their exercise book.
- Ask students to observe the shadow every hour.
- If there is no time, implement Step 4 "Discussion" in the next lesson.



Teacher's Notes

Note:

1. An observation site with an excellent view of the sun must be selected.
2. Do not look directly at the Sun. If one looks at the Sun directly, he/she will get PERMANENT DAMAGE TO THEIR EYES.

The movement of shadows and the Sun

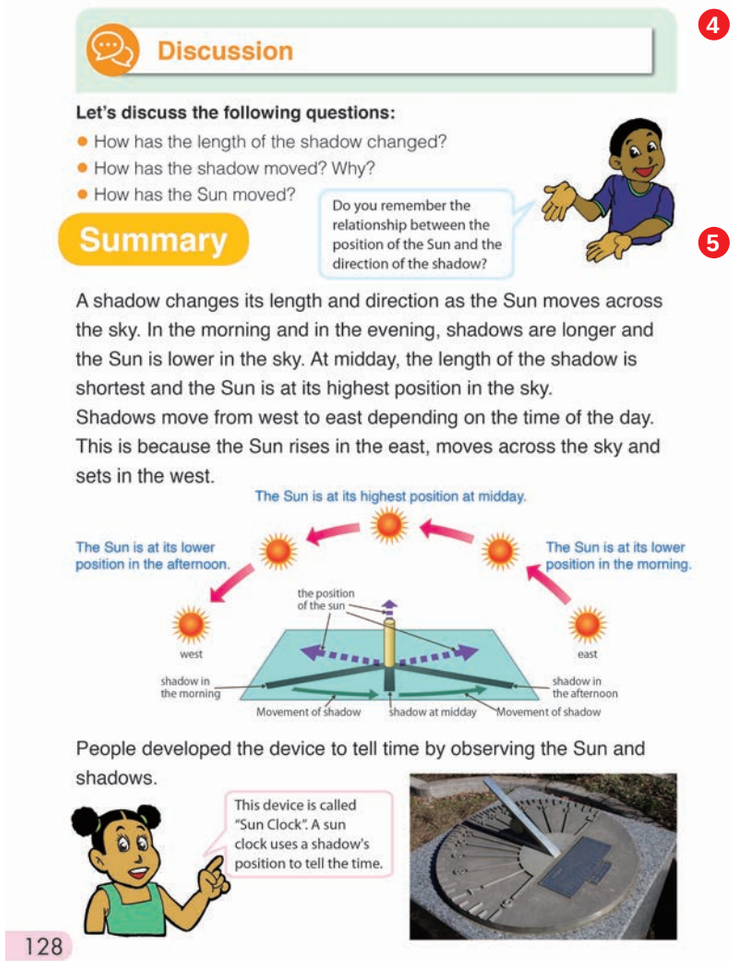
- Based on the fact that shadows are made when the sun is coming out and the Sun it is on the opposite side of the shadows, an idea to relate shadows to the Sun.
- Students know that the Sun moves. The teacher will try to develop students rough ideas and thoughts by making them think about the movement of shadows in connection with the movement of the Sun they have already know.
- The teacher will make students clearly understand that shadows move when people or objects move and shadows move as time proceeds even when people or objects do not move, while trying not to confuse them.

Lesson Objectives

Students will be able to:
- Observe the movement of the Sun.
- Relate the movement of the shadow to the movement of the Sun.

Assessment

Students are able to:
- Measure the length of the shadow with a tape measure.
- Record the movement of the shadow.
- Infer how the Sun moves based on the results of their observation.
- Investigate the movement of the Sun in cooperation with others.



4 Discussion for findings (20 min.)

- Ask students to present their results from the activity.
- Write down their results in a table on a black board.
- Confirm the results with students.
- Based on their results, ask the following questions.

Q:How has the length of the shadow changed? (In the morning, it's longer. And then, it's getting shorter until noon. After that, it's getting longer until evening.)

Q:What causes the changes in the length of the shadow during the day? (It's caused by the changes in the height of the Sun.)

Q:How has the shadow moved? Why? (From West to East. It is because the Sun moved.)

Q:How did the sun move across the sky? (From East to West)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask the following questions:
  Q: How does the Sun move in the sky?
  Q: How do we investigate the movement of the Sun?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:

"Movement of the Sun"

Key question

How does the Sun move in the sky?

Activity

Observing the movement of shadow.

Refer to the sample shown in the textbook

Discussion

Q: How has the length of the shadow changes?
In the morning, it's longer. And then, it's getting shorter until noon. After that, it's getting longer until evening.
Q: What causes the changes in the length of the shadow during the day? It is caused by the changes in the height of the Sun.
Q: How has the shadow moved? Why?
From West to East. It is because the Sun moved.
Q: How did the sun move across the sky?
From East to West

Summary

- A shadow changes its length and position as the sun moves through the sky.
- Shadows are longer in the morning and in the evening because the sun is lower in the sky.
- At noon the shadows are shortest because the sun is at its highest position in the sky.
- The sun rises in the East, moves across the sky and sets in the West.
- The shadow moves from West to East.
- A Sun clock uses a shadow's position to tell the time.

Unit	Chapter : **6. The Sun**	Total lesson No: 55 / 94
Space	Topic : **6.2. Movement of the Sun**	Textbook page: 129 - 130

Lesson 6 / 8

Lesson Title

Day and night

Preparation

- Globe or anything that is round, a sticker, a flashlight

Lesson Flow

1 Introduction (10 min.)

- Review the last lesson:

Q:How does the Sun move in the sky?

- Encourage students to think about day and night by asking:

Q:We get up in the morning and sleep at night every day. Why does day and night occur every day?

2 Introduce the key question

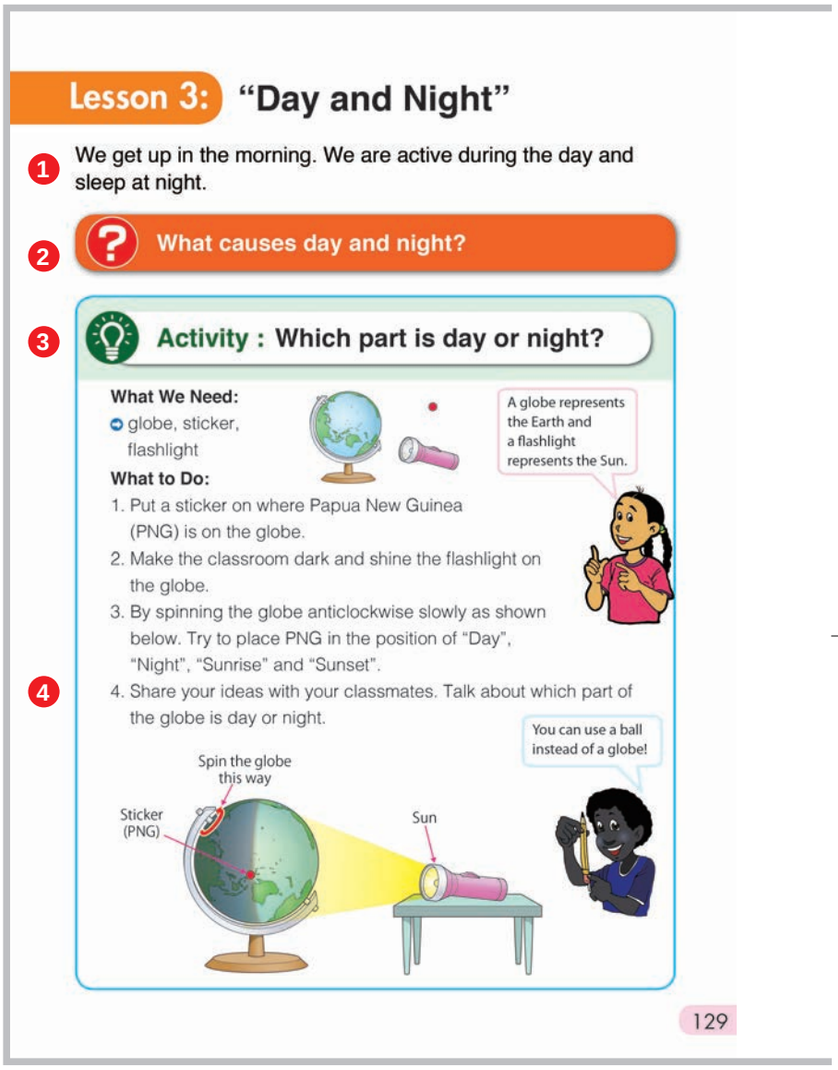
What causes day and night?

3 Activity (20 min.)

- Organise students into groups.
- Explain the steps of the activity.
- Tell students that the globe represents the earth and the torch is the sun.
- Make sure the torch must not move.
- Instruct students to spin the globe anticlockwise slowly and observe the movement of the sticker.
- Have students do the activity and ask them to record their observation in their exercise book.
- Ask students to discuss which part of the globe is day or night based on their findings as a group.

4 Discussion for findings (20 min.)

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



Lesson 3: "Day and Night"

1 We get up in the morning. We are active during the day and sleep at night.

2 What causes day and night?

3 Activity : Which part is day or night?

What We Need:
globe, sticker, flashlight

A globe represents the Earth and a flashlight represents the Sun.

What to Do:

1. Put a sticker on where Papua New Guinea (PNG) is on the globe.
2. Make the classroom dark and shine the flashlight on the globe.
3. By spinning the globe anticlockwise slowly as shown below. Try to place PNG in the position of "Day", "Night", "Sunrise" and "Sunset".
4. Share your ideas with your classmates. Talk about which part of the globe is day or night.

You can use a ball instead of a globe!

Spin the globe this way
Sticker (PNG)
Sun

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Teacher's Notes

The movement of shadows and the sun

- Earth spins around on its axis. This motion is called a 'rotation'. In addition to the rotation, Earth also travels around the sun in a path called an orbit. The motion around the sun along its orbit is called a 'revolution'.

The movement of shadows and the Sun

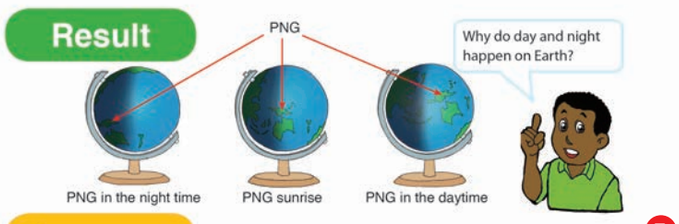
- The rotation of the Earth causes day and night. It is not the Sun's movement that causes days, as the Earth rotates, only one-half of the Earth faces the sun at any given time. The half facing the sun is light (day) and the half facing away from the sun is dark (night).
- When viewed above the North Pole, the Earth rotates counterclockwise, from West to East. This is why the Sun 'rises' in the East and 'sets' in the West.
- The Earth's axis is not at a right angle with the sun. It is slightly tilted at an angle of 23.5°.

Lesson Objectives

Students will be able to:
- Explain the cause of day and night.
- Identify which part of the Earth is day or night.
- Understand why the Sun seems to move.

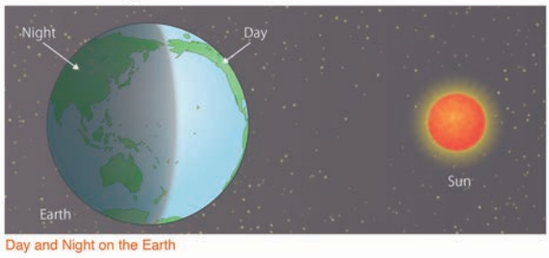
Assessment

Students are able to:
- Describe how the movement of the earth causes day and night.
- Observe the causes of day and night using a globe.
- State the reason why the Sun seems to move.
- Create curiosity to discover the causes of day and night.



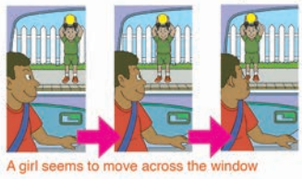
Summary

Day and night occur because the Earth is spinning on its axis once every 24 hours. An **axis** is an imaginary line that runs through the Earth centre from the north to the south poles. The part of the Earth that is facing the Sun is day. The part of the Earth that is facing away from the Sun is night.



Day and Night on the Earth

The Sun actually does not move around the Earth. Why does the Sun seem to move across the sky? This is because the Earth is spinning on its axis. For example, a girl standing outside seems to move when we see the girl from the moving car. The Sun also seems to move when we see the Sun from the spinning Earth.



A girl seems to move across the window when a boy in a moving bus sees the girl.

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- Write down their results in a table on a black board.
- Confirm the findings with students.
- **Based on their findings,** ask the following questions as discussion point or ask each group to demonstrate.

Q:Which part of the earth is day or night? (The part lit up by the flashlight (Sun) is day. The part that is not lit by the flashlight (Sun) is night.)

Q:Which part of the earth is sunrise or sunset? (The parts between the shaded and the lit part.)

Q:Why does day and night occur every day? (This is because the globe (Earth) is spinning.)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- If it is difficult for students to understand that the Sun seems to move, demonstrate the relative motion by letting them spin themselves slowly and observe how something around them looks.
- Summarise today's lesson on the blackboard.
- Ask the following questions:
  Q: Why does day and night occur?
  Q: Why does the Sun seem to move?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:
"Day and Night"
Key question
What causes day and night?
Activity: Which part is day or night?
Your findings:

Drawing:
Refer to the diagram shown in the textbook

Discussion
Q: Which part of the earth is day?
The part lit up by the flashlight (Sun).
Q: Which part of the earth is night?
The part is not lit by the flashlight (Sun).
Q: Which part of the earth is sunrise or sunset?
The parts between the shaded and the lit part
Q: Why does day and night occur every day?
This is because the globe (Earth) is spinning.

Summary
- Day and night occur because the Earth is spinning on its axis once every 24 hours.
- An axis is an imaginary line that runs through the Earth's centre from the north to the south poles.
- The part of the Earth that is facing the Sun has day.
- The part of the Earth that is facing away from the sun has night.
- The Sun actually does not move around the Earth
- The Sun seems to move across the sky because the Earth is spinning on its axis.

Unit	Chapter : **6. The Sun**	Total lesson No: 56 / 94
Space	Topic : **6.2. Movement of the Sun**	Textbook page: 131 - 133

Lesson 7 / 8

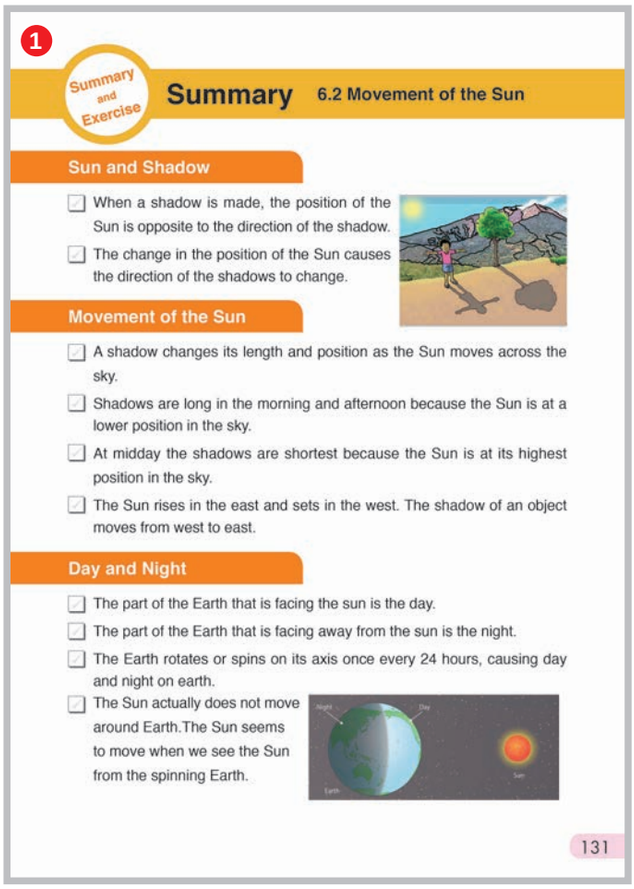
Lesson Title

Summary and Exercise

Tips of lesson

1 Summary (20 min.)

- Recap main learning contents in this topic
- Ask some questions to verify students' understanding. Explain and correct learning contents again if they still have misconceptions.
- Have students to tell how the change of position Sun cause the direction of the shadow to change.
- Provoke students to describe how long or short the shadow formed in the morning, noon and afternoon.
- Ask students what really causes night and day.



1

Summary and Exercise

Summary 6.2 Movement of the Sun

Sun and Shadow

- When a shadow is made, the position of the Sun is opposite to the direction of the shadow.
- The change in the position of the Sun causes the direction of the shadows to change.

Movement of the Sun

- A shadow changes its length and position as the Sun moves across the sky.
- Shadows are long in the morning and afternoon because the Sun is at a lower position in the sky.
- At midday the shadows are shortest because the Sun is at its highest position in the sky.
- The Sun rises in the east and sets in the west. The shadow of an object moves from west to east.

Day and Night

- The part of the Earth that is facing the sun is the day.
- The part of the Earth that is facing away from the sun is the night.
- The Earth rotates or spins on its axis once every 24 hours, causing day and night on earth.
- The Sun actually does not move around Earth.The Sun seems to move when we see the Sun from the spinning Earth.

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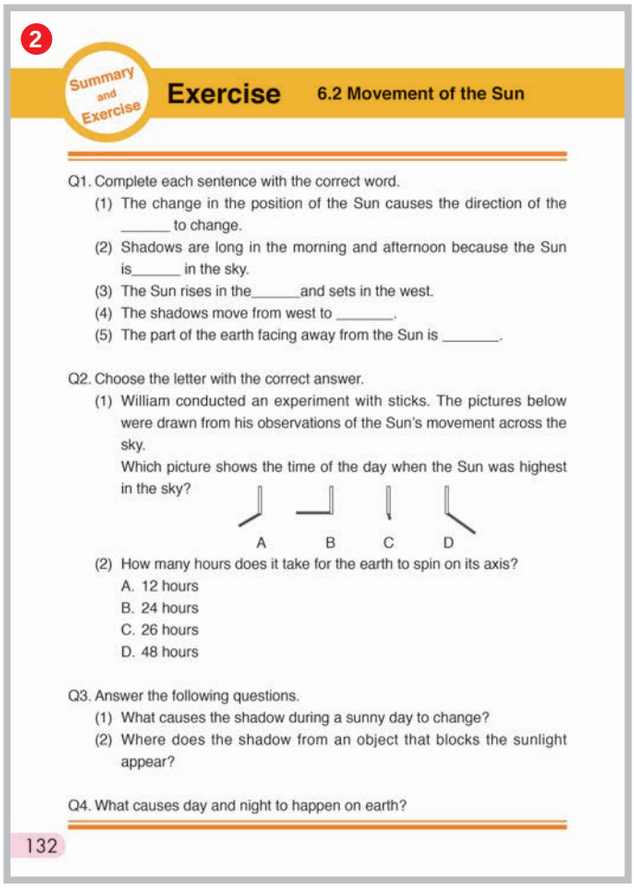
2 Exercise & Explanation (30 min.)

- Allow students to try answering questions individually with enough time in response to students understanding.
- After the test, give the answer of the questions and explain how to solve the questions with asking student's answers and thoughts.
- Guide students well to understand the main ideas or concepts in response to their answers.
- If the concept is still difficult for the students to understand then do the experiments again or demonstrate if necessary.



2

Summary and Exercise

Exercise 6.2 Movement of the Sun

Q1. Complete each sentence with the correct word.

(1) The change in the position of the Sun causes the direction of the _____ to change.

(2) Shadows are long in the morning and afternoon because the Sun is_____ in the sky.

(3) The Sun rises in the_____and sets in the west.

(4) The shadows move from west to _____.

(5) The part of the earth facing away from the Sun is _____.

Q2. Choose the letter with the correct answer.

(1) William conducted an experiment with sticks. The pictures below were drawn from his observations of the Sun's movement across the sky.

Which picture shows the time of the day when the Sun was highest in the sky?

A B C D

(2) How many hours does it take for the earth to spin on its axis?

A. 12 hours
B. 24 hours
C. 26 hours
D. 48 hours

Q3. Answer the following questions.

(1) What causes the shadow during a sunny day to change?

(2) Where does the shadow from an object that blocks the sunlight appear?

Q4. What causes day and night to happen on earth?

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Exercise answers

Q1.
(1) **Shadow**
(2) **low**
(3) **East**
(4) **East**
The shadows move from West to East depending upon the time of day. This is because the sun rises in the East moves across the sky and sets in the West. The position of the of the Sun must be opposite to the direction of the shadow.
(5) **Night**
It is night when the part of the Earth where you live faces the sun. The sky is dark.

Q2.
(1) **C**
Explain that in the morning and afternoon the shadows are long and the sun is low in the sky. At noon the shadow is shortest and the sun is at its highest position in the sky.

(2) **B**
It takes 24 hours for the Earth to rotate one time. The Earth keeps rotating.

Q3.
(1) **The movement of the Sun across the sky.**

(2) **The shadows is made in the same direction as the Sun.**

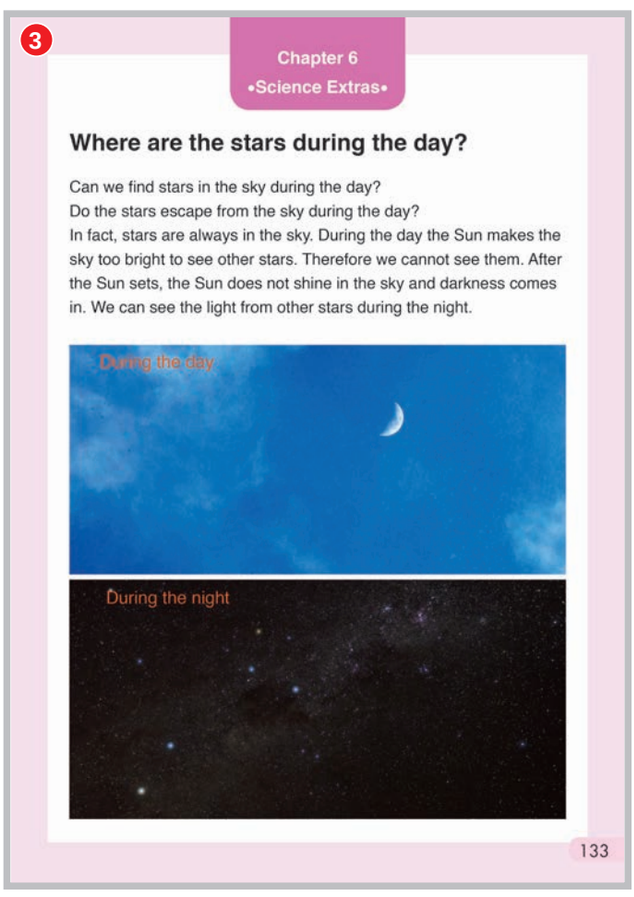
Q4. **The rotation or spin of the earth.**
Tell students each day the Sun seems to move across the sky. But the Sun does not move. Earth rotates or spins around an imaginary line. The line is called an axis. The rotation of the earth's axis produces the night and day cycle.

Explanation of Science Extras

3 Science Extras (10 min.)

- Give opportunities to students to closely observe the nature and its phenomena in the world.

- Allow students to ask questions that demonstrate curiosity about the content in the science extras.



Lesson
8 / 8

Lesson Title

Chapter Test

Answer of the Chapter Test

Chapter Test

6. The Sun

Q1 Complete each sentence with the correct word.

(1) The ground of a sunny place is warmed by the sunlight.
(2) The measure of how warm or cool something is, is called temperature
(3) A thermometer is used to measure temperature.
(4) The Sun rises in the east and sets in the west.

Q2 Choose the letter with the correct answer.

(1) What makes the day sky bright?
A. The moon
B. The stars
C. The sun
D. The planets

(2) Which of the following is the correct explanation about the shadow of an object on a sunny day.
A. Direction of the shadow is opposite to the position of the Sun.
B. Direction of the shadow is always west.
C. Direction of the shadow is same to the position of the Sun.
D. Direction of the shadow never moves.

(3) The pattern of day and night is caused by Earth's _____ on its axis.
A. earthquake
B. gravity
C. revolution
D. spin

(4) Temperature is measured in _____.
A. centimeters
B. millimeters
C. grams
D. degree Celsius

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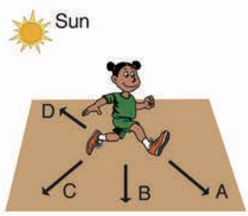
Q3

(1) Look at the picture on the right. Suggest which direction the shadow of the girl would appear? Choose a letter and write your reason?

Answer is A. Direction of the shadow must be opposite to the position of the Sun.

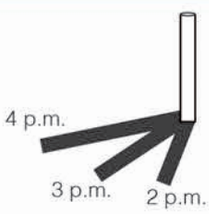


(2) What is the temperature reading shown on the thermometer?

27 °C

Q4

(1) Dave observed the direction of the shadow beside a pole at 2p.m., 3p.m. and 4p.m. The drawing of the shadows are shown in the diagram on the right. What is the reason why the direction of the shadow moves as time goes by?



The shadow changes its position as the Sun moves through the sky.

(2) When you watch the Sun setting, what is happening on the other side of the Earth ? Explain your reason.

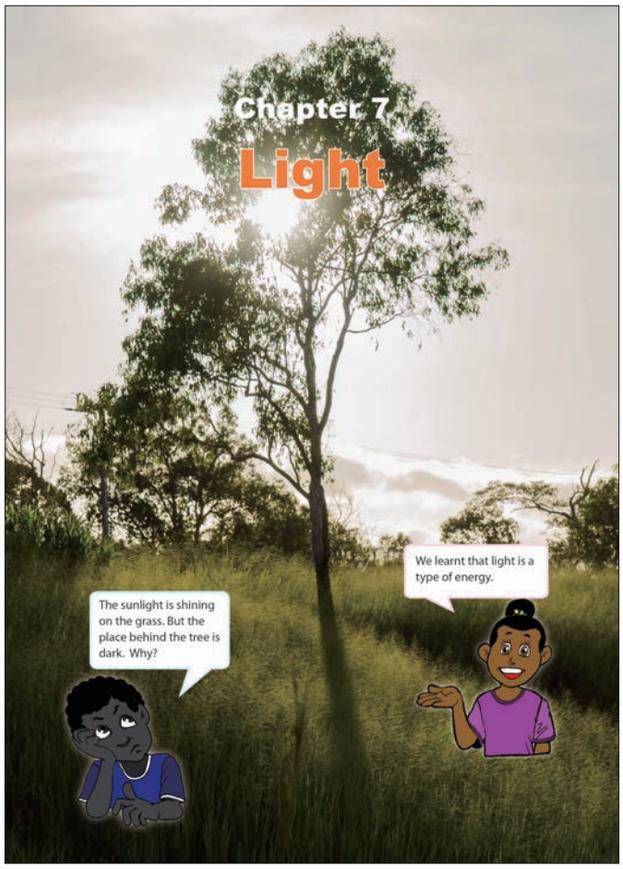
The other side of the world, sun is rising into its day time. When the part of Earth that is facing away from the Sun, the other side of the world is facing the Sun.

Strand : PHYSICAL SCIENCE
Unit : ENERGY

Chapter 7. Light

Chapter Objectives

Students will be able to understand properties of light, paths of light, formation of shadow, reflection and gathering light.
Students will be able to also infer that the size and shape of a shadow of an object changes if the object is moved or turned.



Picture in the chapter heading on the textbook shows that the sunlight makes the shadow of the tree on the ground.

Topic Objectives

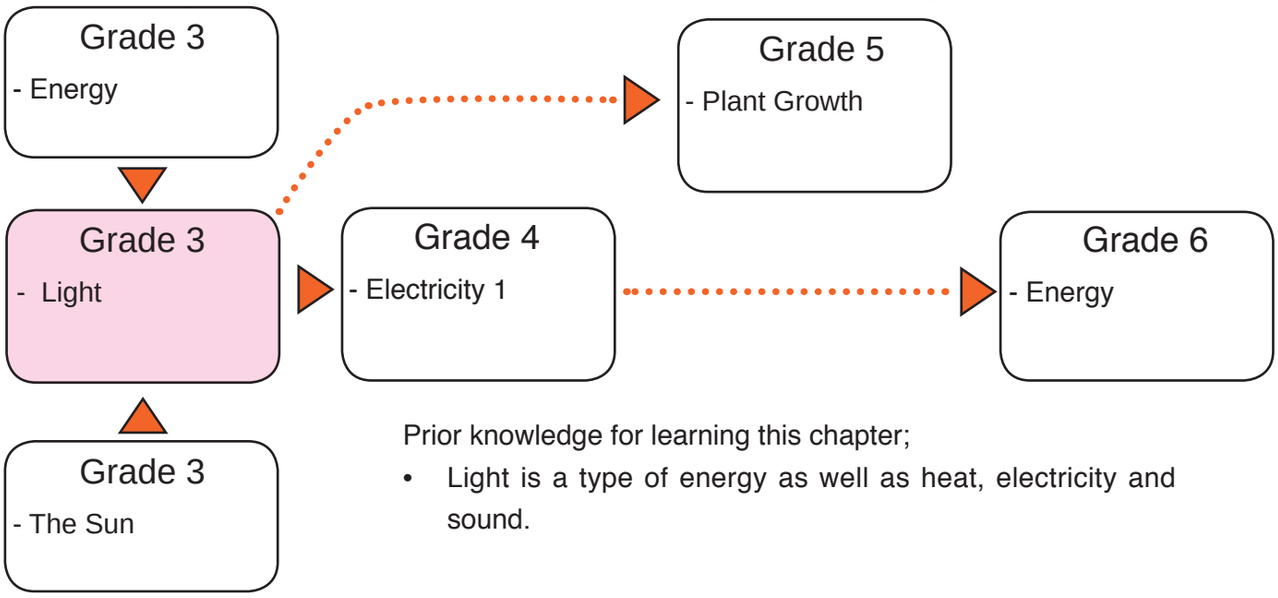
7.1 Properties of Light

Students will be able to;

- Recognise that light helps us to see objects around us.
- Infer that light travels in a straight line from the activity result that light can be seen through the several card board holes arranged in a straight line.
- Group objects into transparent, translucent and opaque objects in line with how they allow light to pass through.
- Explain that a shadow is made when light is blocked by objects.
- Explain shape and size of a shadow can be changed by moving a source of light or the object.
- Explain that the reflected light from an object travels in a straight line and enters our eyes so that we can see the object.
- Describe that the size and brightness of the light on a piece of paper changes and the paper becomes hot when light is gathered by a lens.

Related Learning Contents

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



Prior knowledge for learning this chapter;

- Light is a type of energy as well as heat, electricity and sound.

Teaching Overview

This chapter consists of 9 lessons, each lesson is a double period.

Topic	Lesson No.	Lesson Title and Key Question	Content standard in syllabus	Textbook page number
7.1 Properties of Light	1	**What makes us See Objects?** Why can we see objects during the day but not at night?	3.2.2	137 - 138
	2	**How Does Light Travel?** How does light travel?		139 - 140
	3	**Light Passing Through Objects** Why can we see through a window but not a concrete wall?		141 - 142
	4	**Formation of Shadow** How is a shadow made?		143 - 144
	5	**Shape and Size of Shadow** How can we change the shape and size of a shadow?		145 - 146
	6	**Light Reflection** Why can we see the objects around us?		147 - 148
	7	**Gathering Light** What will happen if light is gathered?		149 - 150
	8	Summary and Exercise		151 - 153
Chapter Test	9	Chapter Test		154 - 155

Unit	Chapter : **7. Light**	Total lesson No: 58 / 94
Energy	Topic : **7.1. Properties of Light**	Textbook page: 137 - 138

Lesson 1 / 9

Lesson Topic:

What makes us See Objects?

Preparation

- Cardboard box with a pin hole, flashlight, any things

Lesson Flow

1 Introduction (10 min.)

- Encourage students to think about energy by asking the questions:

Q:Why can we see objects during the day? Why cannot we see objects at night?

Q:What helps us see objects?

2 Introduce the key question

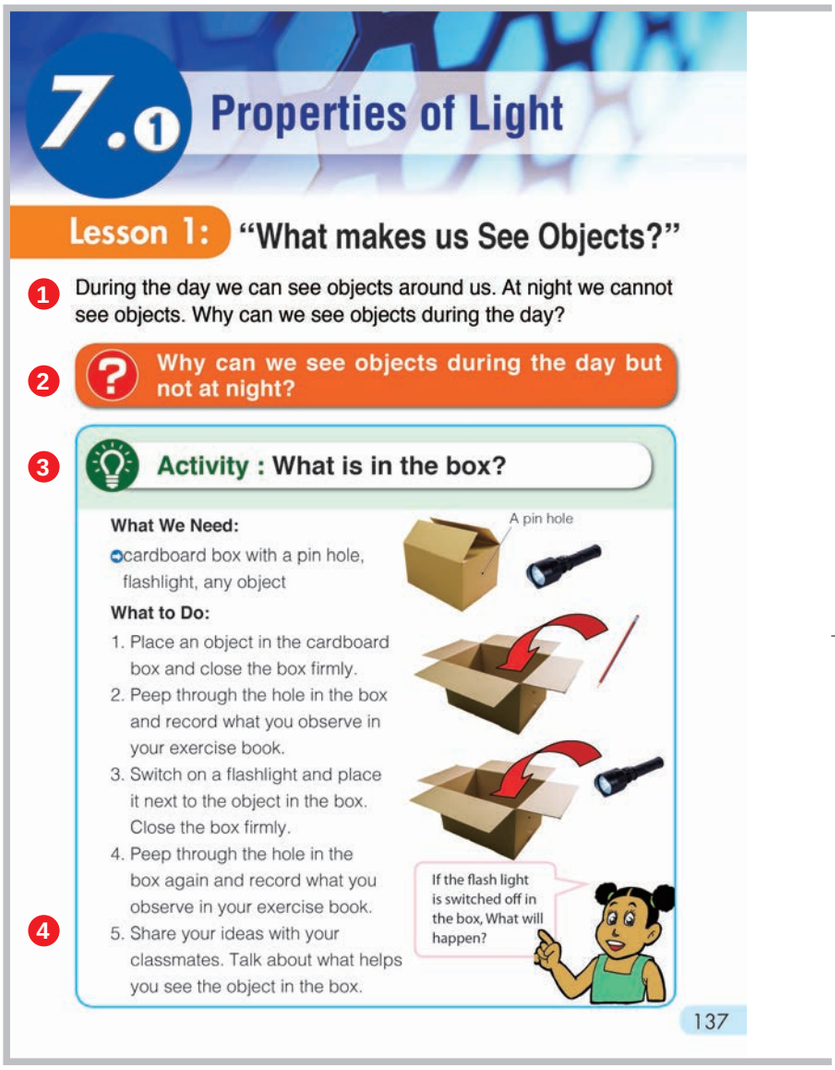
Why can we see objects during the day but not at night?

3 Activity (20 min.)

- Organise students into groups.
- Explain the steps of the activity.
- Have students do the activity and ask them to record their observation in their exercise book.
- Advise students to refer to the character's talking for their investigation.
- Ask students to discuss what makes them see an object in a box based on their observation as a group.

4 Discussion for findings (20 min.)

- Ask students to present their results of observation from the activity.
- Write students results on the blackboard.
- Facilitate active students' discussion. **(Continue)**



7.1 Properties of Light

Lesson 1: "What makes us See Objects?"

1 During the day we can see objects around us. At night we cannot see objects. Why can we see objects during the day?

2 Why can we see objects during the day but not at night?

3 Activity : What is in the box?

What We Need:

- cardboard box with a pin hole, flashlight, any object

What to Do:

1. Place an object in the cardboard box and close the box firmly.
2. Peep through the hole in the box and record what you observe in your exercise book.
3. Switch on a flashlight and place it next to the object in the box. Close the box firmly.
4. Peep through the hole in the box again and record what you observe in your exercise book.
5. Share your ideas with your classmates. Talk about what helps you see the object in the box.

A pin hole

4 If the flash light is switched off in the box, What will happen?

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Teacher's Notes

- In this lesson you will basically define light through the activity by identifying the property of light which is; light allows us to see things and identify the source of light or objects that produce light.

Preparation:

- Preparation of box: the box must be painted with dark colour both inside and outside. Then check that no light from outside enters. It should be pitch black by viewing through pin hole before conducting the activity.
- Prior the lesson classroom environment should be made dark by blocking off some light into the room.
- Suppose one set-up is for the whole class, be sure to place the pen or pencil away from student view. You can use different objects as well

Misconceptions of sources of light

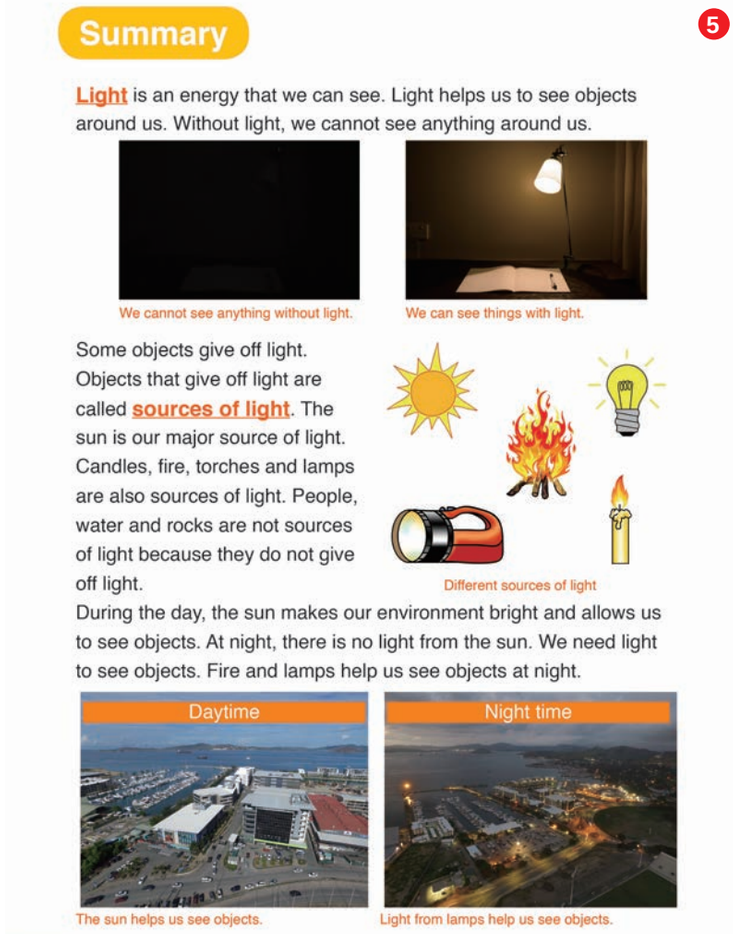
- There are some objects that seem to give off light but are not sources of light because they do not make light on their own. These objects only reflect light, such as the moon, mirrors, reflectors on a jacket, road cones or road signs and sign boards.

Lesson Objectives

Students will be able to:
- Explain the reason why we can see objects.
- Identify the different types of sources of light.

Assessment

Students are able to:
- State that light helps us to see objects.
- Describe how different types of energy sources such as light, electrical, heat and sound energy help people.
- Investigate the properties of light with interest.



Summary

Light is an energy that we can see. Light helps us to see objects around us. Without light, we cannot see anything around us.

We cannot see anything without light.

We can see things with light.

Some objects give off light. Objects that give off light are called **sources of light**. The sun is our major source of light. Candles, fire, torches and lamps are also sources of light. People, water and rocks are not sources of light because they do not give off light.

Different sources of light

During the day, the sun makes our environment bright and allows us to see objects. At night, there is no light from the sun. We need light to see objects. Fire and lamps help us see objects at night.

Daytime

Night time

The sun helps us see objects.

Light from lamps help us see objects.

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- Confirm their results with students.
- **Based on their results, asks** the following questions as discussion points.

Q:Why did you not see anything in the box without a flashlight? (No light, light cannot come into the box, its dark, etc)

Q:Why did you see the object in the box with a flashlight? (It's bright in a box, inside the box is lit, etc)

Q:What condition was different in the box before and after you put on and off the flashlight? (Dark or bright, there is light or not, etc)

Q:What helped us to see the object? (Light helps us to see the thing, etc)

Q:From where did the light come from? (It came from a torch)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the board.
- Ask these questions as assessment:
  Q: What makes us see objects?
  Q: What is a source of light?
  Q: What are some examples of sources of light?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:

"What makes Us See Objects?"

Key question

Why can we see objects during the day but not at night?

Activity: What is in the box?

	Your observation
Without a torch	We cannot see anything, etc
With a torch	We can see something, etc

Discussion

Q: Why did not you see anything in the box without a torch?
No light, light cannot come into the box, its dark, etc
Q: Why did you see the object in the box with a torch?
It's bright in a box, inside the box is lit, etc
Q: What condition was different in a box before and after you put on and off the flashlight?
Dark or bright, there is light or not, etc
Q: What helped us to see the object?
Light helps us to see the thing, etc
Q: From where did the light come from?
It came from a torch.

Summary

- Light is energy that we can see. Light helps us to see objects around us.
- Objects that give off light are called sources of light such as Sun, candles, fires, torches and lamps.
- During the day, the Sun makes our environment bright and allows us to see objects.
- At night, there is no light from the Sun. We cannot see.
- Fires and lamps help us see objects at night.

Unit	Chapter : **7. Light**	Total lesson No: 59 / 94
Energy	Topic : **7.1. Properties of Light**	Textbook page: 139 - 140

Lesson 2 / 9

Lesson Topic:

How Does Light Travel?

Preparation

- Clay, flashlight, three pieces of card boards with a hole

Lesson Flow

1 Introduction (5 min.)

- Review the previous lesson by asking.

Q:What is light?

Q:What are some sources of light?

- Encourage students to think about how light travels by asking:

Q:Light helps us to see objects. What path does the light travels?

2 Introduce the key question

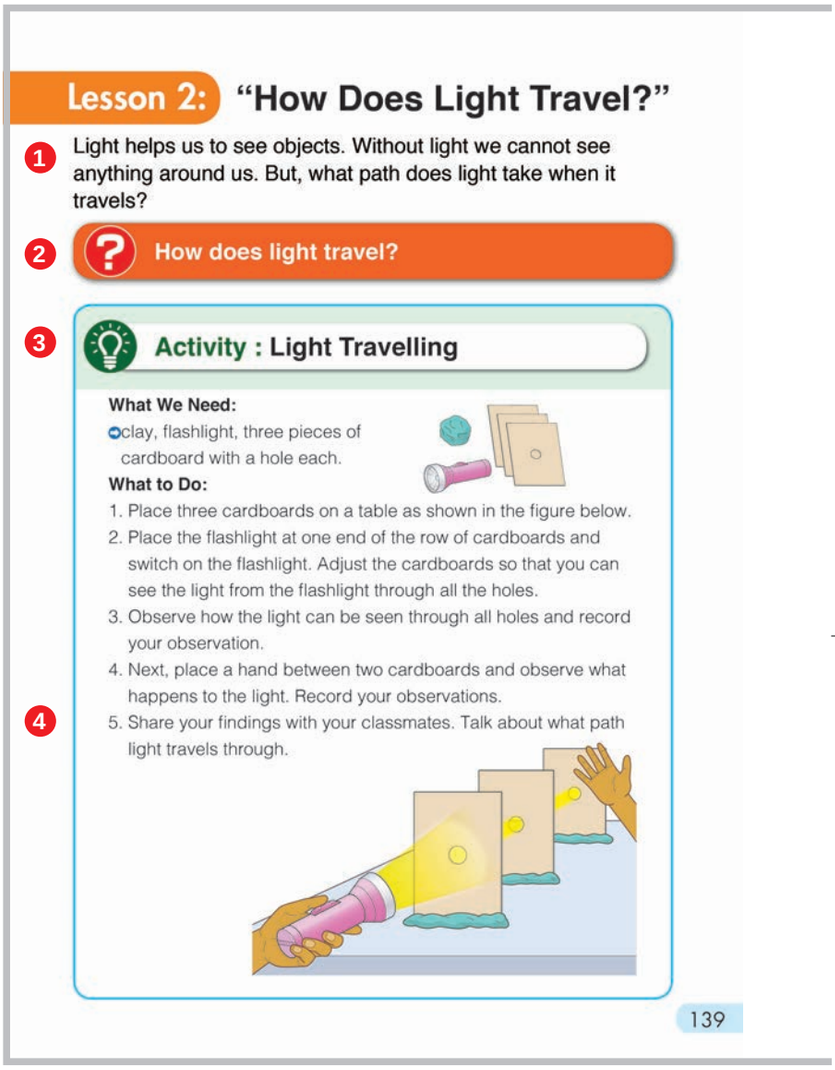
How does light travel?

3 Activity (25 min.)

- Organise students into groups.
- Explain the steps of the activity.
- Ask students to set up their activity with your assistance.
- Ask students to predict how light travels.
- Have students do the activity based on their prediction and ask them to record their findings in their exercise book.
- For step 4, instruct students to place a hand between the cards and record what they observe.
- After that, ask students to discuss 'what path light travels' based on their observation as a group.

Discussion for findings (25 min.)

4 Ask students to present their results of observation from the activity. **(Continue)**



Lesson 2: "How Does Light Travel?"

1 Light helps us to see objects. Without light we cannot see anything around us. But, what path does light take when it travels?

2 How does light travel?

3 Activity : Light Travelling

What We Need:

clay, flashlight, three pieces of cardboard with a hole each.

What to Do:

1. Place three cardboards on a table as shown in the figure below.
2. Place the flashlight at one end of the row of cardboards and switch on the flashlight. Adjust the cardboards so that you can see the light from the flashlight through all the holes.
3. Observe how the light can be seen through all holes and record your observation.
4. Next, place a hand between two cardboards and observe what happens to the light. Record your observations.
5. Share your findings with your classmates. Talk about what path light travels through.

4

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Teacher's Notes

Light travels

- When you get up in the morning, sunlight makes your room bright. When the Sun sets, your room is so dark you might trip over something. Without light, you cannot see. So you flick a light switch and electric light makes your room bright again.
- Light travels in a straight line until it runs into something. What happens then depends on what the light runs into.
- Light rays go right through transparent substances. Clear window glass is transparent, so sunlight goes right through. That is why you can see through a windowpane.

⚠ SAFETY:

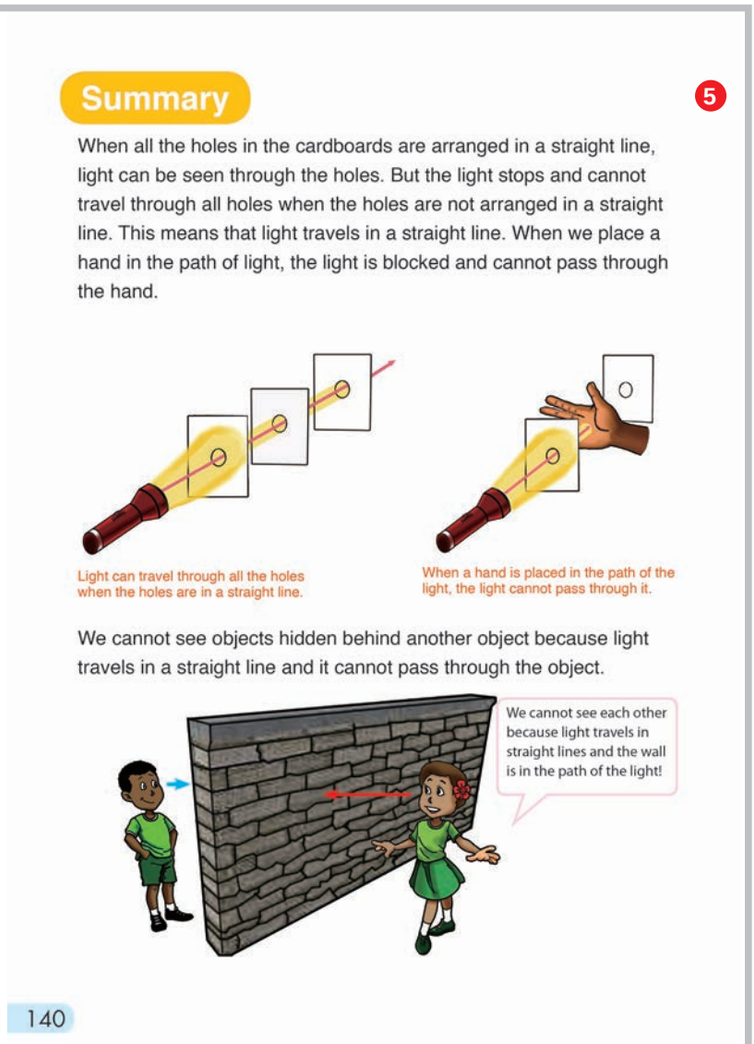
➡ Do not flash the flashlight into others eyes.

Lesson Objectives

Students will be able to:
- Describe the way light travels.
- Relate the results of activity to the way of how light travels.

Assessment

Students are able to:
- Explain that light travels in a straight line.
- State the reason why light travels through the holes in the card boards.
- Respect others discussion.



Summary 5

When all the holes in the cardboards are arranged in a straight line, light can be seen through the holes. But the light stops and cannot travel through all holes when the holes are not arranged in a straight line. This means that light travels in a straight line. When we place a hand in the path of light, the light is blocked and cannot pass through the hand.

Light can travel through all the holes when the holes are in a straight line.

When a hand is placed in the path of the light, the light cannot pass through it.

We cannot see objects hidden behind another object because light travels in a straight line and it cannot pass through the object.

We cannot see each other because light travels in straight lines and the wall is in the path of the light!

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- Write students results on the blackboard.
- Confirm their results with students.
- **Based on their results,** asks the following questions as discussion points.

Q:How did you arrange the card boards so that you saw the light from the flashlight through all the holes? (We arranged the all holes on the card boards in straight line, etc)

Q:What happened to light when you placed your hand between the cardboards? (We could not see the light from the flashlight.)

Q:Can you guess how light travels? (Light travels in a straight line, light cannot travel when it is blocked by an object (hand), light cannot pass through objects (hand), etc)

- Conclude the discussion.

5 Summary (5 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: How does light travel?
  Q: Why can't we see objects hidden behind other objects?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:

"How does light travel?"

Key question

How does light travel?

Activity: Light travelling

1. How can the light be seen through all holes?

The light is travelling straight, etc.

2. What happens to the light when you place a hand between two card boards?

The light could not be seen, etc

Discussion

Q: How did you arrange the card boards so that you saw the light from the flashlight through all the holes?

We arranged the all holes in card board in straight line, etc

Q: What happened to light when you placed your hand between the cardboards?

We could not see the light from the flashlight.

Q: Can you guess how light travels?

Light travels in a straight line, light cannot travel when it is blocked by an object (hand), light cannot pass through objects (hand), etc

Summary

- Light travels in a straight line.
- When light is blocked by objects, light cannot travel.
- Light cannot pass through the objects.
- We cannot see objects hidden behind other object because light travels in a straight line and it cannot pass through an object.

Unit	Chapter : **7. Light**	Total lesson No: 60 / 94
Energy	Topic : **7.1. Properties of Light**	Textbook page: 141 - 142

Lesson 3 / 9

Lesson Topic:

Light Passing Through Objects

Preparation

- Water, glass cup, tissue paper, plastic bag, stone, book, flashlight

Lesson Flow

1 Introduction (5 min.)

- Review the previous lessons:

Q:How does light travel?

Q:Why cannot we see objects hidden behind other objects?

- Encourage students to think about Light Passing Through Objects by asking the questions:

Q:We cannot see objects behind a concrete wall, but why can we see through objects behind a glass window?

2 Introduce the key question

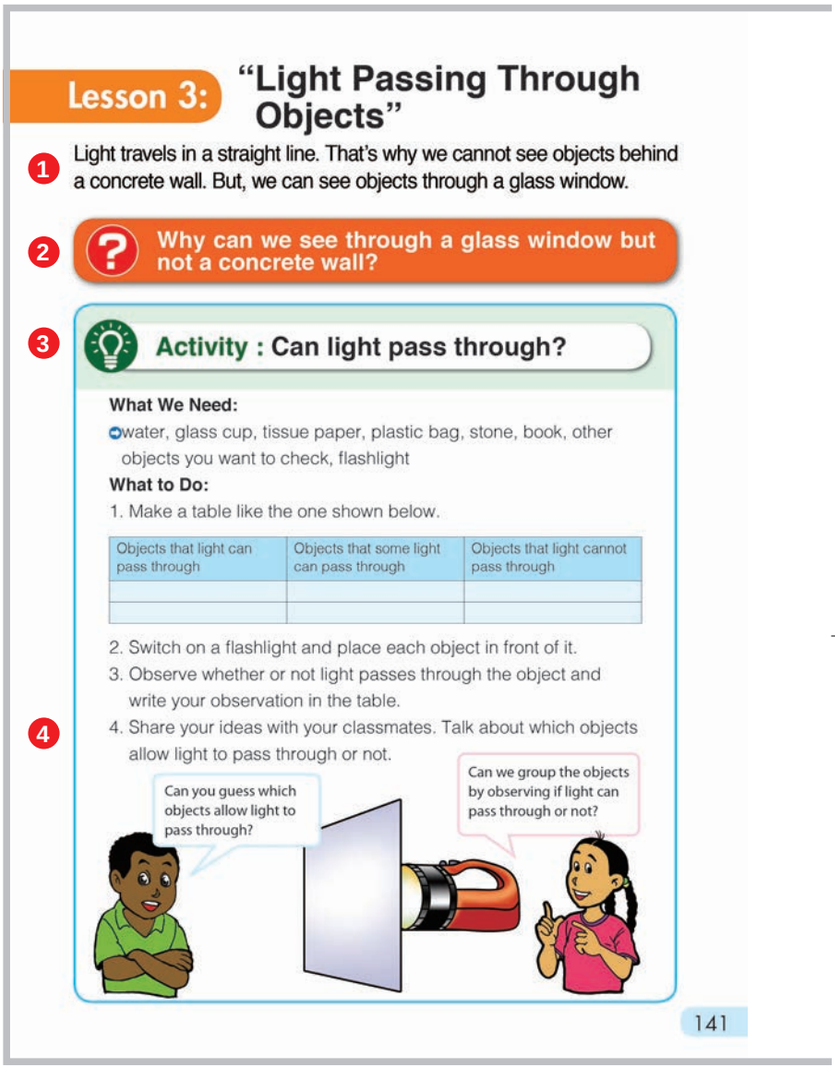
Why can we see through some objects and not others?

3 Activity (25 min.)

- Organise the students into groups.
- Explain the steps of the activity.
- Ask students to draw a table in their exercise books.
- Ask students to predict which objects light can pass through.
- Have students do the activity and record what they observe in the table
- After that, ask students to discuss which objects allow light to pass through or not based on their observation as a group.

4 Discussion for findings (20 min.)

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



Lesson 3: "Light Passing Through Objects"

1 Light travels in a straight line. That's why we cannot see objects behind a concrete wall. But, we can see objects through a glass window.

2 Why can we see through a glass window but not a concrete wall?

3 Activity : Can light pass through?

What We Need:

water, glass cup, tissue paper, plastic bag, stone, book, other objects you want to check, flashlight

What to Do:

1. Make a table like the one shown below.

Objects that light can pass through	Objects that some light can pass through	Objects that light cannot pass through

2. Switch on a flashlight and place each object in front of it.
3. Observe whether or not light passes through the object and write your observation in the table.
4. Share your ideas with your classmates. Talk about which objects allow light to pass through or not.

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Teacher's Notes

Transparent	Description
• Glad wrap	• Sold in the shops (don't need to write this info.)
• Pet bottles	• From fizzy drinks or juice bottles
• Plastic bags	• Used for packaging bail of rice or sugar, popcorn plastic bag
Translucent	**Description**
• Pet bottles	• Small size Orchy pet bottle
• Plastic bags	• White shopping plastic bag
• Waxed paper	• Pour one lid of baby oil, hair oil or cooking oil on clean white paper then dry. (do not use engine oil)

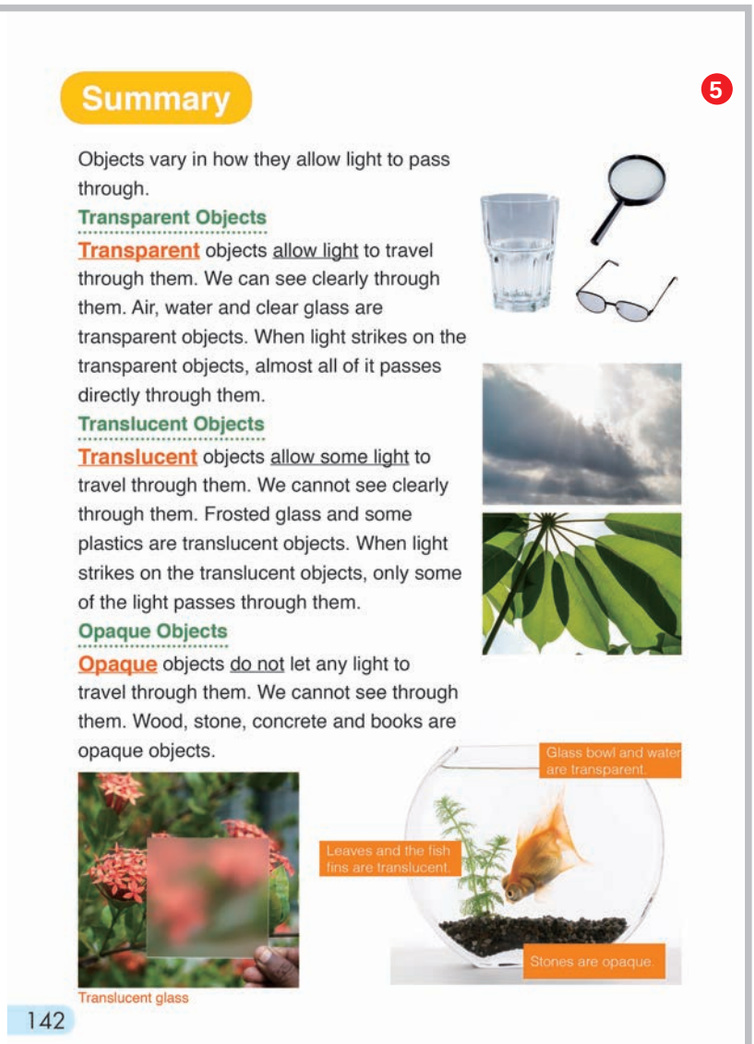
⚠ • Do consider using other transparent or translucent objects that are available.
• Safety: 'Do not flash the light into your eyes or others eyes.'

Lesson Objectives

Students will be able to:
- Define transparent, translucent and opaque objects.
- Classify objects into transparent, translucent and opaque objects.

Assessment

Students are able to:
- Explain the differences between transparent, translucent and opaque objects.
- List the name of transparent, translucent and opaque objects in a table.
- Participate in a group discussion actively.



Summary 5

Objects vary in how they allow light to pass through.

Transparent Objects

Transparent objects allow light to travel through them. We can see clearly through them. Air, water and clear glass are transparent objects. When light strikes on the transparent objects, almost all of it passes directly through them.

Translucent Objects

Translucent objects allow some light to travel through them. We cannot see clearly through them. Frosted glass and some plastics are translucent objects. When light strikes on the translucent objects, only some of the light passes through them.

Opaque Objects

Opaque objects do not let any light to travel through them. We cannot see through them. Wood, stone, concrete and books are opaque objects.

Translucent glass

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- Write students results on the blackboard.
- Facilitate students to take part in the discussion actively.
- Confirm the results with students.
- **Based on their results, ask** the questions as discussion point.

Q:How can we classify objects according to light passing through? (The objects can be classified into Objects that light can pass through, Objects that some light can pass through and Objects that light cannot pass through)

Q:What are examples of objects that light can pass through, objects that some light can pass through and objects that light cannot pass through? (It depends on students' answers.)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  - Q: What are transparent, translucent and opaque objects?
  - Q: How are transparent, translucent and opaque objects different?
  - Q: What are some examples of transparent, translucent and opaque objects?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:

"Light passing through objects"

Key question

Why can we see through a window but not a concrete wall?

Activity Can light pass through?

Objects light pass through	Objects some light pass through	Objects light cannot pass through
Water	Plastic bag	book
Glass cup	paper	stone
.....	.....	.....

Discussion

Q: How can we classify objects according to light passing through?

The objects can be classified into Objects that light can pass through, Objects that some light can pass through, and Objects that light cannot pass through.

Q: What are examples of objects that light can pass through, objects that some light can pass through, and objects that light cannot pass through? Write students' answers here

Summary

- Objects can be classified into transparent, translucent and opaque objects by how they allow light to pass through.

1. Transparent object
   - ➤ It allows light to travel through it. We can see clearly through it.
2. Translucent object
   - ➤ t allows some light to travel through it. We cannot see clearly through it.
3. Opaque object
   - ➤ It doesn't let any light travel through it. We cannot see through it.

Unit	Chapter : **7. Light**	Total lesson No: 61 / 94
Energy	Topic : **7.1. Properties of Light**	Textbook page: 143 - 144

Lesson 4 / 9

Lesson Title

Formation of Shadow

Preparation

- Transparent, translucent, opaque objects, flashlight

Lesson Flow

1 Introduction (5 min.)

- Review the previous lessons:

Q:What are transparent, translucent and opaque objects?

Q:How are transparent, translucent and opaque objects different?

- Encourage students to think about the formation of shadow by asking the question:

Q: We can find shadows in many places. How do transparent, translucent and opaque objects make shadows?

2 Introduce the key question

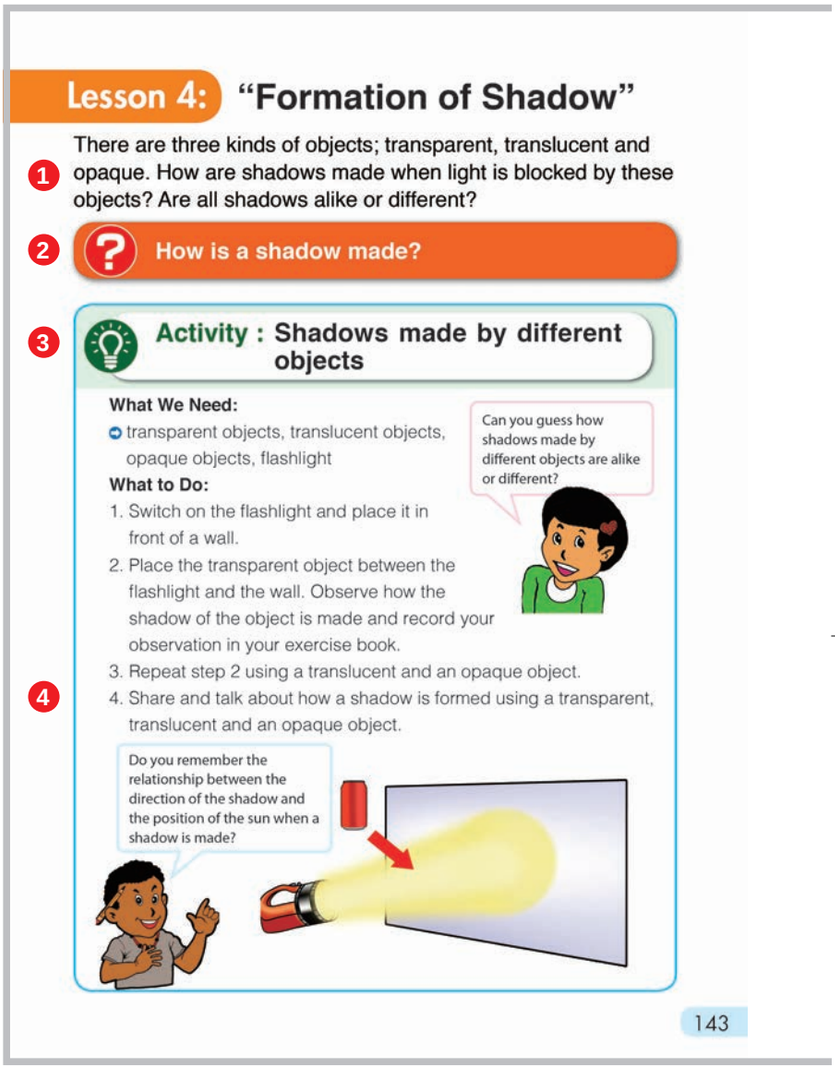
How is a shadow made?

3 Activity (25 min.)

- Organise the students into groups.
- Explain the steps of the activity.
- Ask student to predict which objects can make a shadow.
- Have students do the activity based on their predictions and record their observations in their exercise books.
- Then, ask students to discuss how a shadow is made by a transparent, translucent and opaque object based on their results in groups.

4 Discussion for findings (20 min.)

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



Lesson 4: "Formation of Shadow"

1 There are three kinds of objects; transparent, translucent and opaque. How are shadows made when light is blocked by these objects? Are all shadows alike or different?

2 How is a shadow made?

3 Activity : Shadows made by different objects

What We Need:

transparent objects, translucent objects, opaque objects, flashlight

What to Do:

1. Switch on the flashlight and place it in front of a wall.
2. Place the transparent object between the flashlight and the wall. Observe how the shadow of the object is made and record your observation in your exercise book.
3. Repeat step 2 using a translucent and an opaque object.
4. Share and talk about how a shadow is formed using a transparent, translucent and an opaque object.

Can you guess how shadows made by different objects are alike or different?

Do you remember the relationship between the direction of the shadow and the position of the sun when a shadow is made?

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Teacher's Notes

- Prior the lesson it is better to block of access light. This will enable students to view the shadows created by the different types of objects.
- Let students focus on the darkness of shadows formed from the different objects in the discussion.

		
Opaque object	Translucent object	Transparent object

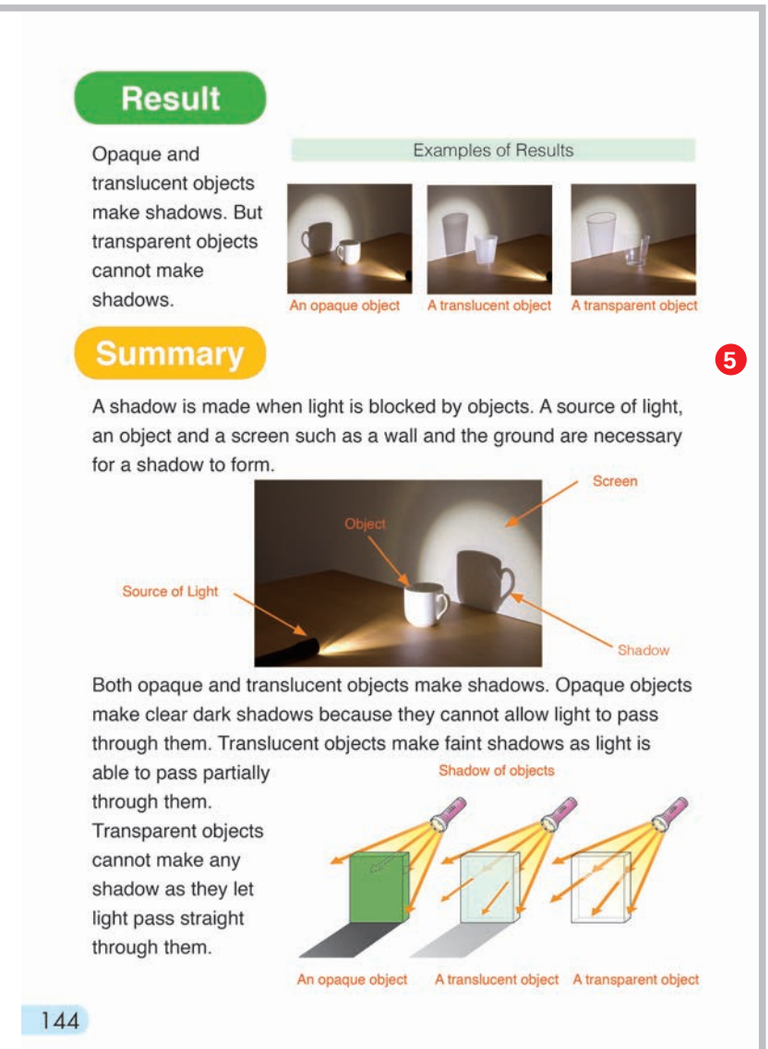
⚠ Safety:
Do not flash the light from flashlight into someone's eyes.

Lesson Objectives

Students will be able to:
- Describe the formation of a shadow.
- Identify how opaque, translucent and transparent objects make a shadow.

Assessment

Students are able to:
- Explain how a shadow is formed by a source of light, an object and a screen.
- Explain how the shadows made by opaque, translucent and transparent objects are alike or different.
- Investigate the formation of a shadow with interest.



Result

Opaque and translucent objects make shadows. But transparent objects cannot make shadows.

Examples of Results

An opaque object | A translucent object | A transparent object

Summary

A shadow is made when light is blocked by objects. A source of light, an object and a screen such as a wall and the ground are necessary for a shadow to form.

Screen
Object
Source of Light
Shadow

Both opaque and translucent objects make shadows. Opaque objects make clear dark shadows because they cannot allow light to pass through them. Translucent objects make faint shadows as light is able to pass partially through them. Transparent objects cannot make any shadow as they let light pass straight through them.

Shadow of objects

An opaque object | A translucent object | A transparent object

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- Write students' results on the blackboard.
- Confirm the results with students.
- **Based on their results,** ask the questions as discussion point.

Q:How are the shadows of opaque, traslucent and transparent objects are different? (Opaque objects make clear dark shadows. Translucent objects make faint shadows. Transparent objects cannot make any shadow.)

Q:Can you guess why opaque and translucent objects can make shadows? (Opaque objects cannot allow light pass through them. Light is able to pass through them partially.)

Q:Can you guess why transparent objects cannot make shadows? (Transparent objects let light pass straight through them.)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: How is a shadow made?
  Q: Which object makes a shadow; transparent, translucent or opaque objects?
  Q: Why can opaque and translucent objects make shadows?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:
" Formation of shadow"

Key question
How is a shadow made?

Activity: Shadow made by different objects
1. Shadow of Opaque object
   clear, dark, black colour, etc
2. Shadow of Translucent object
   not clear, gray colour, etc
3. Shadows of Transparent object
   no shadow, etc

Discussion
Q: How are the shadows of opaque, translucent and transparent objects are different?
Opaque objects make clear dark shadows. Translucent objects make faint shadows. Transparent objects cannot make any shadow.
Q: Can you guess why opaque and translucent objects can make shadows?
Opaque objects cannot allow light pass through them. Light is able to pass only partially through them.
Q: Can you guess why transparent objects cannot make shadows?
Transparent objects let light pass straight through them.

Summary
- A shadow is made when light is blocked by objects.
- Opaque objects can make shadows because opaque objects cannot allow light pass through them.
- Translucent objects can make shadows as light is able to pass only partially through them.
- Transparent objects cannot make any shadow as they let light pass straight through them.

Unit	Chapter : **7. Light**	Total lesson No: 62 / 94
Energy	Topic : **7.1. Properties of Light**	Textbook page: 145 - 146

Lesson 5 / 9

Lesson Title

Shape and Size of Shadow

Preparation

- tin can, flashlight

Lesson Flow

1 Introduction (5 min.)

- Review the previous lessons by asking.

Q: How is a shadow made?

Q:Which object makes a shadow, transparent, translucent or opaque objects?

- Encourage students to think about shape and size of shadow by asking the question:

Q:We can find the different shape and size of shadows. Can we change the shape and size of shadows?

2 Introduce the key question

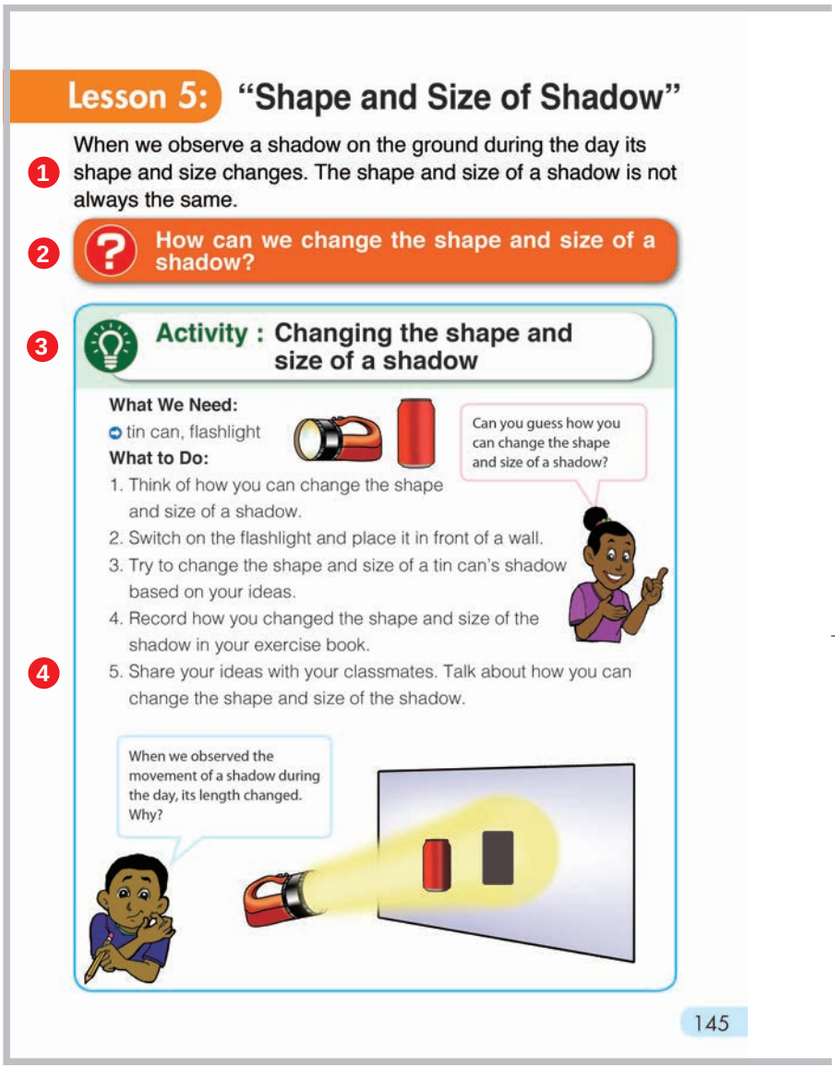
How can we change the shape and size of a shadow?

3 Activity (25 min.)

- Organise the students into groups.
- Explain the steps of the activity.
- Ask students to predict how they can change the shape and size of the shadow.
- Have students do the activity based on their prediction and record their results in their exercise books.
- Then, ask students to discuss how they can change the shapes and size of the shadow based on their results as a group.

4 Discussion for findings (20 min.)

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



Lesson 5: "Shape and Size of Shadow"

1 When we observe a shadow on the ground during the day its shape and size changes. The shape and size of a shadow is not always the same.

2 How can we change the shape and size of a shadow?

3 Activity : Changing the shape and size of a shadow

What We Need:
tin can, flashlight

What to Do:
1. Think of how you can change the shape and size of a shadow.
2. Switch on the flashlight and place it in front of a wall.
3. Try to change the shape and size of a tin can's shadow based on your ideas.
4. Record how you changed the shape and size of the shadow in your exercise book.
5. Share your ideas with your classmates. Talk about how you can change the shape and size of the shadow.

4

Can you guess how you can change the shape and size of a shadow?

When we observed the movement of a shadow during the day, its length changed. Why?

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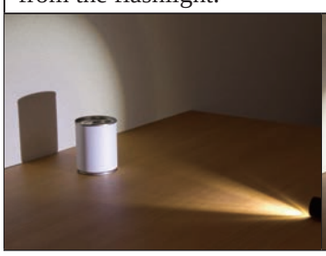
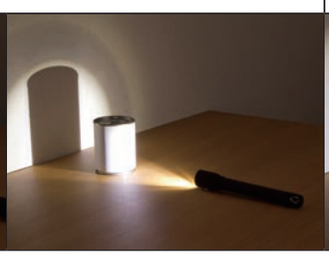
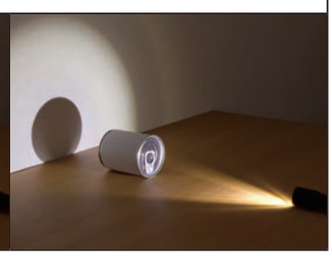
Teacher's Notes

Prior to the lesson it is better to block of access light. This will enable students to view the shadows created by from the object. DO NOT GIVE THE ANSWERS during the activity. Allow the students to find the result and discuss amongst themselves. The answer to the activity will be catered for in the Discussion.

The size of shadow depends on the distance of the object from the flashlight.	The shape of shadow depends on the position of the object in light.
 	 

Lesson Objectives

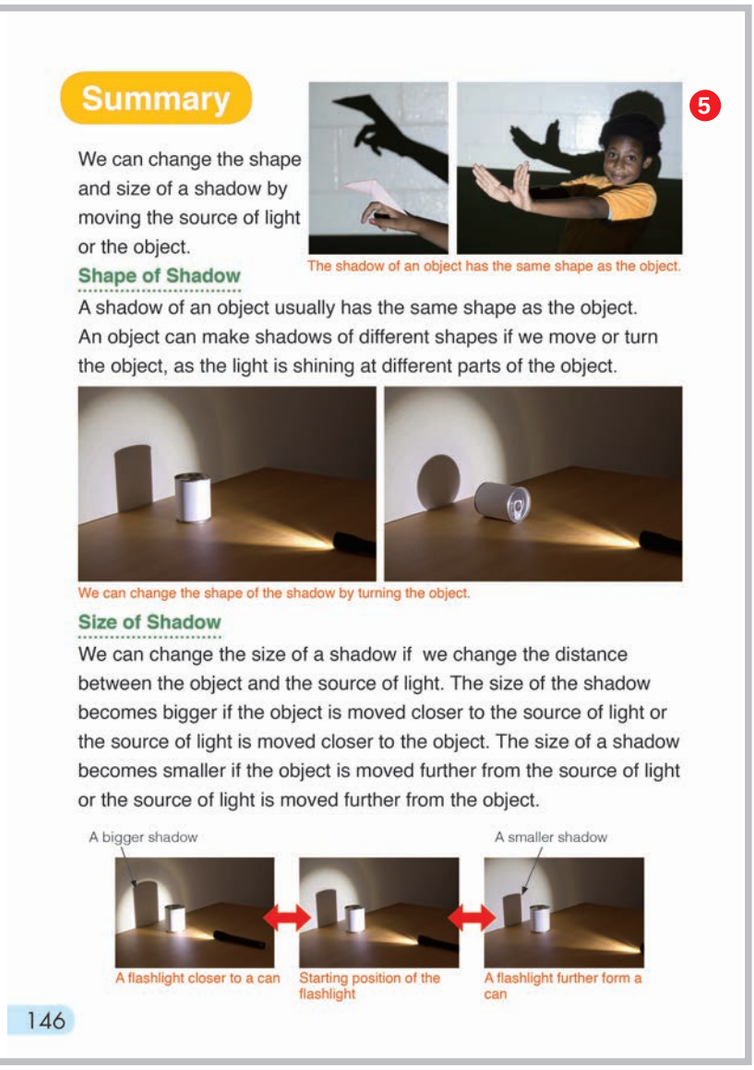
Students will be able to:

- Describe the relationship between the shape of a shadow and the shape of an object.
- Relate the change in the size of a shadow to the distance of an object from a source of light.

Assessment

Students are able to:

- State that the shape of a shadow is similar to the shape of the object.
- Explain how the size of a shadow changes according to the distance of an object from a source of light



Summary

We can change the shape and size of a shadow by moving the source of light or the object.

The shadow of an object has the same shape as the object.

Shape of Shadow

A shadow of an object usually has the same shape as the object. An object can make shadows of different shapes if we move or turn the object, as the light is shining at different parts of the object.

We can change the shape of the shadow by turning the object.

Size of Shadow

We can change the size of a shadow if we change the distance between the object and the source of light. The size of the shadow becomes bigger if the object is moved closer to the source of light or the source of light is moved closer to the object. The size of a shadow becomes smaller if the object is moved further from the source of light or the source of light is moved further from the object.

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- Write students results on the blackboard.
- Confirm the results with students.
- **Based on their results,** ask the questions as discussion point.

Q:How did you change the shape of a shadow? (We move or turn the can, etc)

Q:How is the shape of a shadow and the can alike or different? (The shape of a shadow is similar to the shape of the can, etc)

Q:How did you change the shape of a shadow? (We changed the distance between the can and the flashlight, etc)

Q:How did you make the size of a shadow bigger or smaller? (The size becomes bigger if the object is moved closer to flashlight, etc. The size becomes smaller if the object is moved closer to flashlight, etc.)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: How did you change the shape of the shadow?
  Q: How did you change the size of the shadow?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:

"Shape and Size of Shadow"

Key question

How can we change the shape and size of a shadow?

Activity: Changing shape and size of shadow

1: How can you change the shape of a shadow?
By moving, turning, changing the direction, etc

2: How can you change the shape of a shadow?
By moving the can close to or far away from flashlight, etc

Discussion

Q: How did you change the shape of a shadow? (We move or turn the can, etc)
Q: How is the shape of a shadow and the can alike or different? (The shape of a shadow is similar to the shape of the can, etc)
Q: How did you change the shape of a shadow? (We changed the distance between the can and the flashlight, etc)
Q: How did you make the size of a shadow bigger or smaller?
The size becomes bigger if the object is moved closer to flashlight, etc. The size becomes smaller if the object is moved closer to flashlight, etc.

Summary

1. Shape of Shadow
- A shadow of an object usually has the same shape as the object.
- When an object is moved or turned, the shadow of the object change.

2. Size of Shadow
- We can change the size of a shadow by changing the distance between the object and the source of light.
- The size becomes bigger if the object is closer to a source of light or a source of light is closer to the object.
- The size becomes smaller if the object is closer to a source of light or a source of light is further from the object.

Unit **Energy**	Chapter : **7. Light** Topic : **7.1. Properties of Light**	Total lesson No: 63 / 94 Textbook page: 147 - 148

Lesson
6 / 9

Lesson Topic:

Light Reflection

Preparation

- Mirrors

Lesson Flow

1 Introduction (5 min.)

- Review the previous lesson by asking students;

Q:How did you change the shape of the shadow?

Q:How did you change the size of the shadow?

- Encourage students to think about light reflection by asking the question:

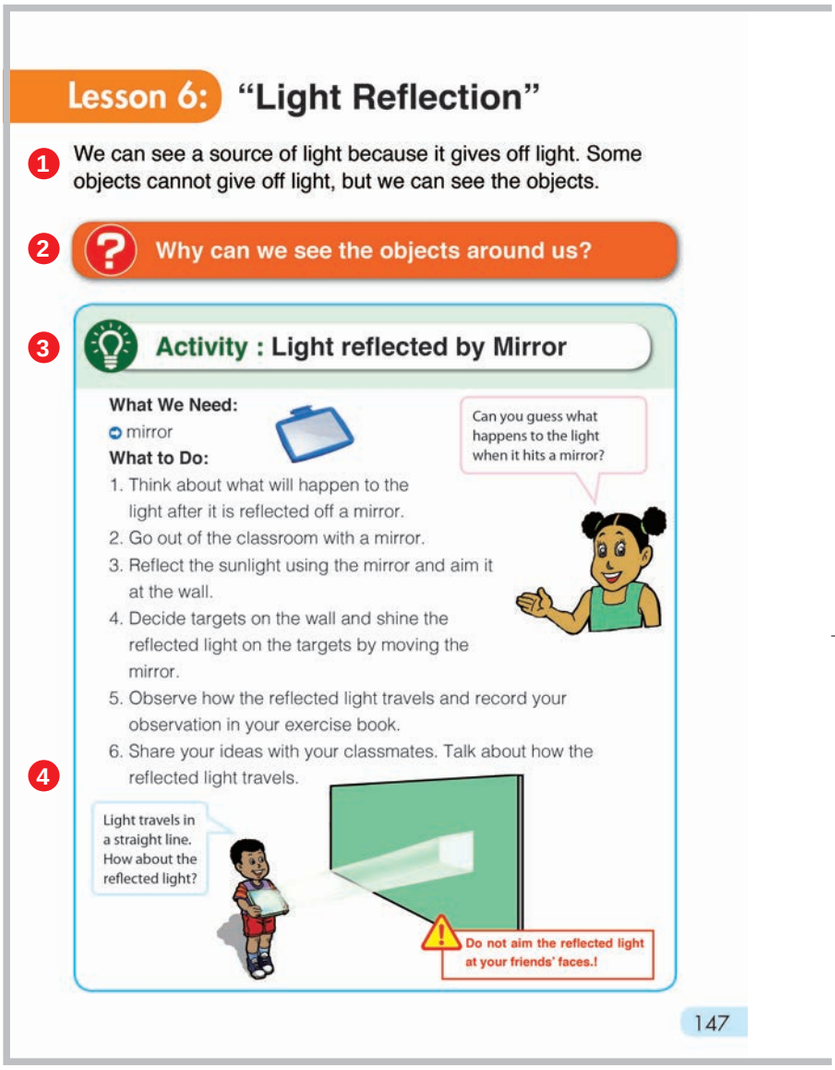
Q:Some objects cannot give off light but we can see the objects. Why?

2 Introduce the key question

Why can we see the objects around us?

3 Activity (20 min.)

- Organise the students into groups.
- Explain the steps of the activity.
- Explain the safety use of mirrors. 'Do not aim the reflected light at your friends!'
- Let student predict how light travels after it bounces off the mirror and record their prediction in their exercise books.
- Go out ot the classroom. Have students do the activity and ask them to record their observations in their exercise books.
- Then, ask students to discuss how the reflected light, travels based on their observation in their groups.



Lesson 6: "Light Reflection"

1 We can see a source of light because it gives off light. Some objects cannot give off light, but we can see the objects.

2 Why can we see the objects around us?

3 Activity : Light reflected by Mirror

What We Need:
mirror

What to Do:
1. Think about what will happen to the light after it is reflected off a mirror.
2. Go out of the classroom with a mirror.
3. Reflect the sunlight using the mirror and aim it at the wall.
4. Decide targets on the wall and shine the reflected light on the targets by moving the mirror.
5. Observe how the reflected light travels and record your observation in your exercise book.
6. Share your ideas with your classmates. Talk about how the reflected light travels.

Can you guess what happens to the light when it hits a mirror?

4

Light travels in a straight line. How about the reflected light?

Do not aim the reflected light at your friends' faces.!

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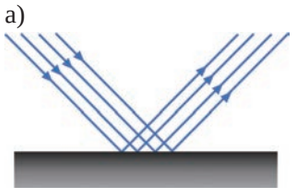
Teacher's Notes

- When light rays hit the smooth surface like a mirror, they bounce off in a straight line as shown in (a). It is called 'specular reflection'. Surface of a mirror is very smooth and almost perfectly reflects light so that you can see a clear image in a mirror.
- Light rays bounce off everywhere when they hit rough surfaces as shown in (b). It is called 'diffused reflection'. That is why you cannot see your face in your palm.
- On a cloudy day you may have an indoor lesson using a flashlight. Use new batteries for the torch and darken the room to observe better the reflection of light.

Safety

⚠ • Do not pass the mirror by tossing or throwing to a friend.
• Try not to aim the reflected light to other students.

a)



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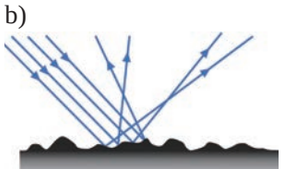
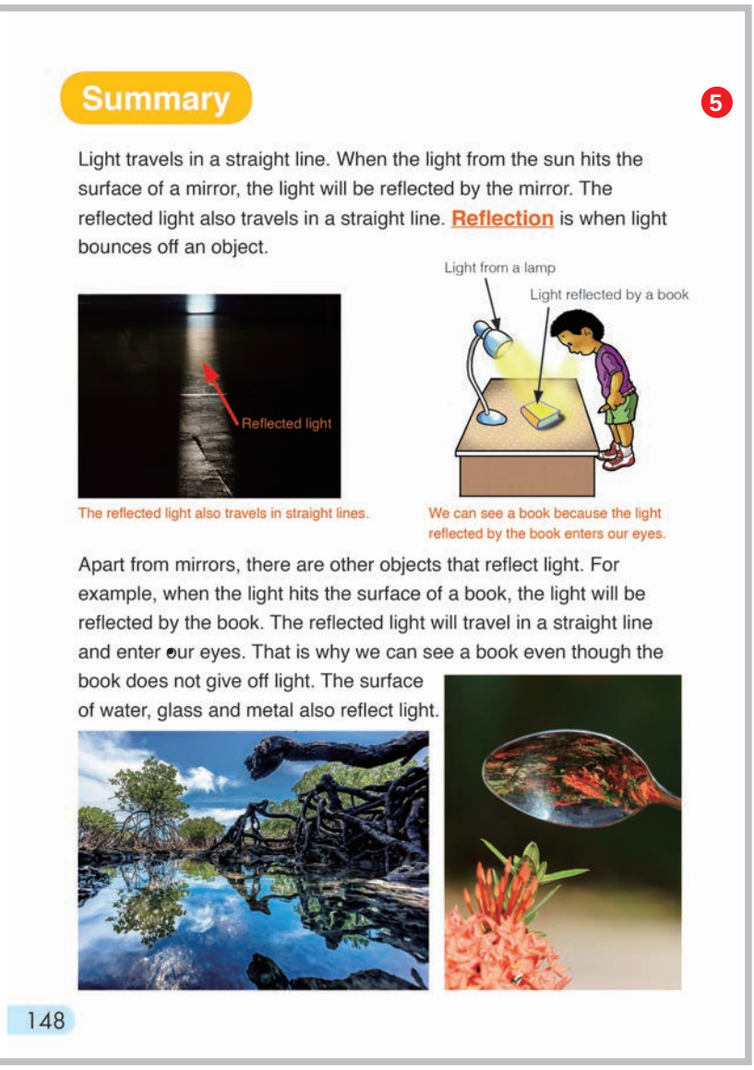


Lesson Objectives

Students will be able to:
- Observe how light acts when it is reflected by a mirror.
- Describe why all objects can be seen.

Assessment

Students are able to:
- State that reflected light travels in a straight line.
- Explain the reason why they can see all objects around them.
- Participate in group activity with interest.



Summary

5

Light travels in a straight line. When the light from the sun hits the surface of a mirror, the light will be reflected by the mirror. The reflected light also travels in a straight line. **Reflection** is when light bounces off an object.

The reflected light also travels in straight lines.

We can see a book because the light reflected by the book enters our eyes.

Apart from mirrors, there are other objects that reflect light. For example, when the light hits the surface of a book, the light will be reflected by the book. The reflected light will travel in a straight line and enter our eyes. That is why we can see a book even though the book does not give off light. The surface of water, glass and metal also reflect light.

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4 Discussion for findings (25 min.)

- Ask students to present their results from their activity.
- Write students results on the blackboard.
- Confirm the results with students.
- **Based on their results,** ask the questions as discussion point.

Q:What happened to the sunlight when it hit the mirror? (The light bounced off the mirror.)

Q:How did the light travel after it hit the mirror? (The light travelled in a straight line)

Q:Can you guess what the properties of light are? (Light can bounce off the surface of an object, bounced light can travels in a straight line, etc)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask the following questions as assessment:
  Q: How does the reflected light travel?
  Q: Why do we see objects around us?
  Q: What are some examples of light reflection around us.
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:

"Light reflection"

Key question

Why can we see the objects around us?

Activity: Light reflected by mirror

Prediction:

(Write students prediction here)

Example:

The sunlight will show everywhere

Your Observation:

(Write students prediction here)

Discussion

Q: What happened to the sunlight when it hit the mirror?

The light bounced off the mirror.

Q: How did the light travel after it hit the mirror?

The light travelled in a straight line

Q: Can you guess what the properties of light are?

Light can bounce off the surface of an object, bounced light can travels in a straight line, etc

Summary

- When the light hits the surface of a mirror, the light will be reflected by the mirror.
- The reflected light travels in a straight line.
- Reflection is when light bounces off an object.
- Most objects also reflect light.
- When the light hits the surface of an object, the light will be reflected by the object. The reflected light will travel in a straight line and enter our eyes. That's why we can see an object.

Unit **Energy**	Chapter : **7. Light** Topic : **7.1. Properties of Light**	Total lesson No: 64 / 94 Textbook page: 149 - 150

Lesson
7 / 9

Lesson Topic:

Gathering light

Preparation

- Hand lens, black paper

Lesson Flow

1 Introduction (5 min.)

- Review previous lesson:

Q:How does reflected light travel?

Q:Why can we see other objects around us?

- Encourage students to think about gathering light by asking the question:

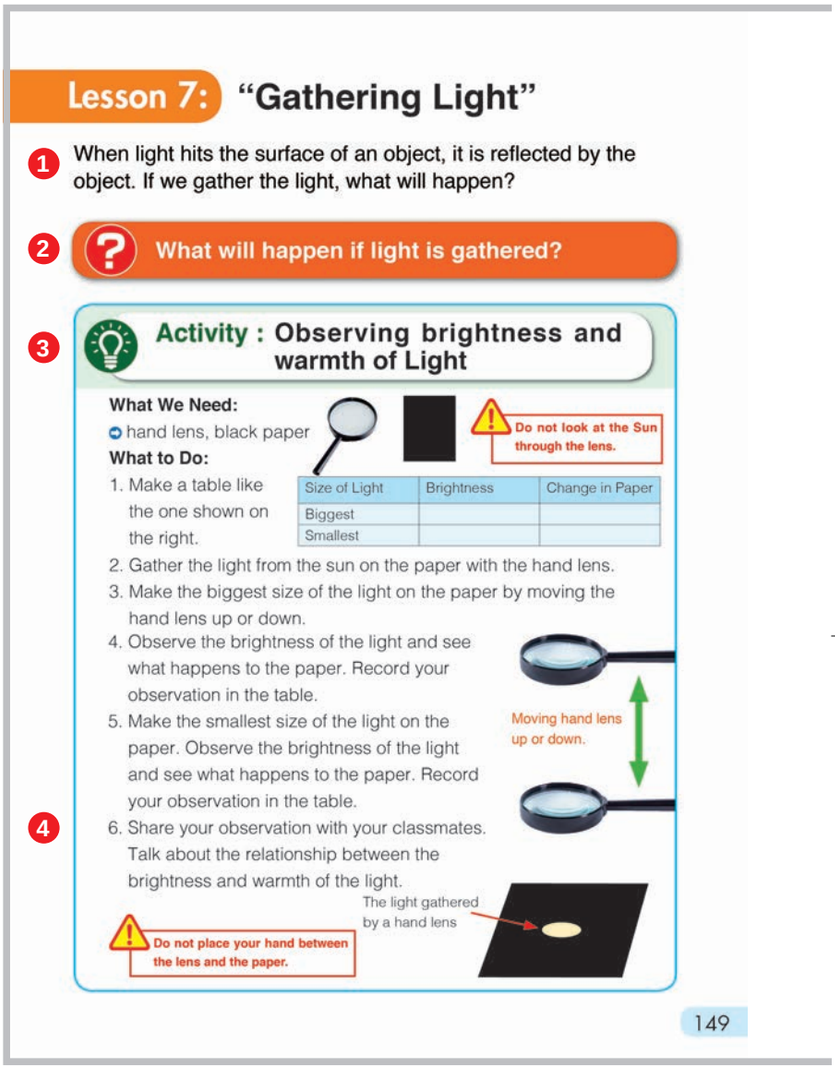
Q:If we gather light, what will happen to light?

2 Introduce the key question

What will happen if light is gathered?

3 Activity (25 min.)

- Organise the students into groups.
- Explain the steps of the activity.
- Ask students to draw a table in their exercise books.
- Explain the safety rules of using the hand lens.
- Ask students to predict what will happen to the light and the paper when the light is gathered.
- Have students do the activity based on their prediction and record their results in the table.
- Then, ask students to discuss the relationship between the brightness and warmth of light based on their results as a group.



Lesson 7: "Gathering Light"

1 When light hits the surface of an object, it is reflected by the object. If we gather the light, what will happen?

2 What will happen if light is gathered?

3 Activity : Observing brightness and warmth of Light

What We Need:
hand lens, black paper

What to Do:

1. Make a table like the one shown on the right.

Size of Light	Brightness	Change in Paper
Biggest		
Smallest		

2. Gather the light from the sun on the paper with the hand lens.
3. Make the biggest size of the light on the paper by moving the hand lens up or down.
4. Observe the brightness of the light and see what happens to the paper. Record your observation in the table.
5. Make the smallest size of the light on the paper. Observe the brightness of the light and see what happens to the paper. Record your observation in the table.
6. Share your observation with your classmates. Talk about the relationship between the brightness and warmth of the light.

Do not look at the Sun through the lens.

Moving hand lens up or down.

The light gathered by a hand lens

Do not place your hand between the lens and the paper.

4

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Teacher's Notes

Develop students' ideas by explaining that as the hand lens moves further from the paper. Light passing through the lens is concentrated on a small area that becomes hot and eventually burns which means that heat is produced.

Examples of answers in the table

Light	How does the light change when you move a hand lens?	⚠ Safety o Do not look at the sun through the lens o Do not place your hand between the lens and the paper. o Place the black paper on the ground and conduct the experiment.
Brightness	The brightness changes when we move a hand lens closer to or away from the paper.	
Hotness	The brighter the light is, the hotter the light is.	

Improvise:

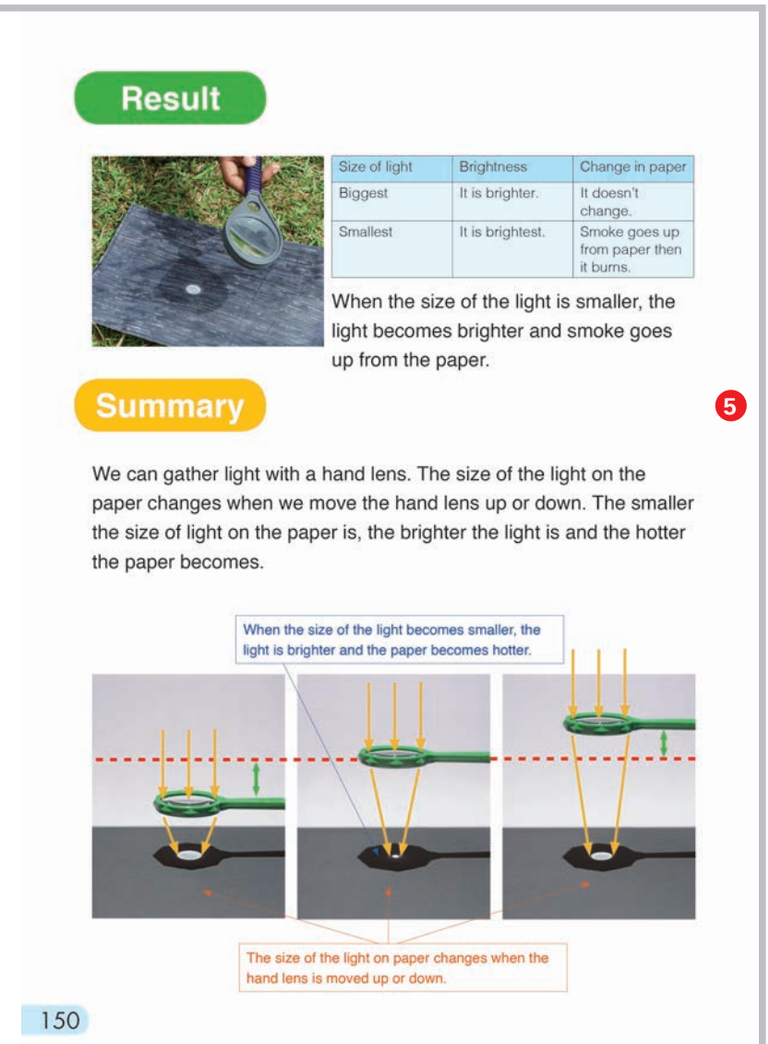
Cut A4 papers into halves then colour the halves with a black marker. Dark surfaces absorb heat rapidly therefore in this experiment the concentrated light spot from the lens creates heat and burns the paper for students to observe.

Lesson Objectives

Students will be able to:
- Observe what happens to the light when it is gathered.
- Describe the way to gather light.

Assessment

Students are able to:
- State that gathered light becomes brighter and hotter.
- Manipulate a hand lens to gather light.
- Explain how to gather light with a hand lens.
- Take part in the group discussion actively.



Result

Size of light	Brightness	Change in paper
Biggest	It is brighter.	It doesn't change.
Smallest	It is brightest.	Smoke goes up from paper then it burns.

When the size of the light is smaller, the light becomes brighter and smoke goes up from the paper.

Summary

We can gather light with a hand lens. The size of the light on the paper changes when we move the hand lens up or down. The smaller the size of light on the paper is, the brighter the light is and the hotter the paper becomes.

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4 Discussion for findings (20 min.)

- Ask students to present their results from their activity.
- Write students results in the table on the blackboard.
- Confirm results with students.
- **Based on their results,** ask the questions as discussion point.

Q:What relationship do you find between the size of light and the brightness of the light?
(The smaller the size, the brighter the light.)

Q:What happened to the paper when the light on the paper is the smallest?
(Smoke rose up from the paper, the paper got burned, etc)

Q:Why did the paper burn?
(This is because the smallest size of light on the paper was hotter, etc)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask the following questions as assessment:
  Q: How can light be gathered?
  Q: Explain the relationship between the size of light and the brightness/hotness of light.
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:

"Gathering Light"

Key question

What will happen if light is gathered?

Activity

Observing brightness and warmth of light

Result:

Size	Brightness	Change in paper
Bigger	Brighter	Don't change, etc
Smaller	Brightest	very hot and burnt the paper

Discussion

Q: What relationship do you find between the size of light and the brightness of the light?
The smaller a size is, the brighter the light is, etc

Q: What happened to the paper when the light on the paper is the smallest?
Smoke rose up from the paper, the paper got burned, etc

Q: Why did the paper burn?
This is because the smallest size of light on the paper was hotter, etc

Summary

- We can gather light with a hand lens.
- The size of the light on the paper change when we move a hand lens up and down.
- The smaller the size of light on the paper is, the brighter the light is and the hotter the paper becomes.

Unit	Chapter : **7. Light**	Total lesson No: 65 / 94
Energy	Topic : **7.1. Properties of Light**	Textbook page: 151 - 153

Lesson
8 / 9

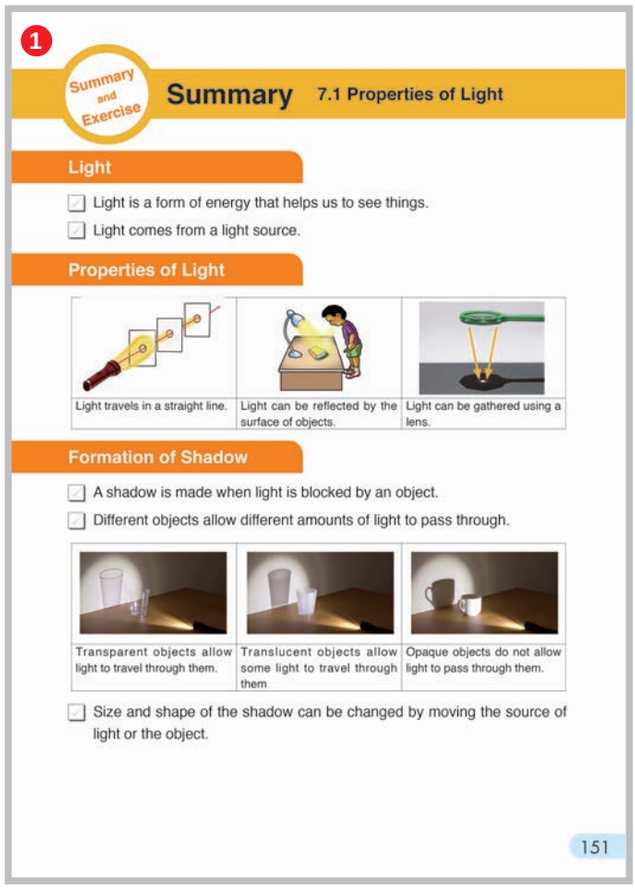
Lesson Title

Summary and Exercise

Tips of lesson

1 Summary (15 min.)

- Recap main learning contents in 'The Properties of Light'.
- Ask students some questions and verify their understanding. Explain and correct learning contents again if they still have misconceptions.
- Ask students to differentiate sources of light
- Provoke students to state some properties of light and describe their properties.



1

Summary and Exercise

Summary 7.1 Properties of Light

Light

- Light is a form of energy that helps us to see things.
- Light comes from a light source.

Properties of Light

Light travels in a straight line.	Light can be reflected by the surface of objects.	Light can be gathered using a lens.

Formation of Shadow

- A shadow is made when light is blocked by an object.
- Different objects allow different amounts of light to pass through.

Transparent objects allow light to travel through them.	Translucent objects allow some light to travel through them	Opaque objects do not allow light to pass through them.

- Size and shape of the shadow can be changed by moving the source of light or the object.

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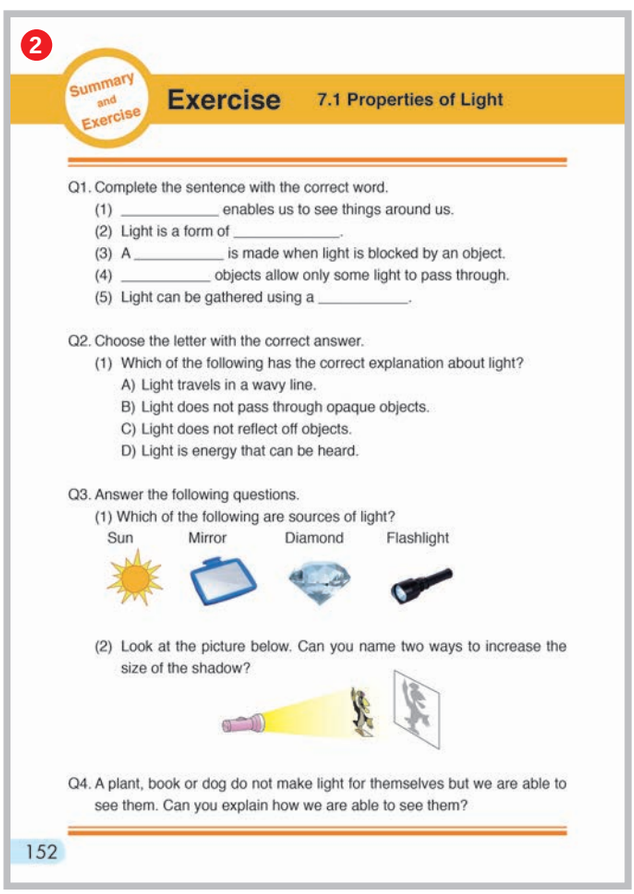
2 Exercise & Explanation (35 min.)

- Allow student to answer questions individually and give enough time to responsed to the questions based on their understanding.
- After the exercise, give the answer of the questions and explain how to solve them based on student's answers and thoughts on them.
- Make reference to the textbook or provide clear examples in daily life to strengthen the learnt concept in this topic.



2

Summary and Exercise

Exercise 7.1 Properties of Light

Q1. Complete the sentence with the correct word.
(1) _____ enables us to see things around us.
(2) Light is a form of _____.
(3) A _____ is made when light is blocked by an object.
(4) _____ objects allow only some light to pass through.
(5) Light can be gathered using a _____.

Q2. Choose the letter with the correct answer.
(1) Which of the following has the correct explanation about light?
A) Light travels in a wavy line.
B) Light does not pass through opaque objects.
C) Light does not reflect off objects.
D) Light is energy that can be heard.

Q3. Answer the following questions.
(1) Which of the following are sources of light?
Sun Mirror Diamond Flashlight

(2) Look at the picture below. Can you name two ways to increase the size of the shadow?

Q4. A plant, book or dog do not make light for themselves but we are able to see them. Can you explain how we are able to see them?

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Exercise answers

Q1.
(1) **Light**
(2) **energy**
(3) **shadow**
(4) **Translucent**
Differentiate clearly for the students a transparent and translucent
(5) **lens**

Q2.
(1) **B**
Objects that are opaque do not allow light to pass through them.

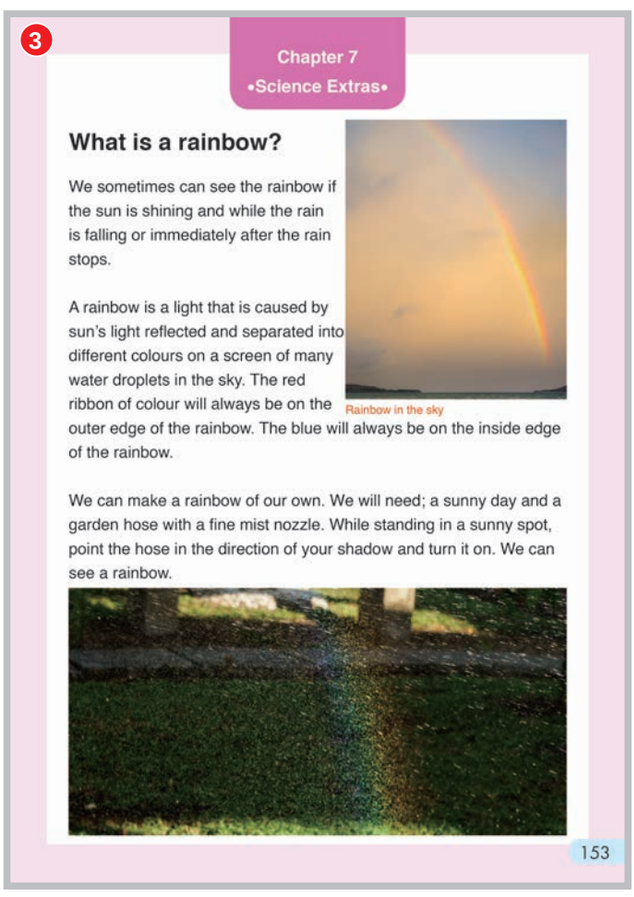
Q3.
(1) **Sun and Torch**
(2) **1. By moving the object closer to the light source**
2. By moving the light source closer to the object
There are two ways to increase the size of the shadow.

Q4. Sample of the answer
Because when light hits these objects the light is reflected off from these objects and travels straight to our eyes which enables us to them.
Answer should be mentioned that light reflects on the object and the reflected light travels into our eyes.

Explanation of Science Extras

3 Science Extras (10 min.)

- Give opportunities to students to closely observe the nature and its phenomena in the world.
- Allow students to ask questions that demonstrate curiosity about the content in the science extras.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Chapter 7
•Science Extras•

What is a rainbow?

We sometimes can see the rainbow if the sun is shining and while the rain is falling or immediately after the rain stops.

A rainbow is a light that is caused by sun's light reflected and separated into different colours on a screen of many water droplets in the sky. The red ribbon of colour will always be on the outer edge of the rainbow. The blue will always be on the inside edge of the rainbow.

Rainbow in the sky

We can make a rainbow of our own. We will need; a sunny day and a garden hose with a fine mist nozzle. While standing in a sunny spot, point the hose in the direction of your shadow and turn it on. We can see a rainbow.

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Lesson
9 / 9

Lesson Title

Chapter Test

Answer of the Chapter Test

Chapter Test

7. Light

Q1 Complete each sentence with the correct word.

(1) An object that produces light is called ___Source___ of light.
(2) The ___Sun___ provides both heat and light for the earth.
(3) A ___Shadow___ is formed when objects block the light path.
(4) ___Opaque___ objects cannot allow light to pass through them.

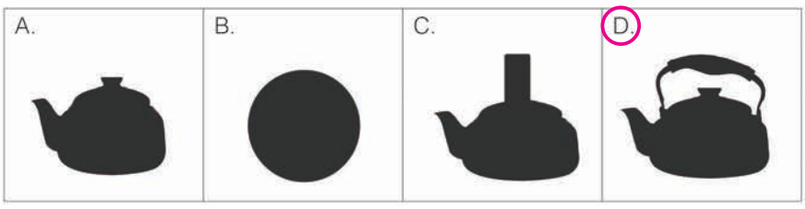
Q2 Choose the letter with the correct answer.

(1) How does light travel?
(A) Light travels in a straight line.
B. Light travels in a wavy line.
C. Light travels around corners.
D. Light travels in a zigzag line.

(2) Which one of the following objects allows light to pass through?
A. Mirror
B. Books
C. Blackboard
(D) Water

(3) What happens to the light when it hits a flat mirror?
A. The light passes through the mirror.
(B) The light is reflected off the mirror.
C. The light gathers at one place.
D. The light disappears.

(4) Study the kettle shown on the right.
Which shadow will be possibly made if light is shone on the kettle?



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Q3

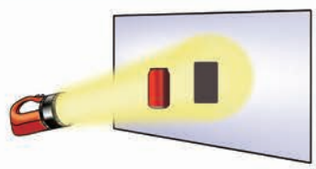
(1) Write two examples of sources of light.
Sun, fire, torch, light bulb, etc

(2) Write two examples of transparent and opaque objects.
Transparent objects: Water, air, clear glass etc.
Opaque objects: Wood, stone, books etc.

(3) State what hand lens can do with light?
Hand lens can gather light that pass through it.

Q4

(1) Ketsin made a shadow of a can on a wall. Explain how he can change the shape of the shadow.



Ketsin can change the shape of shadow by turning the can.

(2) A'alia tries to burn a piece of black paper using a hand lens on a sunny day. But the paper did not burn. Suggest your idea on how to improve her experiment to burn the paper using a hand lens.
(example) She should change the distance between hand lens and the paper to gather more light at the one point and make the paper hotter.

Strand : PHYSICAL SCIENCE
Unit : ENERGY

Chapter 8. Magnet

Chapter Objectives

Students will be able to understand the properties of magnets, by exploring their functions and the objects that are attracted to them.

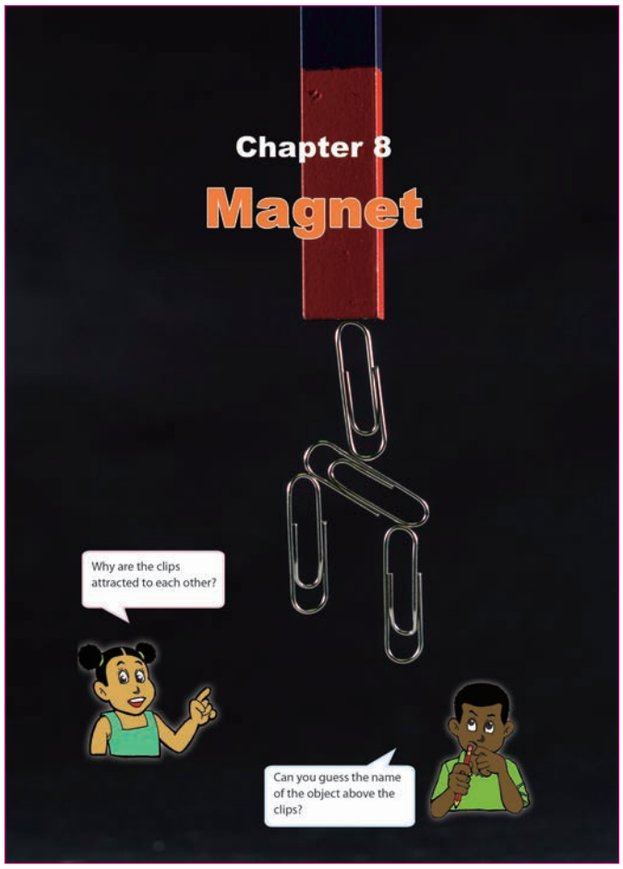
Students will be able to also classify objects that are used in daily life into those attracted to a magnet and those not attracted to a magnet.

Topic Objectives

8.1 Properties of Magnet

Students will be able to;

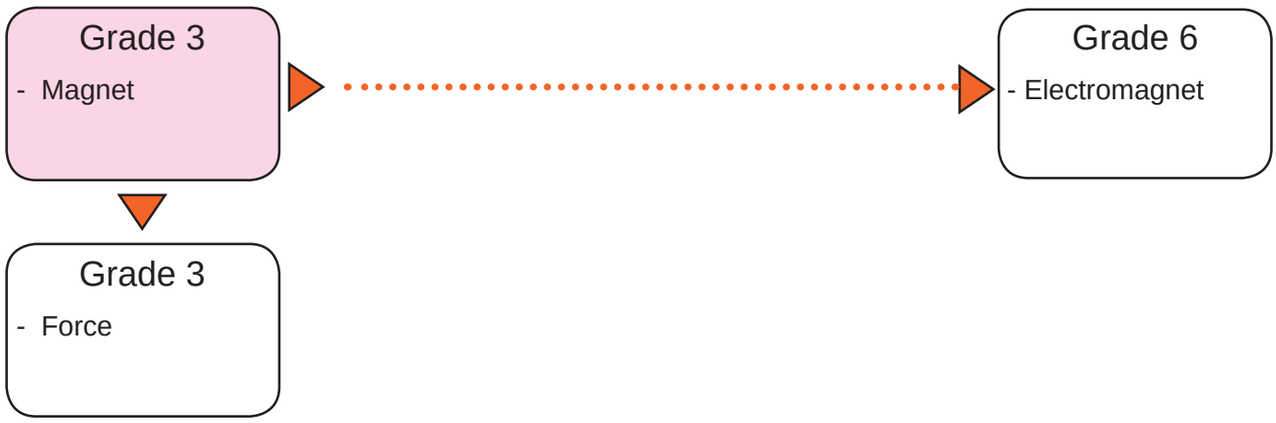
- Describe the function of magnets.
- Group objects into magnetic and non-magnetic object.
- Examine the difference in strength of force at the different parts of a bar magnet.
- Compare the behaviour of two poles when unlike and like poles come together.
- Explain that an iron object becomes a magnet once the object is attracted to a magnet.
- Explain the reason why a compass always points to the same direction.



Picture in the chapter heading in the textbook shows four clips attracted on the bar magnet and balancing their postion without a glue because of magnetism.

Related Learning Contents

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



Teaching Overview

This chapter consists of 8 lessons, each lesson is a double period.

Topic	Lesson No.	Lesson Title and Key Question	Content standard in syllabus	Textbook page number
8.1 Properties of Magnet	1	**Magnet around Us** What is a magnet?	3.2.3	157 - 158
	2	**What is Attracted to a Magnet?** What things are attracted to a magnet?		159 - 160
	3	**Force of Attraction between Magnet and Object** Which part of the magnet can attract more magnetic objects?		161 - 162
	4	**Properties of Poles of Magnets** What happens if the poles are placed near each other?		163 - 164
	5	**Making a Magnet** Does an object attracted by a magnet become a magnet?		165 - 166
	6	**Which Way?** How can we find the direction using a magnet?		167 - 168
	7	Summary and Exercise		169 - 171
Chapter Test	8	Chapter Test		172 - 173

Unit	Chapter : **8. Magnet**	Total lesson No: 67 / 94
Energy	Topic : **8.1. Properties of Magnet**	Textbook page: 157 - 158

Lesson 1 / 8

Lesson Title

Magnet around Us

Preparation

- 2 bar magnets, paper clips, card board, sewing thread, sticky tape

Lesson Flow

1 Introduction (5 min.)

- Begin the lesson by asking the questions:

Q:Have you seen a magnet before?

Q:What do you know about a magnet?

- Tell students that today's lesson we are going to explore the wonders of a magnet.

2 Introduce the key question

What is a magnet?

3 Activity (20 min.)

- Organise students into groups.
- Explain the steps of the activity.
- Ask students to make a table in their exercise book.
- Ask students to predict what a magnet can do.
- Have students do the activity based on their prediction and record their findings in the table.
- Advise students to refer to the pictures and the characters' talking in the activity for their investigation.
- Check students' activity. If necessary, guide students to do their findings.
- After the investigation, ask students to discuss what magnets can do as a group

4 Discussion for findings (15 min.)

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


8.1 Properties of Magnet

Lesson 1: "Magnet around Us"

1 We can find magnets around us. But what are magnets? Let's investigate the wonders of magnets!

2 What is a magnet?

3 Activity : What can magnets do?

What We Need:
two bar magnets, clips, thread, cardboard

Think about how you can investigate magnets by yourself.

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

What you observed

2. Think about what magnets can do. Try to find what magnets can do by using two magnets, clips and cardboard based on your ideas.
3. Record your observations in the table.
4. Share your ideas with your classmates. Talk about what magnets can do.

Do you have remove other ideas on how to investigate magnets?

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Teacher's Notes

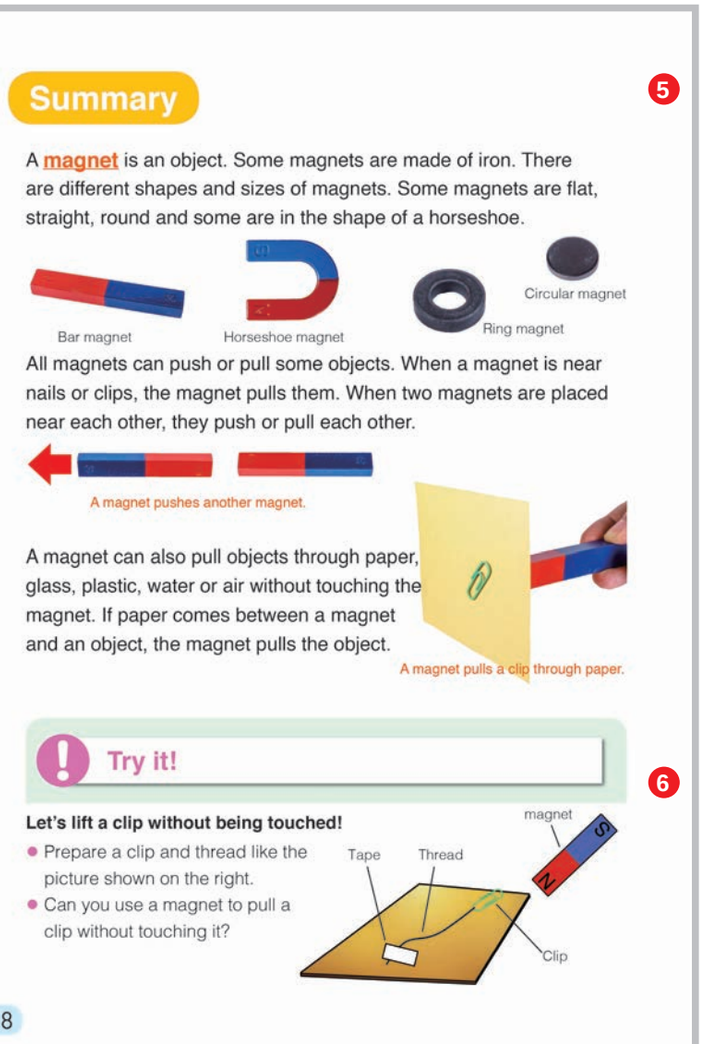
- A magnet is anything that carries a static magnetic field around with it. There are two types of magnets, a permanent magnet and a temporary magnet. A static magnetic field (magnetism) can pass through papers.
- A permanent magnet is an object which keeps its magnetism longer. It is artificially produced in industries (thus various shapes and sizes can be formed). It is a compound of elements. A popular permanent magnet like used in this lesson is called a ferrite magnet which is a compound of iron oxide and a slight amount of other metals.
- A permanent magnet is demagnetised if heated or sharp impacts are applied. It also gradually loses its magnetism by age. Place two magnets with the north pole of one touching the south pole of the other to preserve its strength while in storage.
- A temporally magnet is an object which cannot keep its magnetism permanently. An electromagnet is a typical example of this and will be taught in Gr.6, please refer to Gr.6 textbook and teachers guide for further information.
- Do not put magnets near computers or electronic devices as the magnetic force will damage parts inside.

Lesson Objectives

Students will be able to:
- Investigate the properties of a magnet.

Assessment

Students are able to:
- Describe what a magnet can do.
- Participate in the activity with interest.



Summary

A magnet is an object. Some magnets are made of iron. There are different shapes and sizes of magnets. Some magnets are flat, straight, round and some are in the shape of a horseshoe.

Bar magnet
Horseshoe magnet
Ring magnet
Circular magnet

All magnets can push or pull some objects. When a magnet is near nails or clips, the magnet pulls them. When two magnets are placed near each other, they push or pull each other.

A magnet pushes another magnet.

A magnet can also pull objects through paper, glass, plastic, water or air without touching the magnet. If paper comes between a magnet and an object, the magnet pulls the object.

A magnet pulls a clip through paper.

Try it!

Let's lift a clip without being touched!

- Prepare a clip and thread like the picture shown on the right.
- Can you use a magnet to pull a clip without touching it?

magnet
Tape
Thread
Clip

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- Write students findings on the blackboard.
- Facilitate active student' discussions.
- **Based on their findings,** ask the question as discussion points.

Q:How does a magnet work? (A magnet pulled some clips, it pushed or pulled other magnet when placed closer to them, it has N and S signs, it pulled clips through paper, etc)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask the following questions as assessment:
  Q: How does a magnet work on other magnets?
  Q: How does a magnet work on objects?
- Ask students to copy the notes on the blackboard into their exercise books.

6 Try it! (10 min.)

- Explain the steps of the activity.
- Let students lift a clip without being touched by using a magnet.
- Advice students to use a short length of thread as this will produce a good result.

Sample Blackboard Plan

Title:

"Magnet around Us"

Key question

What is a magnet?

Activity

What can magnets do?

What I observed
✓ A magnet pulls the paper clips when it is place closer to it.
✓ A magnet pulls the paperclip on the card board when moved beneath.
✓ A magnet push each other, etc

Discussion

Q: How does a magnet work?

A magnet pulled some clips.
It pushed or pulled other magnet when placed closer to them.
It has N and S signs,
It pulled clips through paper, etc

Summary

- A magnet is an object made of iron.
- There are different shapes and sizes of magnets.
  ➤ Bar, Horseshoe, Ring, Circular
- Magnets can push and pull some objects.
- When two magnets placed near each other, they push or pull each other.
- A magnet can also pull objects through paper, glass, plastic and air without being touched.

Unit	Chapter : **8. Magnet**	Total lesson No: 68 / 94
Energy	Topic : **8.1. Properties of Magnet**	Textbook page: 159 - 160

Lesson 2 / 8

Lesson Title

What is Attracted to a Magnet?

Preparation

- Magnet, coin, iron nail, clip, Exercise book, steel can, aluminium can

Lesson Flow

1 Introduction (10 min.)

- Review previous lesson:

Q:How does a magnet work on other magnets and objects?

- Encourage students to think about the things that are attracted to a magnet by asking:

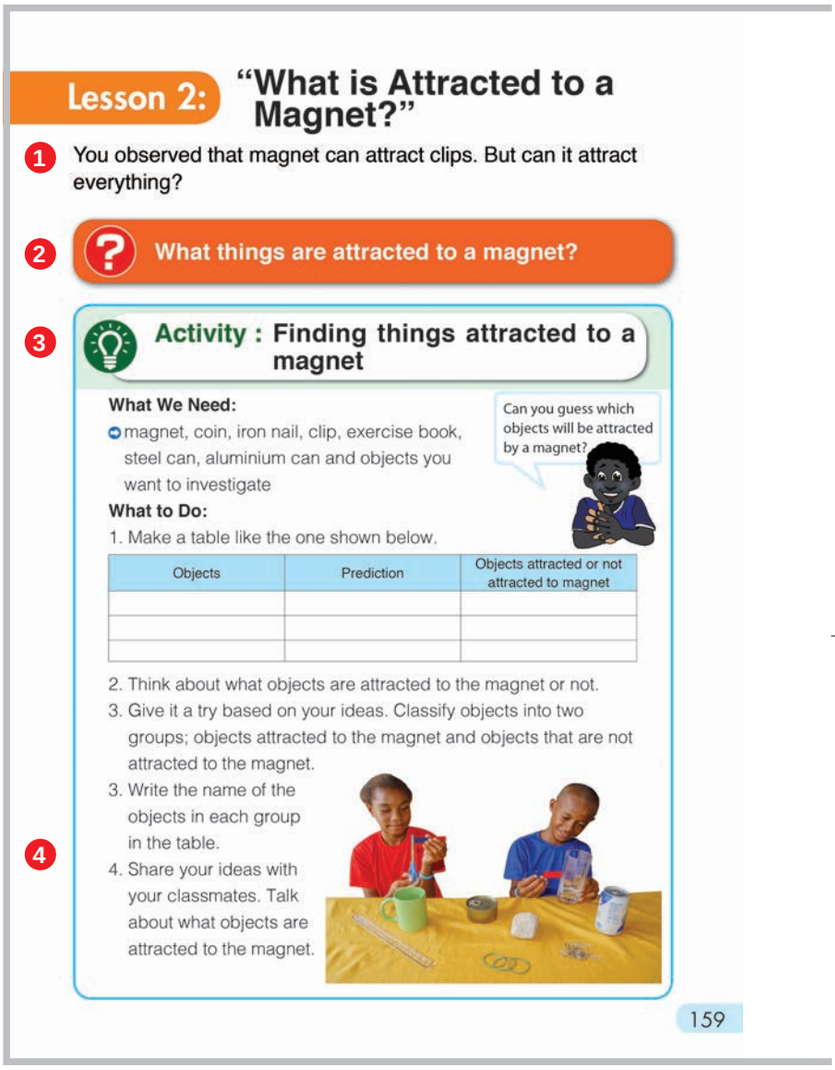
Q: A magnet attracts clips, but can a magnet attract everything?

2 Introduce the key question

What things are attracted to a magnet?

3 Activity (20 min.)

- Organise students into groups.
- Explain the steps of the activity.
- Ask students to make a table in their exercise book.
- Explain that 'attract' means 'pull' according to the previous lesson.
- Let students guess/predict which objects will be attracted/not attracted by a magnet.
- Have students do the activity and record their results in the table.
- Check students' activity. If necessary, guide the students to do their findings.
- After investigation, ask students to discuss what things are attracted to a magnet based on their results as a group.



Lesson 2: "What is Attracted to a Magnet?"

1 You observed that magnet can attract clips. But can it attract everything?

2 What things are attracted to a magnet?

3 Activity : Finding things attracted to a magnet

What We Need:

magnet, coin, iron nail, clip, exercise book, steel can, aluminium can and objects you want to investigate

Can you guess which objects will be attracted by a magnet?

What to Do:

1. Make a table like the one shown below.

Objects	Prediction	Objects attracted or not attracted to magnet

2. Think about what objects are attracted to the magnet or not.
3. Give it a try based on your ideas. Classify objects into two groups; objects attracted to the magnet and objects that are not attracted to the magnet.
3. Write the name of the objects in each group in the table.
4. Share your ideas with your classmates. Talk about what objects are attracted to the magnet.

4

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Teacher's Notes

- Students may believe a magnet attracts all metals, however it only attracts iron, cobalt and nickel. Other metals such as aluminium, copper, brass, tin, gold and silver are not attracted to it. Thus, this activity should include some of these non-magnetic metals to guide students to understand that there are metals not attracted to a magnet.
- Iron is a common metal and steel is a major industrial product of iron in our daily life (more exactly, steel is an alloy of iron and carbon to reinforce its strength, but you can recognize steel is almost same as iron for children).
- Cobalt is rarely used in our daily life. Nickel is not easily found in our daily life, too. PNG coins used to use a copper-nickel alloy (cupronickel) but it loses its magnetic trait. Hence you can say most of the magnetic objects we can find in our daily life are made of iron.
- All non-metals in solid their state are not attracted to a magnet.
- As described above, objects will be classified as follows; (Note, some coins are attracted, and some others are not)
  - Magnetic objects: toea coins, iron nails, paper clips, steel can
  - Non-magnetic objects: toea coins, exercise book, aluminium can, tin can, rubber, plastic, pencil

Lesson Objectives

Students will be able to:

- Classify objects into magnetic and non-magnetic objects by using magnets.

Assessment

Students are able to:

- List the names of things that can be attracted and not attracted to a magnet in a table.
- Explain what magnetic and non-magnetic objects are made of.
- Respect other students' opinions on magnetic and non-magnetic materials.

4 Discussion for findings (20 min.)

- Ask students to present their results from the activity.
- Write students results in the table on the blackboard.
- **Based on their findings,** ask the following questions as discussion points.

Q:What are things that are attracted to a magnet made of? (They are made of iron (steel).)

Q:What are the things that are not attracted to a magnet made of? (They are not made of iron or steel, they are made of paper, glass, etc.)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask the following questions as assessment:
  Q: What is a magnetic object?
  Q: What is a non-magnetic object?
  Q: If we change the shape or size of a magnetic object, is it still attracted to a magnet or not?
  Q: Give some examples of magnetic and non-magnetic objects.
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:

"What is attracted to a Magnet?"

Key question What things are attracted to a magnet?

Activity: Finding things attracted to a magnet

Objects attracted to magnet	Objects not attracted to magnet
Coins Iron nail Steel can Paper clip	Coins Exercise book Aluminium can Biro Rubber

Discussion

Q: What are things that are attracted to a magnet made of?

They are made of iron (steel).

Q: What are the things that are not attracted to a magnet made of?

They are not made of iron or steel, they are made of paper, glass, etc.

Summary

- An object attracted by a magnet is called a magnetic object.
- Most magnetic objects are made of iron.
- A magnet attracts iron objects even though their shape, colour and size are different.
- An object which is not attracted by a magnet is called a non-magnetic object.
- Non-magnetic objects are made from paper, plastic, glass, wood, etc.
- An aluminium can is a metal but is not attracted by a magnet because it is a non-magnetic metal.

Unit	Chapter : **8. Magnet**	Total lesson No: 69 / 94
Energy	Topic : **8.1. Properties of Magnet**	Textbook page: 161 - 162

Lesson 3 / 8

Lesson Title

Force of Attraction between Magnet and Object

Preparation

- Bar magnets
- Paper clips

Lesson Flow

1 Introduction (5 min.)

- Review previous lesson:

Q:Which object does a magnet attract?

- Encourage students to think about the parts of a magnet that attract objects by asking:

Q:A magnet attracts clips, but do all parts of a magnet attract clips?

2 Introduce the key question

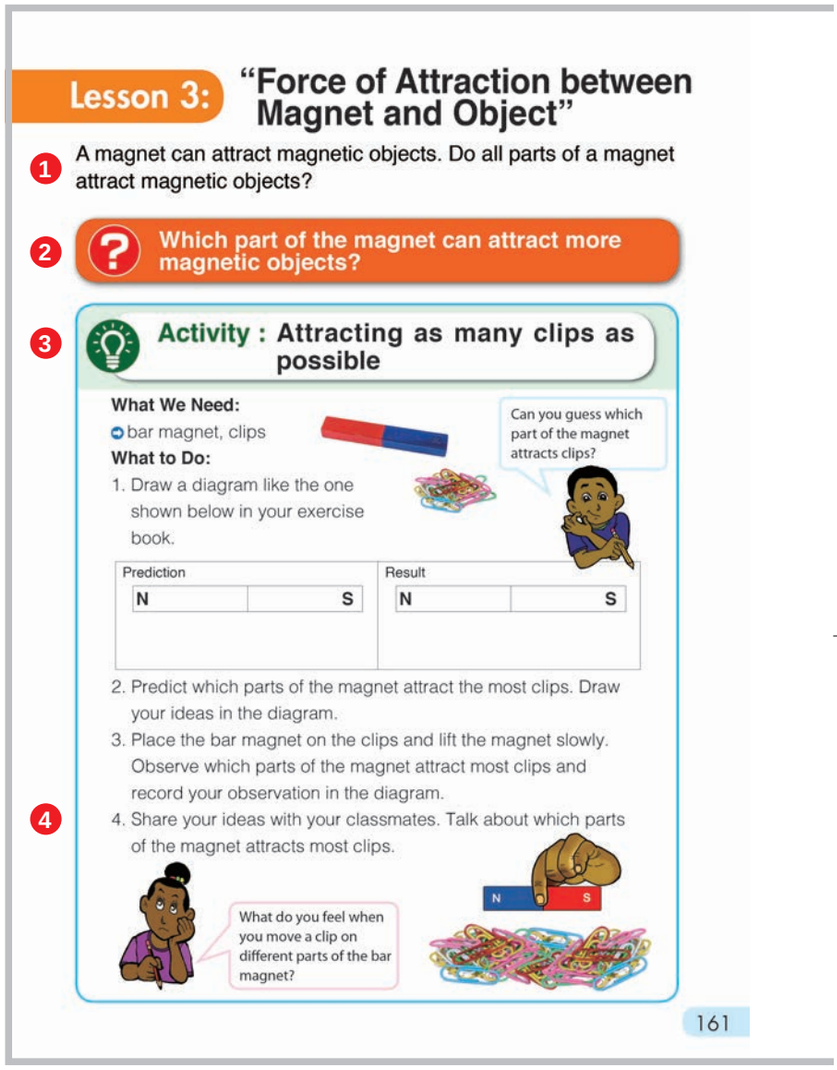
Which part of the magnet can attract more magnetic objects?

3 Activity (20 min.)

- Organise students into groups.
- Explain the steps of the activity.
- Ask students to draw diagrams in their exercise book.
- Ask students to predict which part of a magnet will attract the most clips and to record their predictions in the diagram.
- Have students do the activity and record their results in the diagram.
- After investigation, ask students to discuss which parts of a magnet attracts the most clips based on their results as a group.

4 Discussion for findings (25 min.)

- Ask students to present their results from the activity.
- Write students results in the table on the blackboard. **(Continue)**



Lesson 3: "Force of Attraction between Magnet and Object"

1 A magnet can attract magnetic objects. Do all parts of a magnet attract magnetic objects?

2 Which part of the magnet can attract more magnetic objects?

3 Activity : Attracting as many clips as possible

What We Need:
bar magnet, clips

What to Do:
1. Draw a diagram like the one shown below in your exercise book.

Can you guess which part of the magnet attracts clips?

Prediction		Result	
N	S	N	S

2. Predict which parts of the magnet attract the most clips. Draw your ideas in the diagram.
3. Place the bar magnet on the clips and lift the magnet slowly. Observe which parts of the magnet attract most clips and record your observation in the diagram.
4. Share your ideas with your classmates. Talk about which parts of the magnet attracts most clips.

4

What do you feel when you move a clip on different parts of the bar magnet?

N S

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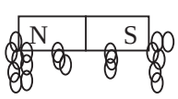
Teacher's Notes

- All magnets have two poles; One is called a north-seeking pole (abbreviated to just north pole or N). It is usually coloured red. The other is called a south-seeking pole (south pole or S) and coloured blue. These poles are present at each end of a magnet which produce the strongest magnetism. Detailed properties of poles will be taught in next lesson (referring the next lesson guide prior to this lesson is recommendable)
- What happens to a U-shape magnet?
  A U-shape magnet (sometimes called a horseshoe magnet) is just a bar magnet bent around so that the N and S poles are near the same location. The strongest parts are present at each end (poles), so that it puts the strongest part of the magnet all in one location making it easier to pick up the clips or other magnetic objects.
- An example of Expected Result

If teachers allow students to freely do this activity, students may not test whether a middle part attracts clips or not. Prompt students to attach clips to various part of a magnet. Theoretically, the middle part along with centre line doesn't attract anything



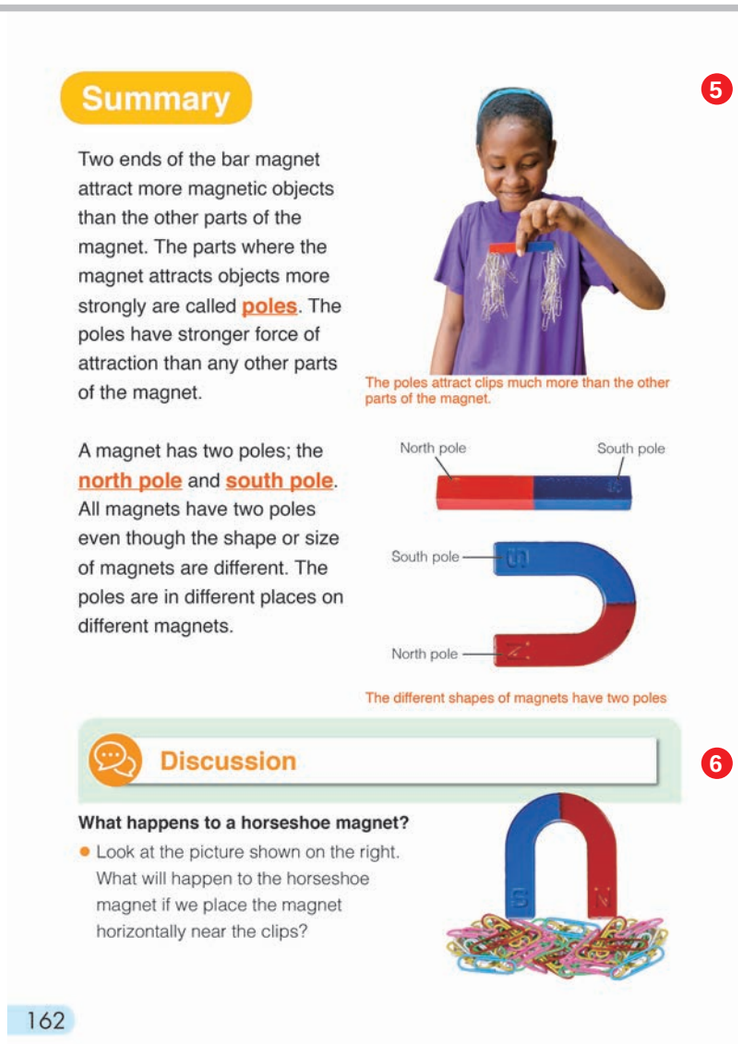
The previous lesson explained, magnetic power passes through other objects thus clips got joined all the way to other parts of the bar magnet. Guide students to scientifically explain this concept.

Lesson Objectives

Students will be able to:
- Identify two kinds of pole on a magnet.
- Observe which parts of a magnet attracts more magnetic objects.

Assessment

Students are able to:
- Explain that a magnet has two kinds of poles; north and south.
- State that the poles of a magnet attract objects most strongly.
- Actively participate in the activity.



Summary

Two ends of the bar magnet attract more magnetic objects than the other parts of the magnet. The parts where the magnet attracts objects more strongly are called **poles**. The poles have stronger force of attraction than any other parts of the magnet.

The poles attract clips much more than the other parts of the magnet.

A magnet has two poles; the **north pole** and **south pole**. All magnets have two poles even though the shape or size of magnets are different. The poles are in different places on different magnets.

The different shapes of magnets have two poles

Discussion

What happens to a horseshoe magnet?

- Look at the picture shown on the right. What will happen to the horseshoe magnet if we place the magnet horizontally near the clips?

- Confirm their results with students.
- **Based on their findings,** ask the following questions as discussion points.

Q:Which part of the magnet attracts most clips?(Ends of the magnet are the strongest to attract the most clips.)

Q:Which part of the magnet attracts the least clips? (The centre of a magnet attracts the least clips)

Q:Which part of the magnet has the strongest force to attract? (The ends of a magnet)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask the following questions as assessment:
  Q: What is a pole?
  Q: What kinds of poles are there?
  Q: Which parts of a magnet attract magnetic objects more strongly?
- Ask students to copy the notes on the blackboard into their exercise books.

6 Further Discussion (5 min.)

- Let students think about the question in 'Discussion' in a group.
- Ask each group to present their answers and confirm them with students.
- Conclude the further discussion.

Sample Blackboard Plan

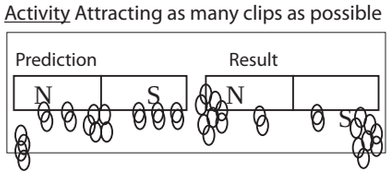
Title:

"Force of Attraction between Magnet and Object"

Key question

Q: Which part of the magnet can attract more magnetic objects?

Activity Attracting as many clips as possible



Discussion

Q: Which part of the magnet attracts most clips?

Ends of the magnet

Q: Which part of the magnet attracts the least clips?

The centre of a magnet

Q: Which part of the magnet has the strongest force to attract?

The ends of a magnet

Summary

- The parts where a magnet attracts objects most strongly are called poles.
- All magnets have two poles called a north pole and a south pole.
- The two ends attract the most magnetic objects and the centre is the weakest point where doesn't attract anything.
- All magnets have two poles even though the shapes or sizes of magnets are different.

Unit	Chapter : **8. Magnet**	Total lesson No: 70 / 94
Energy	Topic : **8.1. Properties of Magnet**	Textbook page: 163 - 164

Lesson 4 / 8

Lesson Title

Properties of Poles of Magnets

Preparation

- A pair of bar magnet

Lesson Flow

1 Introduction (5 min.)

- Review the previous lesson:

Q:What is a pole?

Q:What kinds of poles are there?

- Encourage students to think about the other properties of poles of a magnet by asking:

Q:Do the poles of magnets have other properties?

2 Introduce the key question

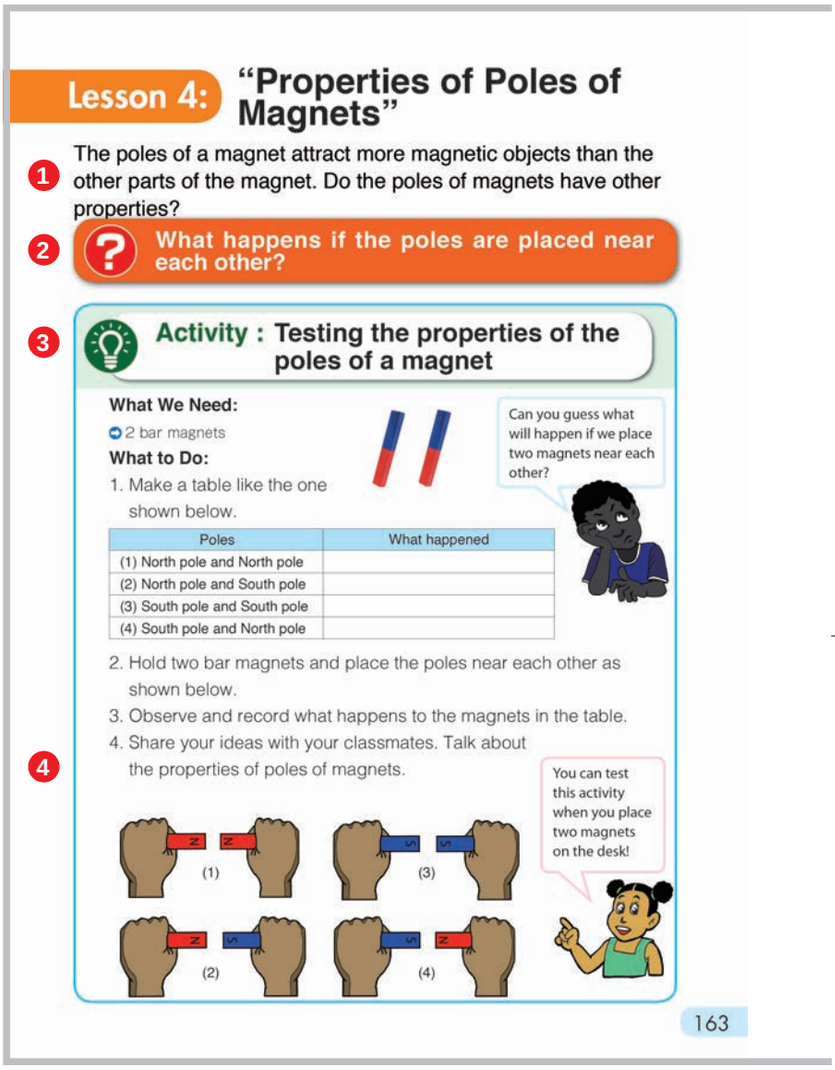
What happens if the poles are placed near each other?

3 Activity (20 min.)

- Organise students into groups.
- Explain the steps of the activity.
- Ask students to make a table in their exercise book.
- Ask students to predict what will happen to two bar magnets when the poles of two magnets are placed as shown in the pictures (1), (2), (3) and (4).
- Have students do the activity based on their prediction and ask them to record their results in the table.
- After the investigation, ask students to discuss the properties of poles based on their results as a group.

4 Discussion for findings (15 min.)

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



Lesson 4: "Properties of Poles of Magnets"

1 The poles of a magnet attract more magnetic objects than the other parts of the magnet. Do the poles of magnets have other properties?

2 What happens if the poles are placed near each other?

3 Activity : Testing the properties of the poles of a magnet

What We Need:

2 bar magnets

What to Do:

1. Make a table like the one shown below.

Can you guess what will happen if we place two magnets near each other?

Poles	What happened
(1) North pole and North pole	
(2) North pole and South pole	
(3) South pole and South pole	
(4) South pole and North pole	

2. Hold two bar magnets and place the poles near each other as shown below.
3. Observe and record what happens to the magnets in the table.
4. Share your ideas with your classmates. Talk about the properties of poles of magnets.

4

(1) (3) (2) (4)

You can test this activity when you place two magnets on the desk!

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Teacher's Notes

- Expected results for the test in the students' tables are as follows;

Test	Your Prediction	What happens?
(1)North pole and North pole		Push each other away
(2)North pole and South pole		Pull/stuck together
(3)South pole and South pole		Push each other away
(4)South pole and North pole		Pull/stuck together

- 'Repel (push away)', 'Like poles (same poles)' and 'Unlike poles (different poles)' may be new words for students, hence teacher should carefully explain the meaning and concept of these terminologies.
- Teachers can easily demonstrate the attraction of unlike poles and the repulsion of like poles by placing two magnets on the paper to reduce their friction. When you put two magnets like (1), (2), (3) and (4), gradually move one magnet closely to the other, the other magnet will be either pushed or pulled.

Lesson Objectives

Students will be able to:
- Identify the properties of poles between two magnets.

Assessment

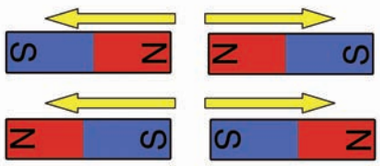
Students are able to:
- Describe how two magnets move when unlike and like poles are put close to each other.
- Show eagerness to find out the properties of poles between two magnets.

Summary

All magnets attract or repel other magnets.
If the north pole of one magnet is placed near the south pole of another magnet, the magnets attract each other. When a magnet **attracts** an object, it **pulls** the object towards itself. **Unlike poles of magnets attract each other.**

Unlike poles attract each other.

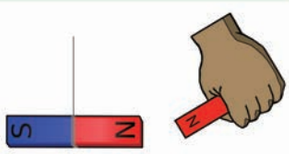
If the north pole of one magnet is near the north pole of another magnet, the magnets repel. If two south poles of magnets are near each other, the magnets also repel. When a magnet **repels** an object, it **pushes** the object away from itself. **Like poles repel each other.**



Like poles repel each other.

Discussion

What happens to a magnet?
- Look at the picture shown on the right. A magnet is hang by a thread.
- What will happen to the magnet if we place another magnet near it?



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- Write students results in the table on the blackboard.
- Confirm their results with students.
- **Based on their findings,** ask the following questions as discussion points.

Q:What happened when the same poles of the magnet are placed closer to each other?
(They push each other away, bounced away from each other, etc.)

Q:What happened when different poles of the magnet are placed closer to each other?
(They pull towards each other, etc.)

- Conclude the discussion.

5 Summary (5 min.)
- Ask the students to open their textbooks to the summary page and explain it..
- Summarise today's lesson on the blackboard.
- Ask the following questions as assessment:
  Q: What happens when like and unlike poles are put close together?
  Q: What happens when unlike poles are put close together?
- Ask students to copy the notes on the blackboard into their exercise books.

6 Further Discussion (15 min.)
- Let students think about the question in 'Discussion' in a group.
- Have students do the activity if possible.
- Ask each group to present their answers and confirm them with students.
- Conclude the further discussion.

Sample Blackboard Plan

Title:

"Properties of Poles of Magnet"

Key question What happens if the poles are placed near each other??

Activity Testing the properties of poles of a magnet.

Result:

Poles	What happened
(1) N-N	Push each other away
(2) N-S	Pull/stuck together
(3) S-S	Push each other away
(4) S-N	Pull/stuck together

Discussion

Q: What happened when the same poles of the magnet are placed closer to each other?
They push each other away, bounced away from each other, etc.

Q: What happened when different poles of the magnet are placed closer to each other?
They pull towards each other , etc.

Summary
- All magnets attract or repel other magnets.
- Unlike poles (N&S poles) of magnets attract each other.
- Like poles (N&N poles or S&S poles) of magnets repel each other.

Unit	Chapter : **8. Magnet**	Total lesson No: 71 / 94
Energy	Topic : **8.1. Properties of Magnet**	Textbook page: 165 - 166

Lesson 5 / 8

Lesson Title

Making a Magnet

Preparation

- Bar magnet, iron nails, and paper clips

Lesson Flow

1 Introduction (5 min.)

- Review the previous lesson:

Q:What happens when like and unlike poles are put close together?

Q:What happens when unlike poles are put close together?

- Encourage students to think about how an iron becomes a magnet by asking:

Q:A magnet is usually made of iron and can attract magnetic objects, but the iron nail cannot attract magnetic objects. Why?

2 Introduce the key question

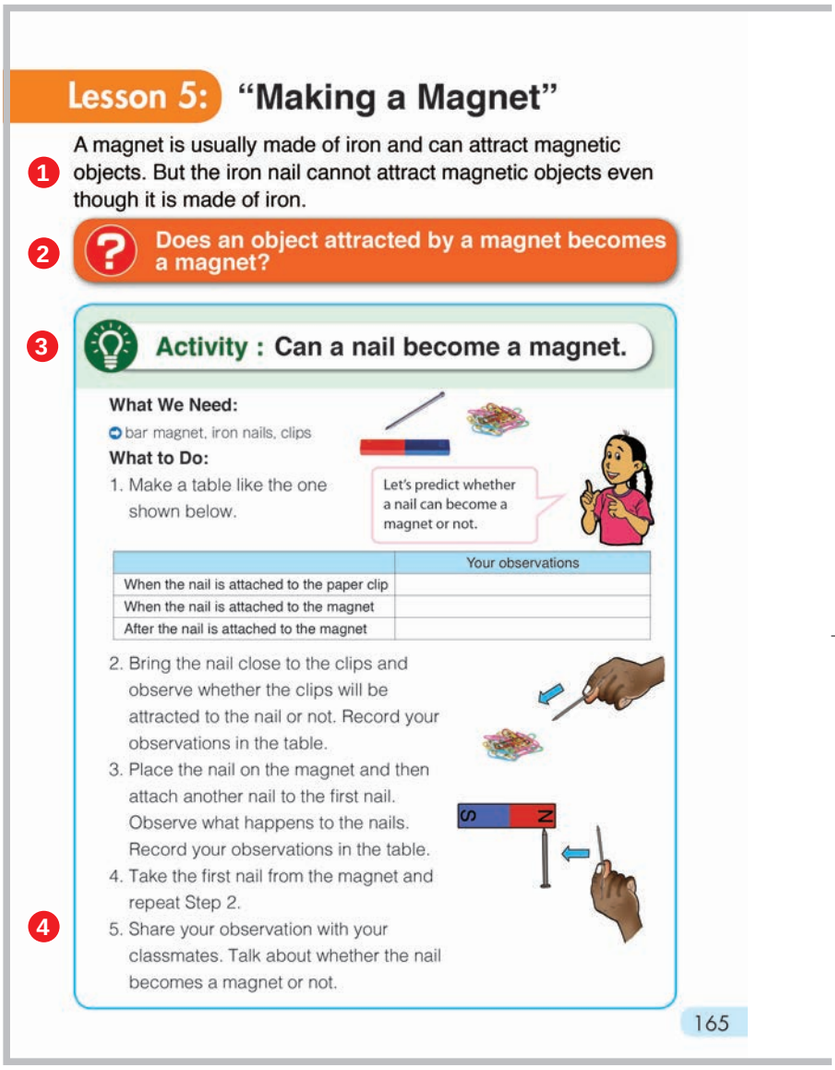
Does an object attracted by a magnet become a manget?

3 Activity (20 min.)

- Organise students into groups.
- Explain the steps of the activity.
- Ask students to make a table in their exercise book.
- Ask students to predict whether a nail becomes a magnet or not.
- Have students do the activity based on their prediction and ask them to record their results in the table.
- After the investigation, ask students to discuss a nail becomes a magnet or not based on their results as a group.

4 Discussion for findings (15 min.)

- Ask students present their results. **(Continue)**



Lesson 5: "Making a Magnet"

1 A magnet is usually made of iron and can attract magnetic objects. But the iron nail cannot attract magnetic objects even though it is made of iron.

2 Does an object attracted by a magnet becomes a magnet?

3 Activity : Can a nail become a magnet.

What We Need:

bar magnet, iron nails, clips

What to Do:

1. Make a table like the one shown below.

Let's predict whether a nail can become a magnet or not.

	Your observations
When the nail is attached to the paper clip	
When the nail is attached to the magnet	
After the nail is attached to the magnet	

2. Bring the nail close to the clips and observe whether the clips will be attracted to the nail or not. Record your observations in the table.
3. Place the nail on the magnet and then attach another nail to the first nail. Observe what happens to the nails. Record your observations in the table.
4. Take the first nail from the magnet and repeat Step 2.
5. Share your observation with your classmates. Talk about whether the nail becomes a magnet or not.

4

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Teacher's Notes

- A magnetic object has a similar characteristic with a magnet. Thus, it easily reacts to a magnet and once it is attached to a magnet, it becomes a temporally magnet (See teacher's note of lesson one 'Magnets around us' in page 162 for more information on a temporally magnet). This phenomenon is called a 'Magnetisation'. A magnetic object cannot keep its magnetism permanently.
- Note for the activity – the activity to make a magnet requires sensitive operation.

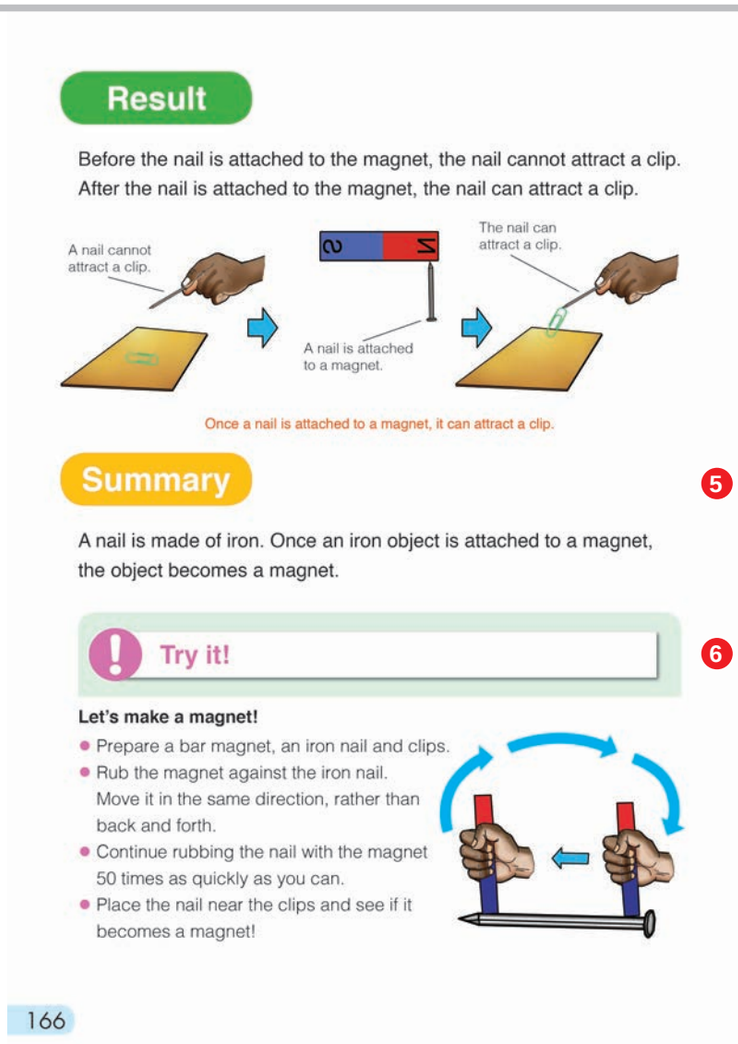
1. The magnets should never contact the paper clips at all in the preparation of this lesson because they are also eventually magnetised will defeat the purpose of this lesson.
2. Students should not mingle with magnets and paper clips unless they told to do so by the teacher.
3. Students groups should be given only about 5 paper clips
4. Students should be instructed to used 1-2 paper clips at a time and others must be kept away from a magnet to avoid magnetisation.

Lesson Objectives

Students will be able to:
- Realise a magnetic object can become a magnet.
- Understand a way to make a magnet.

Assessment

Students are able to:
- Infer that the nail attached to a magnet becomes a magnet based on the results of activity.
- Describe how to make a nail becomes a magnet
- Work co-operatively in group activity.



Result

Before the nail is attached to the magnet, the nail cannot attract a clip.
After the nail is attached to the magnet, the nail can attract a clip.

Once a nail is attached to a magnet, it can attract a clip.

Summary 5

A nail is made of iron. Once an iron object is attached to a magnet, the object becomes a magnet.

Try it! 6

Let's make a magnet!
- Prepare a bar magnet, an iron nail and clips.
- Rub the magnet against the iron nail. Move it in the same direction, rather than back and forth.
- Continue rubbing the nail with the magnet 50 times as quickly as you can.
- Place the nail near the clips and see if it becomes a magnet!

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- Write students' results in the table on the blackboard.
- Confirm their results with students.
- **Based on their results,** ask the following questions as discussion points.

Q:Before a nail was attached to the magnet, did the nail become a magnet? (No, it's because the nail didn't attract the clips.)

Q:During the time a nail was attached to a magnet, did the nail become a magnet? (Yes, it's because the nail attracted the clips.)

Q:After a nail was attached to the magnet, did the nail become a magnet? (Yes, it's because the nail attracted the clips.)

- Conclude the discussion.

5 Summary (10 min.)
- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask the following questions as assessment:
  Q: How does a magnet become a magnet?
- Ask students to copy the notes on the blackboard into their exercise books.

6 Try it! (10 min.)
- Organise students into groups.
- Explain the steps of the activity.
- Have students do the activity.
- Conclude 'Try it!'.

Sample Blackboard Plan

Title:

"Making a Magnet"

Key question

Does an object attracted by a manget become a magent?

Activity A nail becomes a magnet?

	Your observation
Before a nail attracted to a magnet	Clips not attracted, etc
During a nail being attracted to a magnet	Clips attracted, etc
After a nail attracted to a magnet	Clips attracted, etc

Discussion

Q: Before a nail was attached to the magnet, did the nail become a magnet?
No, it's because the nail didn't attract the clips.
Q: During the time a nail was attached to a magnet, did the nail become a magnet?
Yes, it's because the nail attracted clips.
Q: After a nail was attached to the magnet, did the nail become a magnet?
Yes, it's because the nail attracted the clips.

Summary
- A nail is made of iron.
- Once an iron object is attached to a magnet, the object becomes a magnet.

Unit	Chapter : **8. Magnet**	Total lesson No: 72 / 94
Energy	Topic : **8.1. Properties of Magnet**	Textbook page: 167 - 168

Lesson 6 / 8

Lesson Title

Which Way?

Preparation

- A bar magnet, water, medium size bowl/ dish, polystyrene tray, compass

Lesson Flow

1 Introduction (10 min.)

- Review the previous lessons so far:

Q:What kinds of poles does a magnet have?

Q:What properties do the poles of a magnet have?

- Encourage students to think about how to find the direction by asking:

Q:How can we find the direction when we lose our way? Can a magnet help us to find the direction?

2 Introduce the key question

How can we find the direction using a magnet?

3 Activity (20 min.)

- Organise students into groups.
- Explain the steps of the activity.
- Advice students to refer to the characters' talking for their activity.
- Ask students to predict which direction a magnet points to.
- Have students do the activity and ask them to record their results in their exercise book.
- After the investigation, ask students to discuss which direction a magnet points to as a group.

4 Discussion for findings (20 min.)

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

Lesson 6: "Which Way?"

1 We use magnets in many ways. Sometimes, we use a magnet to find the direction of where we should go.

2 How can we find the direction using a magnet?

3 Activity : The direction a magnet points to

What We Need:
bar magnet, water, plastic basin, plastic tray

What to Do:
1. Place the magnet on the plastic tray.
2. Float the tray on the water in the basin.
3. Rotate the tray slowly and wait until it comes to rest.
4. Observe the direction the magnet points to and record your observation.
5. Repeat steps 3 and 4 several times and record your observations.
6. Share your ideas with your classmates. Talk about the direction the magnet points to.

4

We know four directions, North, South, East and West. Can you guess which direction the magnet will point to?

Do all magnets always point to the same direction?

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Teacher's Notes

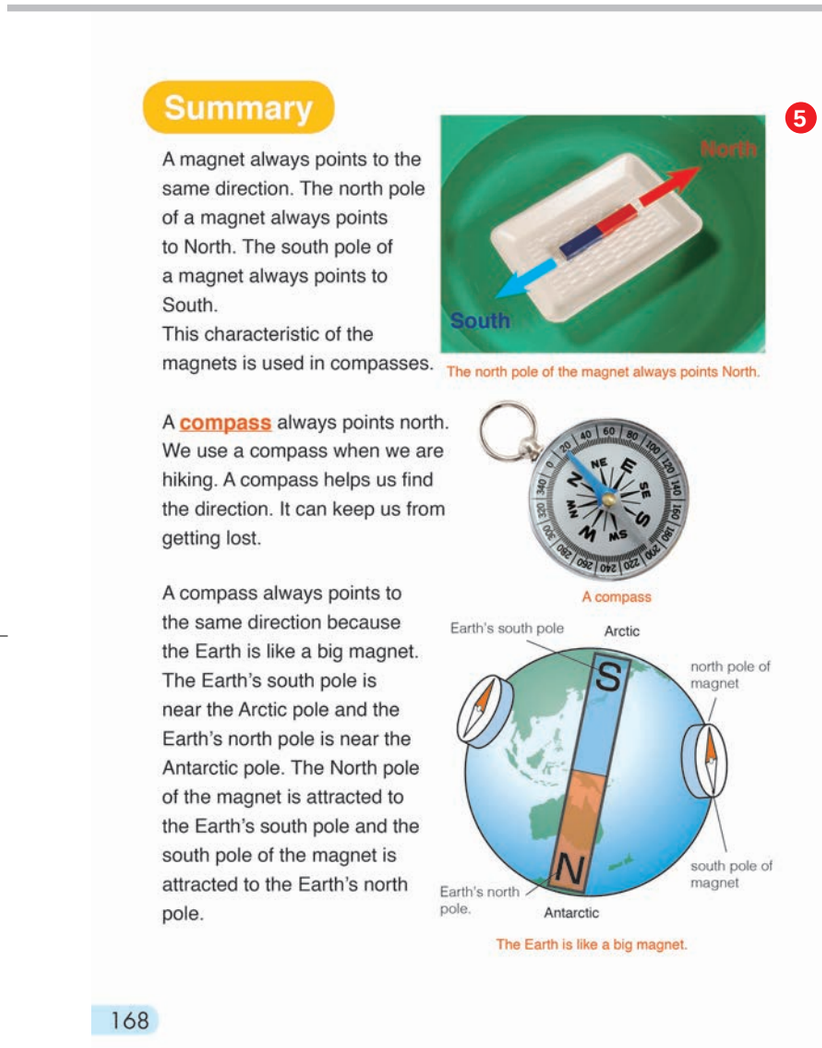
- **Why does a compass always point North and South?**
  The earth itself is a huge permanent magnet. The poles of that huge magnet are located near geographic north pole and south pole (though not exactly the same location as the geographic poles).
  Thus, north/south-seeking poles of a magnet always point to the geographic north/south poles.
  Note, unlike poles attract each other, so the south pole of 'earth magnet' is located at north and vice versa. Many people misunderstand the north pole of earth magnet corresponds to the geographic north pole of the earth. Be careful.
- **Notes for the activity**
  1. Make sure the polystyrene tray is always in the centre of the bowl of water
  2. Plastic plate and small plastic bowls can be used instead of the polystyrene tray
  3. Remind students not to touch the tray while in the bowl of water (keep the condition steady)
  4. You can identify the north and south at your school from direction of sunrise (east) and sunset (west)

Lesson Objectives

Students will be able to:
- Describe the direction of a magnet that points to.
- Realise that the Earth is a big magnet.
- Identify the properties of a compass.

Assessment

Students are able to:
- Explain the direction that a magnet always points to.
- State the reason why the north pole of a magnet points to north and the south pole of a magnet points to south.
- Explain how a compass helps people to identify the direction.
- Participate in the activity in co-operation with classmates.



Summary

A magnet always points to the same direction. The north pole of a magnet always points to North. The south pole of a magnet always points to South.
This characteristic of the magnets is used in compasses.

The north pole of the magnet always points North.

A **compass** always points north. We use a compass when we are hiking. A compass helps us find the direction. It can keep us from getting lost.

A compass

A compass always points to the same direction because the Earth is like a big magnet. The Earth's south pole is near the Arctic pole and the Earth's north pole is near the Antarctic pole. The North pole of the magnet is attracted to the Earth's south pole and the south pole of the magnet is attracted to the Earth's north pole.

The Earth is like a big magnet.

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- Write students results on the blackboard.
- Confirm their results with students.
- **Based on their results,** ask the following questions as discussion points:

Q:Does a magnet always point to the same direction? (Yes)

- By showing a compass, ask a question:

Q:Do you know how a compass helps us? (A compass helps us find the direction, North and South.)

- Put a compass near the bar magnet on a tray floating on water and let students compare the direction of the bar magnet and the compass. Ask a question:

Q:Which direction does the bar magnet point to? (North pole points to North and south pole points to South.)

Q:What is the needle of a compass made of? (Magnet)

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask the following questions as assessment:
  Q: Which direction does the N and S poles of a magnet points to?
  Q: Why do the poles of a magnet point to the same direction?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:

"Which Way?"

Key question

How can we find the direction using a magnet?

Activity

The direction a magnet points to

TESTS	What happened
Test 1	Students' Answers
Test 2	Students' Answers
Test 3	Students' Answers

Discussion

Q: Does a magnet always point to the same direction? Yes

Q: Do you know how a compass helps us? A compass helps us to find the direction, North and South.

Q: Which direction does the bar magnet point to?
North pole points to North and south pole points to South.

Q: What is the needle of a compass made of? Magnet

Summary

- A magnet always points to the same direction.
- The north pole of a magnet always points to North.
- The south pole of a magnet always points to South.
- This characteristic of a magnet is used as a compass. A compass always points North.
- A compass always points the same direction because the Earth is a big magnet!

Unit	Chapter : **8. Magnet**	Total lesson No: 73 / 94
Energy	Topic : **8.1. Properties of Magnet**	Textbook page: 169 - 171

Lesson 7 / 8

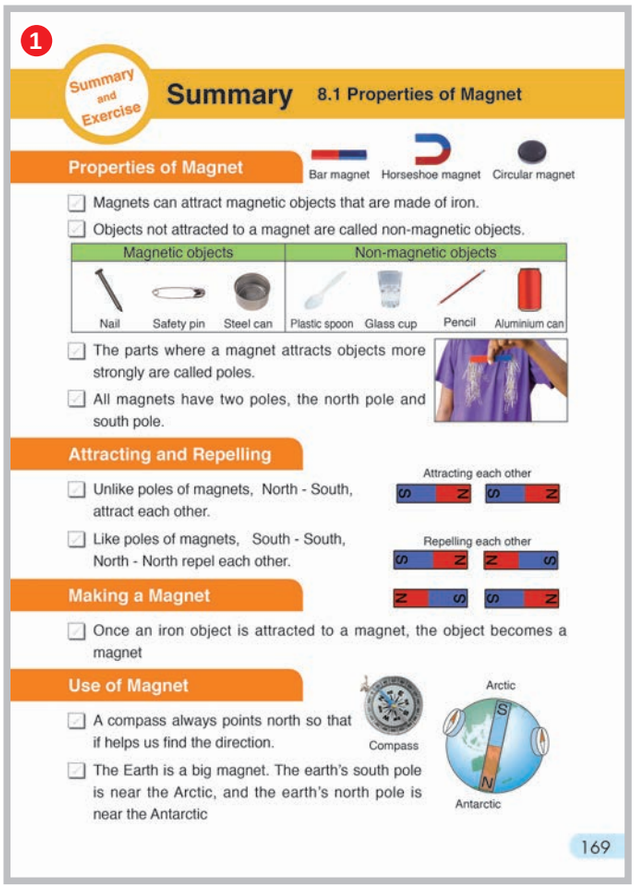
Lesson Title

Summary and Exercise

Tips of lesson

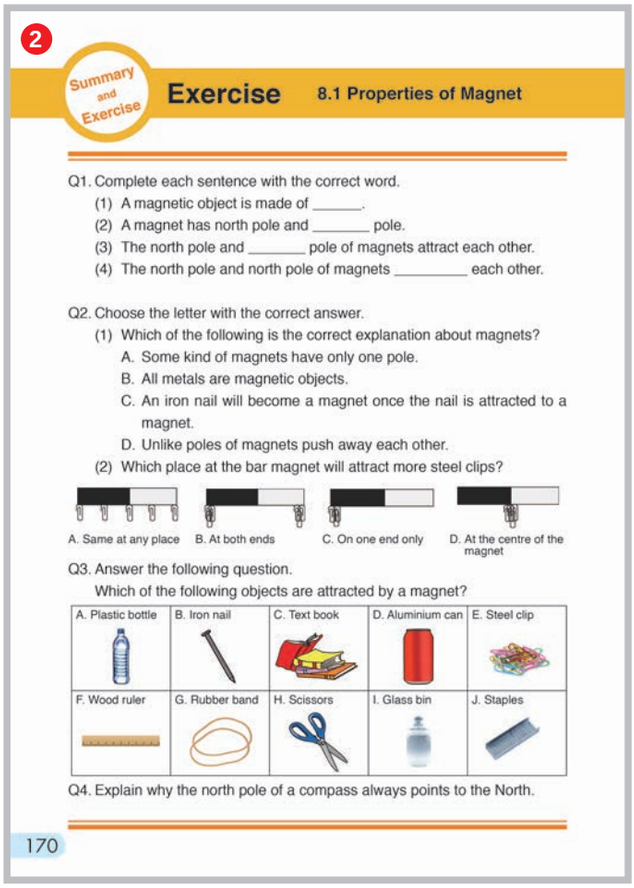
1 Summary (15 min.)

- Recap main learning contents in this chapter.
- Demonstrate and show the phenomena again in this lesson by using magnets and some objects as needed.
- Ask some questions to students throughout the lesson and verify student's understanding if they don't have any misconceptions.
- Ask students the meaning of the words 'unlike' and 'like' poles and what will happen by placing the poles of magnets close to each other.



2 Exercise & Explanation (35 min.)

- Go through the instructions of the exercise with the students.
- Provide enough time for students to attend to the questions in response to their understanding
- After the exercise, give them the answers of the questions and explain how to solve the questions using their scientific knowledge.
- After the exercise, provide the answers to the questions and explain to justify the answers along with students' answers.



Exercise answers

Q1.
(1) **iron**
(2) **South**
(3) **South**
(4) **repel**

Q2.
(1) **C**
- All kinds of magnet have both north and south pole.
- Metals such as aluminium and copper are not magnetic substance
- Unlike poles of magnets attract each other

(2) **B**
Edges of a bar magnet are north and south pole that attract magnetic objects most strongly than other parts.

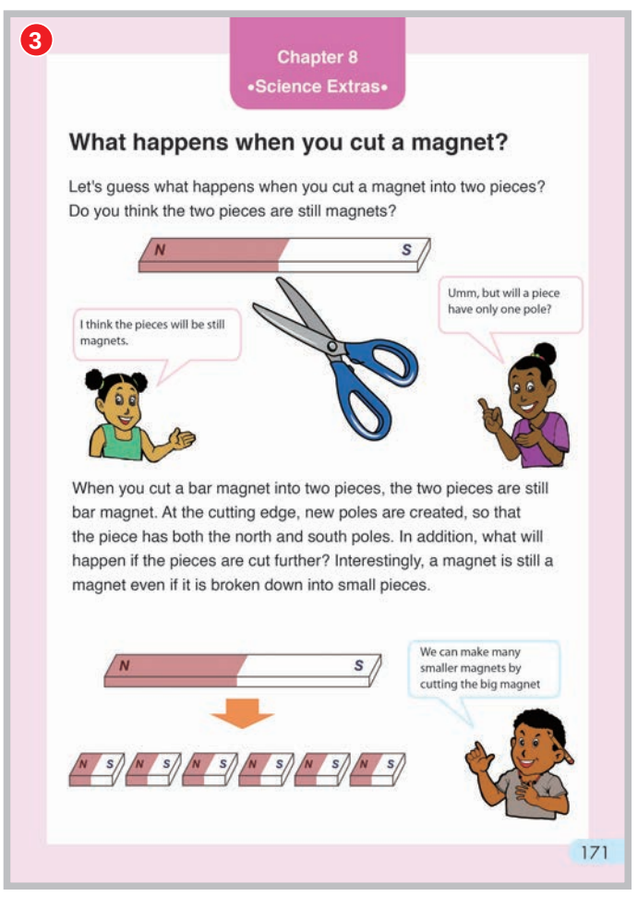
Q3. **B, E, H, J**
Magnetic objects that attracted by a magnet contain iron.
Both aluminium and iron are kinds of metal but they are different substances.

Q4. Sample of the answer
The earth is big magnet whose south pole is placed at the North (Arctic). North pole on a compass is always attracted by south pole of magnet. Therefore, north pole of a compass always indicates to the North of the earth.

Explanation of Science Extras

3 Science Extras (10 min.)

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



Lesson
8 / 8

Lesson Title

Chapter Test

Answer of the Chapter Test

Chapter Test

8. Properties of Magnet

Q1 Complete each sentence with the correct word.

(1) A magnet attracts objects made of ___iron___.
(2) Objects attracted by a magnet are called ___magnetic___ objects.
(3) The two ends of a bar magnet are its ___poles___.
(4) The south and north poles of magnets ___attract___ each other.

Q2 Choose the letter with the correct answer.

(1) Which part of a bar magnet attracts most magnetic objects?

A. Centre of a bar magnet.
(B.) Two ends of a bar magnet.
C. All parts of a bar magnet.
D. One end of a bar magnet.

(2) Which of the following are non-magnetic objects?

a wooden ruler an iron nail a plastic cap a tin can staples

A. a ruler and an iron nail
B. an iron nail and a tin can
C. a plastic cap and a tin can
(D.) a wooden ruler and a plastic cap

(3) What happens when an iron object is attracted to a magnet?

(A.) The iron object becomes a magnet.
B. The iron object changes its colour.
C. The iron object loses its strength.
D. The iron object pushes the magnet away.

(4) A compass needle always points to the _____.

(A.) North
B. South
C. East
D. West

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Q3

(1) What happens when you put the north pole of one magnet near the south pole of another magnet?

The north pole of one magnet and the south pole of another magnet attract each other.

(2) How is a metal paper clip different from a plastic paper clip?

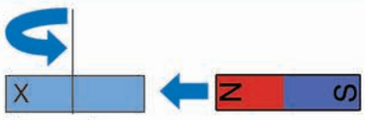
A metal paper clip is a magnetic object, while a plastic paper clip is a non-magnetic object.

(3) How is a bar magnet similar to a horseshoe magnet?

The bar magnet and a U-shaped magnet both have two poles, the North Pole and the South Pole.

Q4

Mary hung magnet A as shown in the picture. She didn't know which side of magnet A is north or south. When magnet B was brought near to magnet A, magnet A rotated and side "X" faced north pole of magnet B.



the

From this experiment, explain which pole is side "X" in magnet A, north or south.

North pole in magnet B must attracts to south pole in magnet A so side X in magnet B should be south pole.

Strand : PHYSICAL SCIENCE
Unit : FORCE AND MOTION

Chapter 9. Force

Chapter Objectives

Students will be able to understand what force can do in an object and the types of simple machines.

Students will be able to also observe the difference in the motion of objects with large and small forces.

Topic Objectives

9.1 Objects in Motion

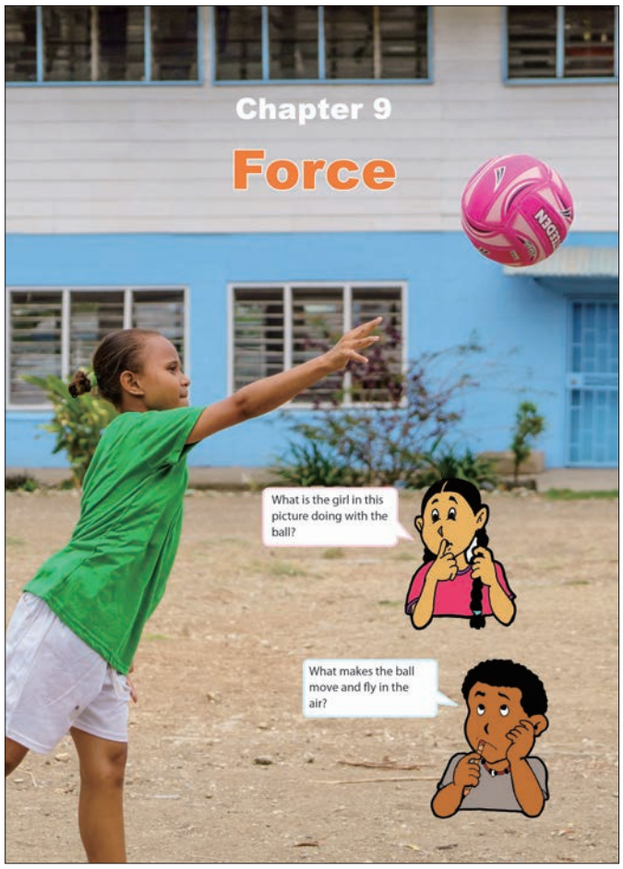
Students will be able to;

- Recognise that a force can make objects move.
- Describe difference between the forces that can move heavy and light objects.
- Explain that friction makes a moving object to slow down and stop.
- Observe the change in speed of an object through applying a force.
- Describe that force can change the direction of a moving object.
- Describe how a force works on shape and size of an object.

9.2 Simple Machine

Students will be able to;

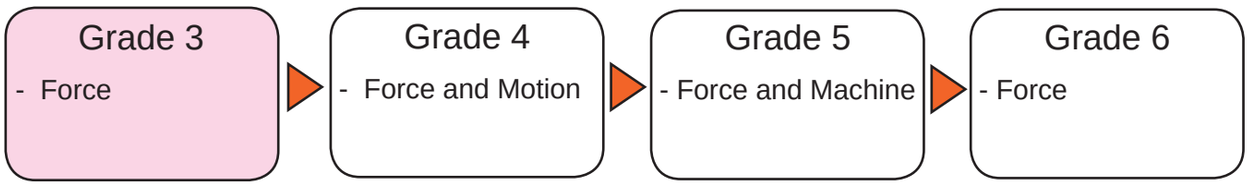
- Name the different types of simple machines.
- Explain the functions of an incline plane in our daily life.
- Explain the functions of a lever when we lift and move an object.
- Explain the functions of a pully when we lift an object to a higher position.



Picture in the chapter heading on the textbook shows the ball released from the girl's hand with force.

Related Learning Contents

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



Teaching Overview

This chapter consists of 13 lessons, each lesson is a double period.

Topic	Lesson No.	Lesson Title and Key Question	Content standard in syllabus	Textbook page number
9.1 Objects in Motion	1	**How Objects Move** What make objects move?	3.2.4	175 - 176
	2	**Push and Pull** How do we push or pull a heavy or light object?		177 - 178
	3	**Slower and Stop** What makes things slow down and stop?		179 - 180
	4	**Speed Up and Slow Down** How can forces change the movement of things?		181 - 182
	5	**The Way Objects Move** What makes the direction of things change?		183 - 184
	6	**More about Forces** What else can force do?		185 - 186
	7	Summary and Exercise		187 - 188
9.2 Simple Machine	8	**What is a Simple Machine?** What tools help us do things easier?		189 - 190
	9	**Inclined Plane** How does an inclined plane work?		191 - 192
	10	**Lever** How does a lever work?		193 - 194
	11	**Pulley** How does a pulley work?		195 - 196
	12	Summary and Exercise		197 - 199
Chapter Test	13	Chapter Test		200 - 201

Unit	Chapter : **9. Force**	Total lesson No: 75 / 94
Force and Motion	Topic : **9.1. Objects in Motion**	Textbook page: 175 - 176

Lesson 1 / 13

Lesson Title

How Objects move

Preparation

- Pen, book, stone and other available materials.

Lesson Flow

1 Introduction (10 min.)

- 'Force' is a new learning concept for Gr.3 students. In order to build their curiosity, remind them of their experiences of force.

Q:Do you think a table can move by itself?
Q:How can you move a table?

2 Introduce the key question

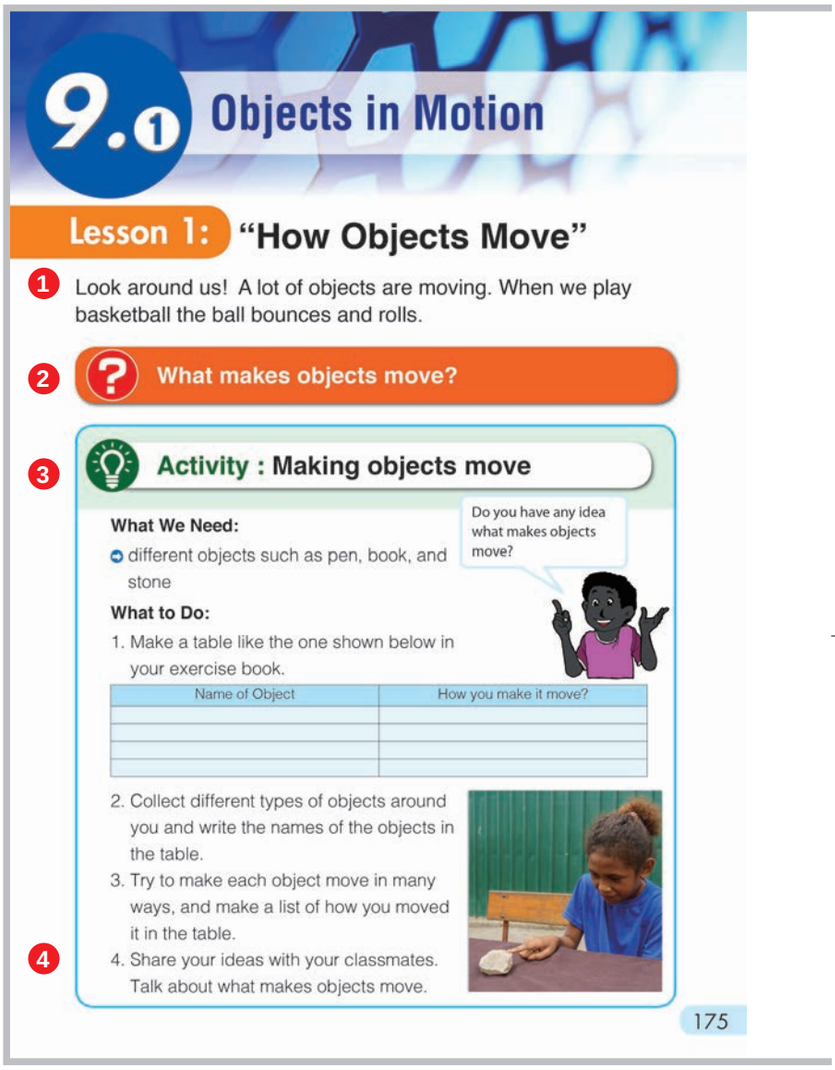
What makes objects move?

3 Activity (20 min.)

- Organise students into some groups.
- Explain the steps of the activity.
- Have students do the activity and ask them to record their findings in the table.
- Advise students to refer to the pictures and the character's talking in the activity for their investigation.
- After that, ask students to discuss what makes objects move based on their findings in a group.

4 Discussion for findings (20 min.)

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



9.1 Objects in Motion

Lesson 1: "How Objects Move"

1 Look around us! A lot of objects are moving. When we play basketball the ball bounces and rolls.

2 What makes objects move?

3 Activity : Making objects move

What We Need:
- different objects such as pen, book, and stone

Do you have any idea what makes objects move?

What to Do:
1. Make a table like the one shown below in your exercise book.

Name of Object	How you make it move?

2. Collect different types of objects around you and write the names of the objects in the table.
3. Try to make each object move in many ways, and make a list of how you moved it in the table.
4. Share your ideas with your classmates. Talk about what makes objects move.

4

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Teacher's Notes

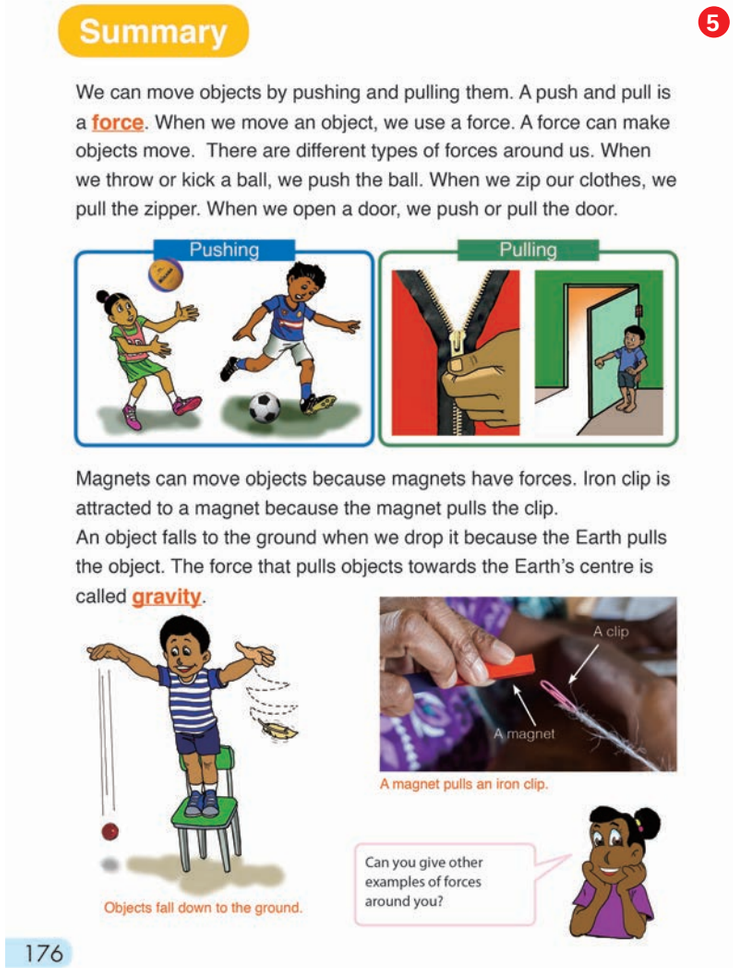
- A force occurs when an object interacts with another object. When a force is applied to an object, the object changes its shape or changes its speed/direction of motion or both.
- A force can be found everywhere around us. In our daily life, we often use our muscles and our arm to pull up a glass of milk to get it to our mouth for instance, at that time, the shape of the muscle changes and the speed of motion of the glass changes. Because we use a force and the muscle, a glass interact with each other. When we walk, we use muscles and our legs push the floor to move forward. Again, the shape of the muscle changes and speed of legs changes, because we use a force. These interactions simply summarised as 'push' and 'pull' for children. When an object pushes or pulls another object, there must be a force.
- There are two types of forces;
  1. Contact forces are those that result when the two interacting objects physically contact with each other. e.g. applied force to kick a ball.
  2. Non-contact forces are those that result even when the two interacting objects are able to exert a push or pull despite, they are not in physical contact with each other. e.g. gravitational force (gravity) and magnetic force.

Lesson Objectives

Students will be able to:
- Define force.
- Identify push and pull in daily life.
- Observe how the object moves.

Assessment

Students are able to:
- Explain what a force is.
- State some examples of push and pull in their daily life.
- List how objects move on a table.
- Investigate force in cooperation with classmates.



Summary

We can move objects by pushing and pulling them. A push and pull is a force. When we move an object, we use a force. A force can make objects move. There are different types of forces around us. When we throw or kick a ball, we push the ball. When we zip our clothes, we pull the zipper. When we open a door, we push or pull the door.

Pushing

Pulling

Magnets can move objects because magnets have forces. Iron clip is attracted to a magnet because the magnet pulls the clip.
An object falls to the ground when we drop it because the Earth pulls the object. The force that pulls objects towards the Earth's centre is called gravity.

A clip

A magnet

A magnet pulls an iron clip.

Objects fall down to the ground.

Can you give other examples of forces around you?

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- Confirm their findings with the students.
- **Based on their findings,** ask the following questions as discussion points.

Q:How did you move the objects? (Pushing, pulling, flicking, dragging, kicking, throwing, etc)

Q:How do you move bigger or heavier objects such as a car? (Pushing, pulling, etc)

Q:What do you need to move bigger or heavier objects? (Force, power, etc)

Q:Do you have any idea of how to move objects without touching the objects? (We drop the objects, magnets attract or repels, etc)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  - Q: What is a force?
  - Q: What can force do?
  - Q: What are some examples of push and pull forces in daily life.
  - Q: What is the force that pulls objects back down towards the Earth?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:

"How Objects Move"

Key question

What makes objects move?

Activity

Making objects move

Name of thing	How you make it move
Book	Push it, pull it, slide, throw it
Pen	Push it back and forth when writing, throw, pass
Book	Pull, push, slide, throw
Ball	Kick, throw, roll, bounce, spin

Discussion

Q: How did you move the objects?
Pushing, pulling, flicking, dragging, kicking, throwing, etc

Q: How do you move bigger or heavier objects such as a car?
Pushing, pulling, etc

Q: What do you need to move bigger or heavier objects?
Force, power, etc

Q: Do you have any ideas on how to move objects without touching the objects?
We drop the objects, magnets attract or repels, etc

Summary

- A force is a push or a pull.
- A force makes objects move.
- There are different types of forces:
  - ➤ Throwing or kicking a ball
  - ➤ Pulling up the zipper
  - ➤ Open and close a door, etc
- A magnet has forces. It can move objects by attracting or repelling.
- The Earth also pulls the objects.
- The force that pulls objects toward Earth's centre is called gravity.

Unit	Chapter : **9. Force**	Total lesson No: 76 / 94
Force and Motion	Topic : **9.1. Objects in Motion**	Textbook page: 177 - 178

Lesson 2 / 13

Lesson Title

Push and Pull

Preparation

- Tyres
- Ropes

Lesson Flow

1 Introduction (10 min.)

- Review the previous lesson by asking:

Q:What is a force?

Q:What can force do?

- Encourage students to think about how to push and pull a heavy or lighter objects by asking:

Q:If an object is lighter or heavier, how do we push or pull it?

2 Introduce the key question

How do we push or pull a heavy or light object?

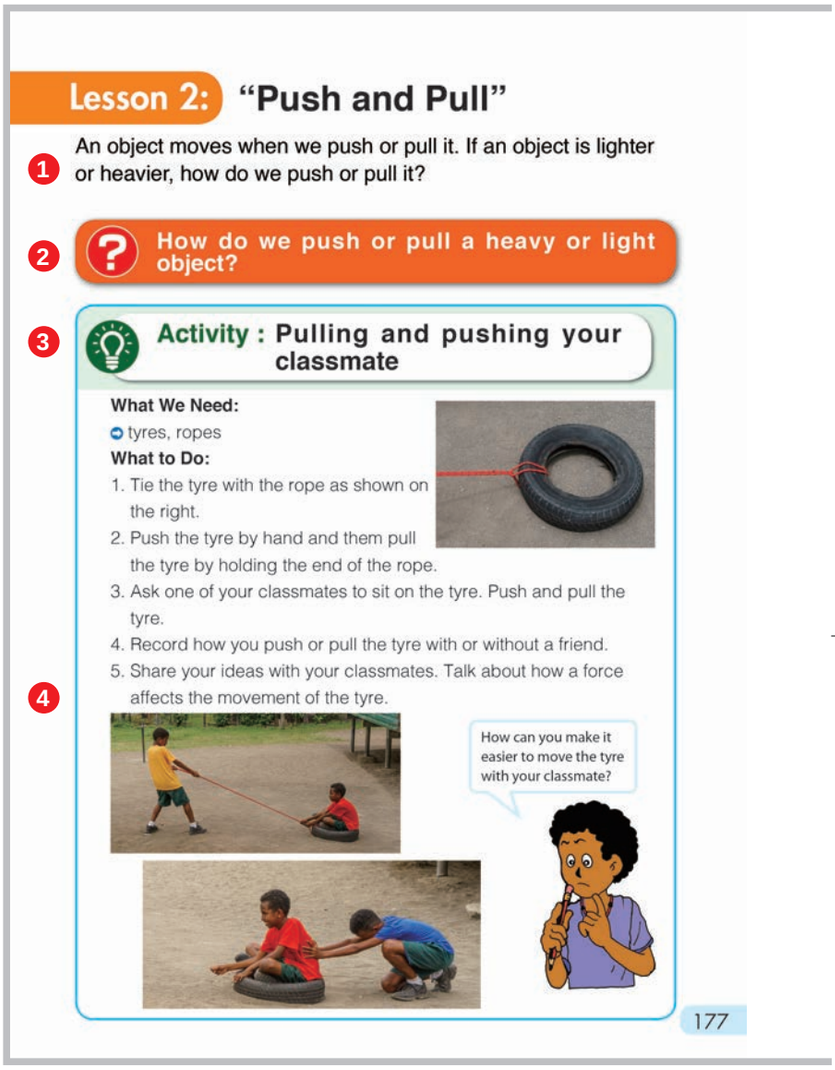
3 Activity (20 min.)

- Organise students into some groups.
- Explain the steps of the activity.
- Instruct students on the ground rules for outside activity.
- Go outside and have students do the activity.
- Have students record their findings in the table.
- After that, ask students to discuss how they pushed and pulled the tyre with or without friend based on their results in a group.

4 Discussion for findings (20 min.)

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

(Continue)



Lesson 2: "Push and Pull"

1 An object moves when we push or pull it. If an object is lighter or heavier, how do we push or pull it?

2 How do we push or pull a heavy or light object?

3 Activity : Pulling and pushing your classmate

What We Need:
tyres, ropes

What to Do:
1. Tie the tyre with the rope as shown on the right.
2. Push the tyre by hand and them pull the tyre by holding the end of the rope.
3. Ask one of your classmates to sit on the tyre. Push and pull the tyre.
4. Record how you push or pull the tyre with or without a friend.
5. Share your ideas with your classmates. Talk about how a force affects the movement of the tyre.

4

How can you make it easier to move the tyre with your classmate?

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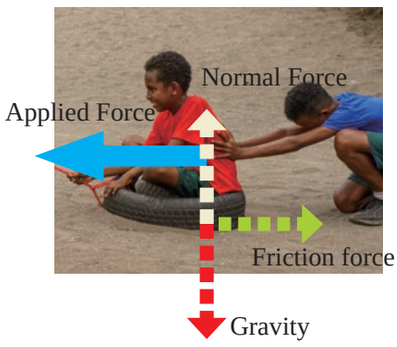
Teacher's Notes

Note: In case of no tyre, use a heavy box or any heavy objects in-order for students realise that more force is needed to move the heavy box or heavy object.

- (For teachers only - should NOT teach this information) For those who firstly learn about 'force', the lesson only talks about 'push' and 'pull' though, there are four forces acting around the object as shown on the right.
- Gravity (gravitational force) pulls the students on the tyre downwards but the student does not fall down. Because he is supported by ground. The force supporting is called normal force. Rough surface of the ground resist to move the student forward. This resistance is called frictional force. Frictional force is studied in the next lesson.
- Normal force and frictional force are a contact force, whereas gravitational force is a non-contact force (see previous page for more information).

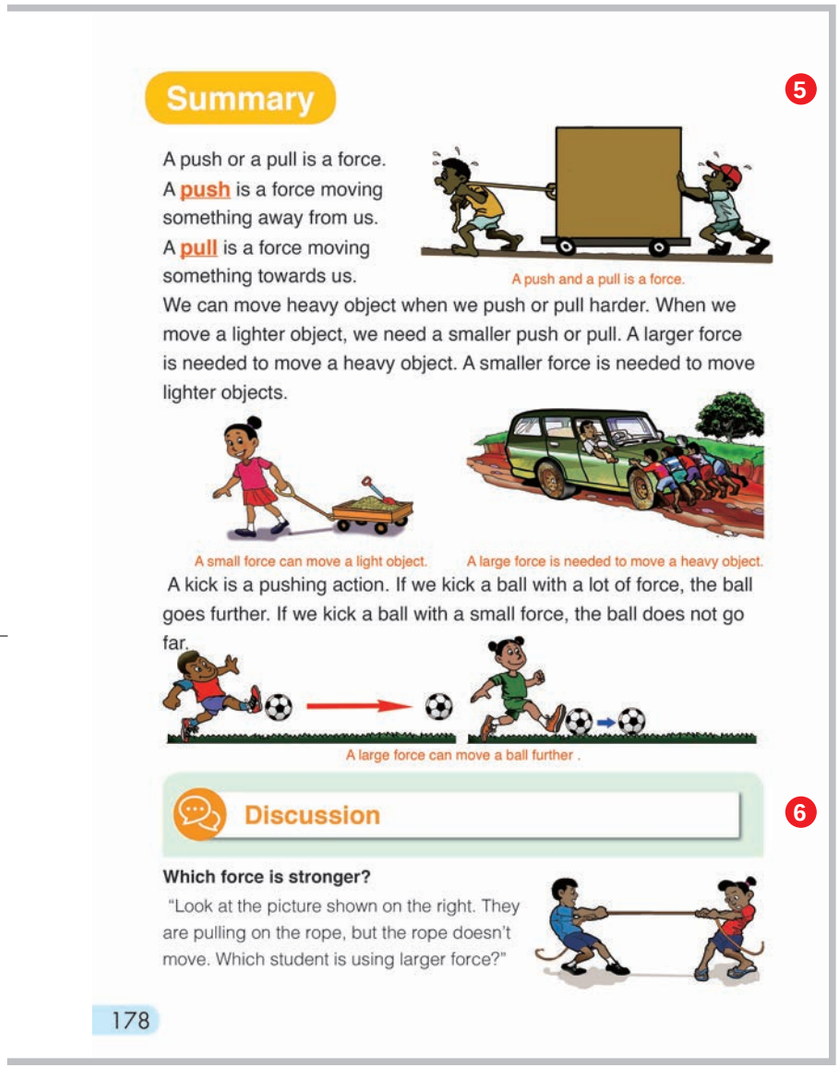


Lesson Objectives

Students will be able to:
- Explain what a push and a pull is.
- Realise the relationship between the amount of force to use and the heaviness of objects to move.

Assessment

Students are able to:
- State that a push is a force moving something away while a pull is a force moving something towards us.
- Explain how they push and pull a heavy or lighter object.
- Participate in the activity with interest.



Summary 5

A push or a pull is a force.
A **push** is a force moving something away from us.
A **pull** is a force moving something towards us.

A push and a pull is a force.

We can move heavy object when we push or pull harder. When we move a lighter object, we need a smaller push or pull. A larger force is needed to move a heavy object. A smaller force is needed to move lighter objects.

A small force can move a light object. A large force is needed to move a heavy object.

A kick is a pushing action. If we kick a ball with a lot of force, the ball goes further. If we kick a ball with a small force, the ball does not go far.

A large force can move a ball further .

Discussion 6

Which force is stronger?

"Look at the picture shown on the right. They are pulling on the rope, but the rope doesn't move. Which student is using larger force?"

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- Confirm their results with students.
- **Based on their findings,** ask the questions as discussion point.

Q:How did you push and pull the tyre with and without a friend on it? (With a friend we needed more force. Without a friend we needed less force to move.)

Q:Which was heavier, the tyre without a friend on it or the tyre with a friend on it? (The tyre with a friend was heavier.)

Q:How much force do you need to push and pull a heavier or lighter object? (A larger force is needed to move a heavier object. A smaller force can move lighter objects.)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise the lesson on the blackboard.
- Ask these questions:
  Q: What is a push and a pull?
  Q: How much force is necessary to move a heavier or a lighter object?
- Ask students to copy the notes on the blackboard into their exercise books.

6 Further Discussion (5 min.)

- Let students think about the questions in 'Discussion' in a group.
- Ask each group to present their answers and confirm them with students.
- Conclude the further discussion.

Sample Blackboard Plan

Title:

"Push and Pull"

Key question

How do we push or pull a heavy or light object?

Activity

Pulling and pushing your classmate

Results:

	How did you move?
A tyre without a friend	We didn't need more force, we need smaller force, etc
A tyre with a friend	We push and pulled it with more or larger force, etc

Discussion

Q: How did you push and pull the tyre with and without a friend on it?
With a friend we needed more force. Without a friend we needed less force to move.
Q: Which was heavier, the tyre without a friend on it or the tyre with a friend on it?
The tyre with a friend was heavier.
Q: How much force do you need to push and pull a heavier or lighter object?
A larger force is needed to move a heavier object. A smaller force can move lighter objects.

Summary

- A push is a force moving something away from us.
- A pull is a force moving something towards us.
- A larger force is needed to move a heavy object.
- A smaller force can move lighter objects.

Further Discussion

- Two students are using the same amount of force to pull each other.

Unit	Chapter : **9. Force**	Total lesson No: 77 / 94
Force and Motion	Topic : **9.1. Objects in Motion**	Textbook page: 179 - 180

Lesson 3 / 13

Lesson Title

Slower and Stop

Preparation

- Textbook, note book, Books, cardboard, a toy car, ruler

Lesson Flow

1 Introduction (10 min.)

- Review the previous lesson.

Q:What is a push and a pull?

Q:How much force is necessary to move a heavier or a lighter object?

- Encourage students to think about a friction by asking:

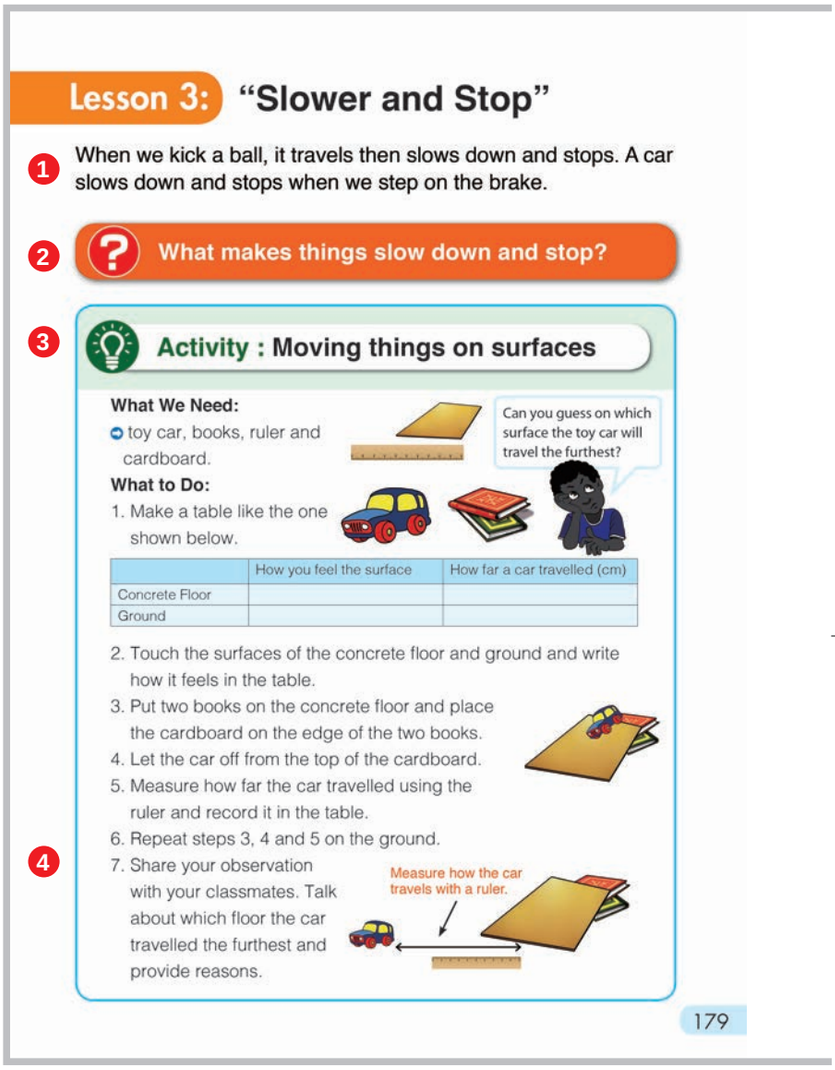
Q:When we kick a ball, it will move, slow down and finally stop. Why?

2 Introduce the key question

What makes things slow down and stop?

3 Activity (20 min.)

- Organise students into some groups.
- Explain the steps of the activity.
- Ask students to draw a table in their exercise books.
- Ask students to guess on which surface the toy car will travel further and record their prediction in their exercise book.
- Have students do the activity based on their prediction and record their results in the table.
- Ensure that the students measure from the end of the cardboard to the back of the car.
- Ask students to discuss which surface the toy car travelled the furthest and its reasons based on their findings in a group.



Lesson 3: "Slower and Stop"

1 When we kick a ball, it travels then slows down and stops. A car slows down and stops when we step on the brake.

2 What makes things slow down and stop?

3 Activity : Moving things on surfaces

What We Need:
- toy car, books, ruler and cardboard.

Can you guess on which surface the toy car will travel the furthest?

What to Do:

1. Make a table like the one shown below.

	How you feel the surface	How far a car travelled (cm)
Concrete Floor		
Ground		

2. Touch the surfaces of the concrete floor and ground and write how it feels in the table.
3. Put two books on the concrete floor and place the cardboard on the edge of the two books.
4. Let the car off from the top of the cardboard.
5. Measure how far the car travelled using the ruler and record it in the table.
6. Repeat steps 3, 4 and 5 on the ground.
7. Share your observation with your classmates. Talk about which floor the car travelled the furthest and provide reasons.

4

Measure how the car travels with a ruler.

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Teacher's Notes

- Facilitation notes: The result will depend on the type of toy car and the surfaces. Hence this manual does not provide expected figure of the result. Teachers are requested to test the activity prior to the lesson so that teachers can know possible results with your toy and your classroom condition.
- If it is difficult to prepare car toy like in textbook, you can use small balls, cans and bottles instead.

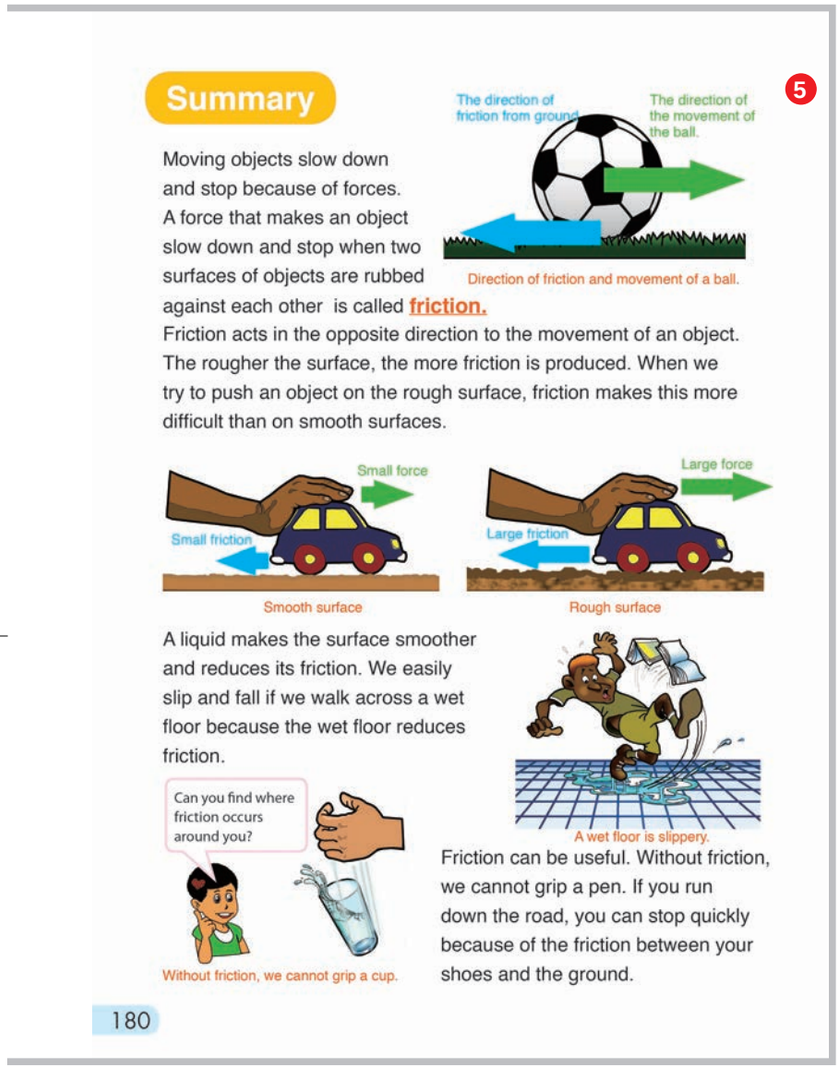
- Friction happens when two things rub against each other. The magnitude of the frictional force is determined by the roughness of the contact surface and weight of the object put on the surface. The rougher surface and heavier object generate more frictional force.
- Friction makes things slow down or fix. You can find friction everywhere that objects come into contact with each other. For example, a nail fixed on wall because of frictional force. It can be easily removed if there is no frictional force. Liquids such as oil reduce frictional force when they lay on the contact surface.

Lesson Objectives

Students will be able to:
- Define friction.
- Identify the function of friction.
- Observe the movement of an object on a rough and smooth surface.

Assessment

Students are able to:
- Explain what a friction is.
- State the reason why an object slows down and stops.
- Measure how far a toy car travels on a smooth and a rough surface.
- Share their opinions with respect.



Summary

5

Moving objects slow down and stop because of forces. A force that makes an object slow down and stop when two surfaces of objects are rubbed against each other is called **friction.**

The direction of friction from ground

The direction of the movement of the ball.

Direction of friction and movement of a ball.

Friction acts in the opposite direction to the movement of an object. The rougher the surface, the more friction is produced. When we try to push an object on the rough surface, friction makes this more difficult than on smooth surfaces.

Small force

Small friction

Smooth surface

Large force

Large friction

Rough surface

A liquid makes the surface smoother and reduces its friction. We easily slip and fall if we walk across a wet floor because the wet floor reduces friction.

A wet floor is slippery.

Can you find where friction occurs around you?

Without friction, we cannot grip a cup.

Friction can be useful. Without friction, we cannot grip a pen. If you run down the road, you can stop quickly because of the friction between your shoes and the ground.

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4 Discussion for findings (20 min.)

- Ask each group to present their results from the activity.
- Write down students' results in a table on the blackboard.
- Confirm findings with students.
- **Based on their findings,** ask the questions as discussion point.

Q:How are the surfaces of the concrete and ground different? (Concrete floor is smooth, but ground is rough.)

Q:On which floor did the toy car travelled the furthest? (Concrete floor)

Q:Can you guess why the toy car travelled further on the concrete floor and shorter on the ground? (This is because the smoothness or roughness of the surface is different, etc.)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: What is a friction?
  Q: Why does a ball on the floor slow down and stop at last when we kick it?
  Q: What would happen if there were no friction?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:

"Slower and Stop"

Key question

What makes things slow down and stop?

Activity

Moving a thing on surfaces

Results:

	How do you feel?	How far a car travelled (cm)
Concrete floor	Smooth	e.g. 80 cm
Ground	Rough	e.g.40 cm

Discussion

Q: How are the surfaces of the concrete and ground different?

Concrete floor is smooth, but ground is rough.

Q: On which floor did the toy car travelled the furthest?

Concrete floor

Q: Can you guess why the toy car travelled further on the concrete floor and shorter on the ground?

This is because the smoothness or roughness of the surface is different, etc.

Summary

- Moving objects slow down and stop because of friction.
- A force that makes an object slows down and stops when two surfaces of objects are rubbed together are called friction.
- Frictions act in the opposite direction to the movement of an object.
- The rougher the surface, the more friction is produced.
- Without friction,
  ➤ We cannot grip a pen.
  ➤ We cannot stop quickly on the ground.
  ➤ We cannot grip a cup.

Unit	Chapter : **9. Force**	Total lesson No: 78 / 94
Force and Motion	Topic : **9.1. Objects in Motion**	Textbook page: 181 - 182

Lesson 4 / 13

Lesson Title

Speed Up and Slow Down

Preparation

- A ball

Lesson Flow

1 Introduction (5 min.)

- Review the previous lesson.

Q:What force makes things to slow down and stop?

Q:What is a friction?

- Encourage students to think about friction by asking:

Q:Force can move, slow down and stop things. What else can force do?

2 Introduce the key question

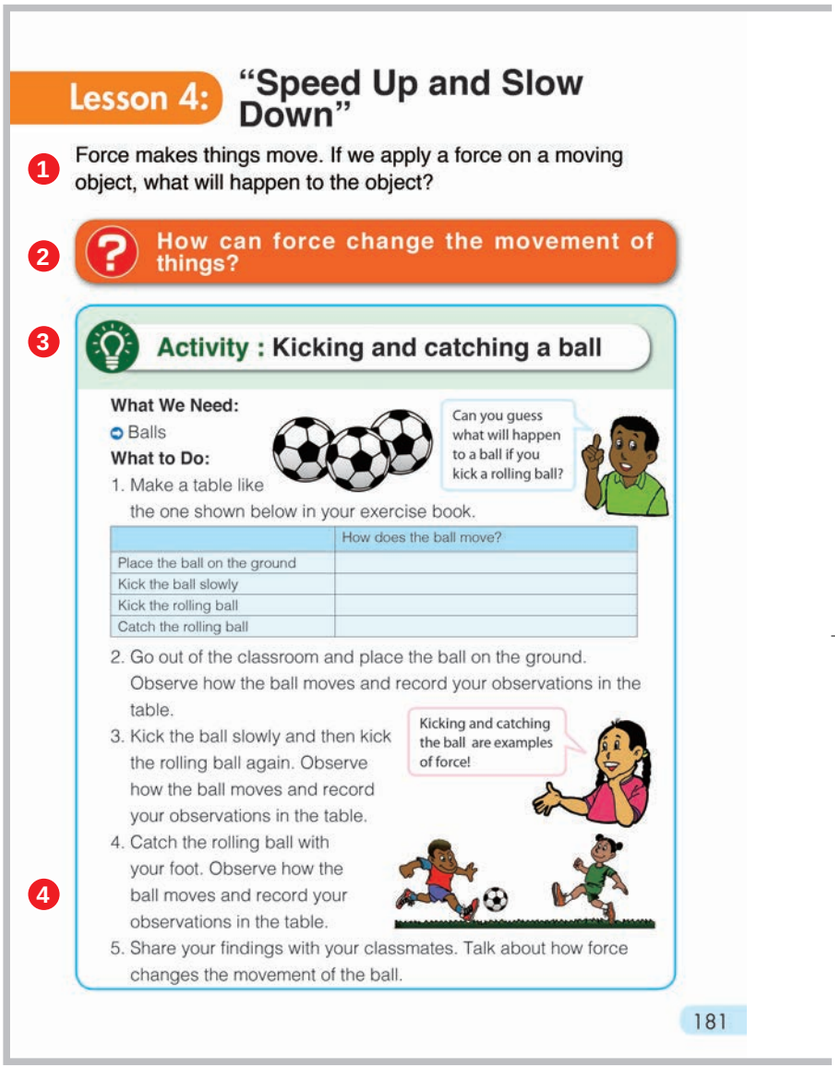
How can force change the movement of things?

3 Activity (20 min.)

- Organise students into some groups.
- Explain the steps in the activity.
- Let students guess what will happen if a rolling ball is kicked and record their prediction in their exercise book.
- Have students do the activity based on their prediction and record their results in the table.
- 'Kick a rolling ball' means 'kick the rolling ball to the same direction as the rolling ball is moving'.
- Ask students to discuss how a force changes the movement of a ball based on their results in a group.

4 Discussion for findings (25 min.)

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



Lesson 4: "Speed Up and Slow Down"

1 Force makes things move. If we apply a force on a moving object, what will happen to the object?

2 How can force change the movement of things?

3 Activity : Kicking and catching a ball

What We Need:
- Balls

What to Do:

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

Can you guess what will happen to a ball if you kick a rolling ball?

	How does the ball move?
Place the ball on the ground	
Kick the ball slowly	
Kick the rolling ball	
Catch the rolling ball	

2. Go out of the classroom and place the ball on the ground. Observe how the ball moves and record your observations in the table.
3. Kick the ball slowly and then kick the rolling ball again. Observe how the ball moves and record your observations in the table.
4. Catch the rolling ball with your foot. Observe how the ball moves and record your observations in the table.
5. Share your findings with your classmates. Talk about how force changes the movement of the ball.

Kicking and catching the ball are examples of force!

4

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Teacher's Notes

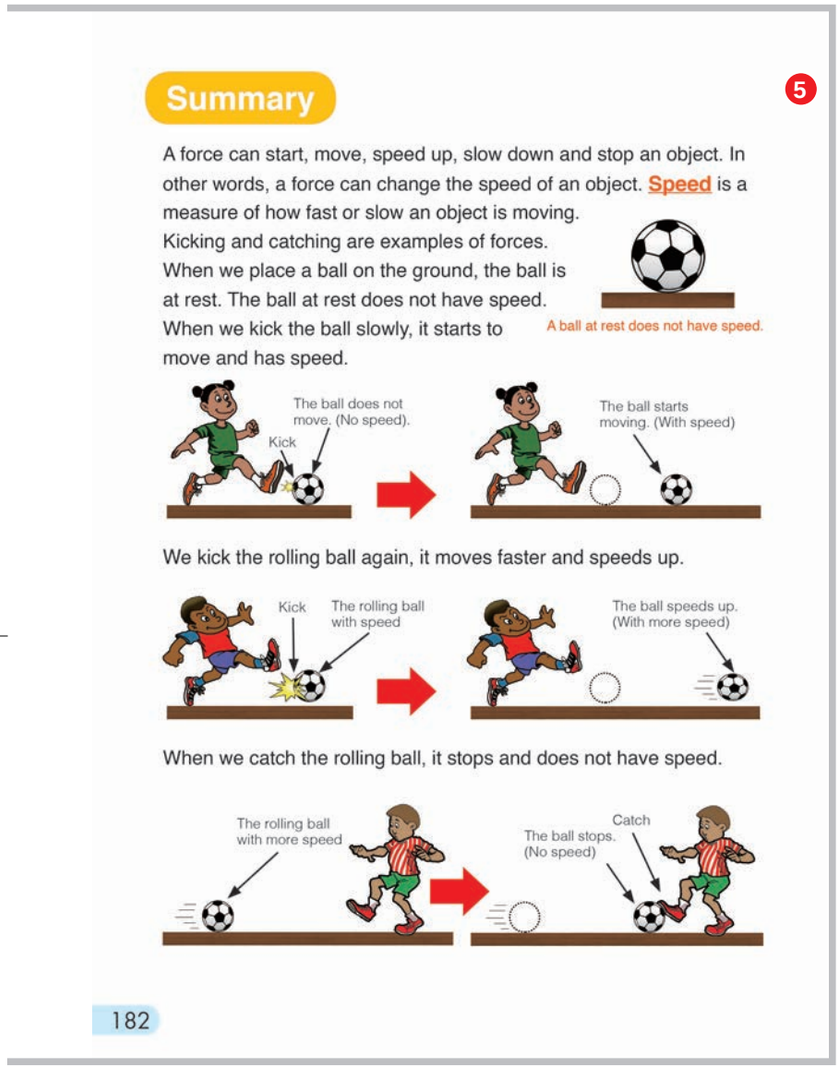
- Facilitation note: Students may be enthusiastic about playing football rather than learning the scientific concepts. Teachers must guide students to pay attention when observing the motion of the ball and tell them to record their findings in their notebook.
- As described in the teacher's note for the first lesson, when a force is applied to an object, the object can change its speed of motion. Force changes the speed.
- The magnitude of the force applied to an object determines its speed. The larger force increases the speed of the object and vice versa.
- Force changes the motion of body that is already in motion, too. For example, when we push again on a moving toy car, its speed increases. Similarly, we can apply force in opposite direction of the motion to slow down the speed of the toy car. The action applying a force can cause an object to move or speed up (accelerate), to slow down (decelerate), to stop, or to change direction.

Lesson Objectives

Students will be able to:
- Define speed.
- Describe how force affects the speed of objects.

Assessment

Students are able to:
- State what speed is.
- Explain that a force can change the speed of objects
- Cooperate with classmates in group activity.



Summary

5

A force can start, move, speed up, slow down and stop an object. In other words, a force can change the speed of an object. Speed is a measure of how fast or slow an object is moving. Kicking and catching are examples of forces. When we place a ball on the ground, the ball is at rest. The ball at rest does not have speed. When we kick the ball slowly, it starts to move and has speed.

A ball at rest does not have speed.

We kick the rolling ball again, it moves faster and speeds up.

When we catch the rolling ball, it stops and does not have speed.

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- Write down students' results in the table on the blackboard.
- Confirm the findings with students.
- **Based on their findings,** ask the questions as discussion point.

Q:What happened to the ball when you kicked the ball slowly? (It started to move or roll slowly.)

Q:What happened to the rolling ball when you kicked the ball again? (It moved faster.)

Q:What happened to the rolling ball when you caught the ball again? (It stopped moving, it didn't move etc.)

Q:Kicking and catching are forces. How can force change the movement of an object? (Force can change the speed of objects, etc)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions in order to check students understanding.
  Q: What is speed?
  Q: How can a force change the movement of an object?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:

"Speed Up and Slow Down"

Key question

How can force change the movement of things?

Activity: Kicking and catching a ball

	How does the ball move?
Place a ball on the ground	Does not move
Kick a ball slowly	Moves slowly
Kick a rolling ball	Moves faster
Catch a rolling ball	Stops moving

Discussion

Q: What happened to the ball when you kicked the ball slowly?
It started to move or roll slowly.
Q: What happened to the rolling ball when you kicked the ball again?
It moved faster.
Q: What happened to the rolling ball when you caught the ball again?
It stopped moving, it didn't move etc.
Q: Kicking and catching are forces. How can force change the movement of an object?
Force can change the speed of objects, etc

Summary

- Speed is a measure of how fast or slow an object is moving.
- A force can start to move, speed up, slow down, and stop an object.
  → **a force can change the speed of an object.**
- A force also changes the speed of an object.

Unit	Chapter : **9. Force**	Total lesson No: 79 / 94
Force and Motion	Topic : **9.1. Objects in Motion**	Textbook page: 183 - 184

Lesson 5 / 13

Lesson Title

The Way Objects Move

Preparation

- Marbles, large table, wood block

Lesson Flow

1 Introduction (10 min.)

- Review the previous lesson by asking:

Q:What is speed?

Q:How can a force change the movement of an object?

- Let students imagine when playing ball and ask:

Q:What happens to the ball when we bounce a ball?

2 Introduce the key question

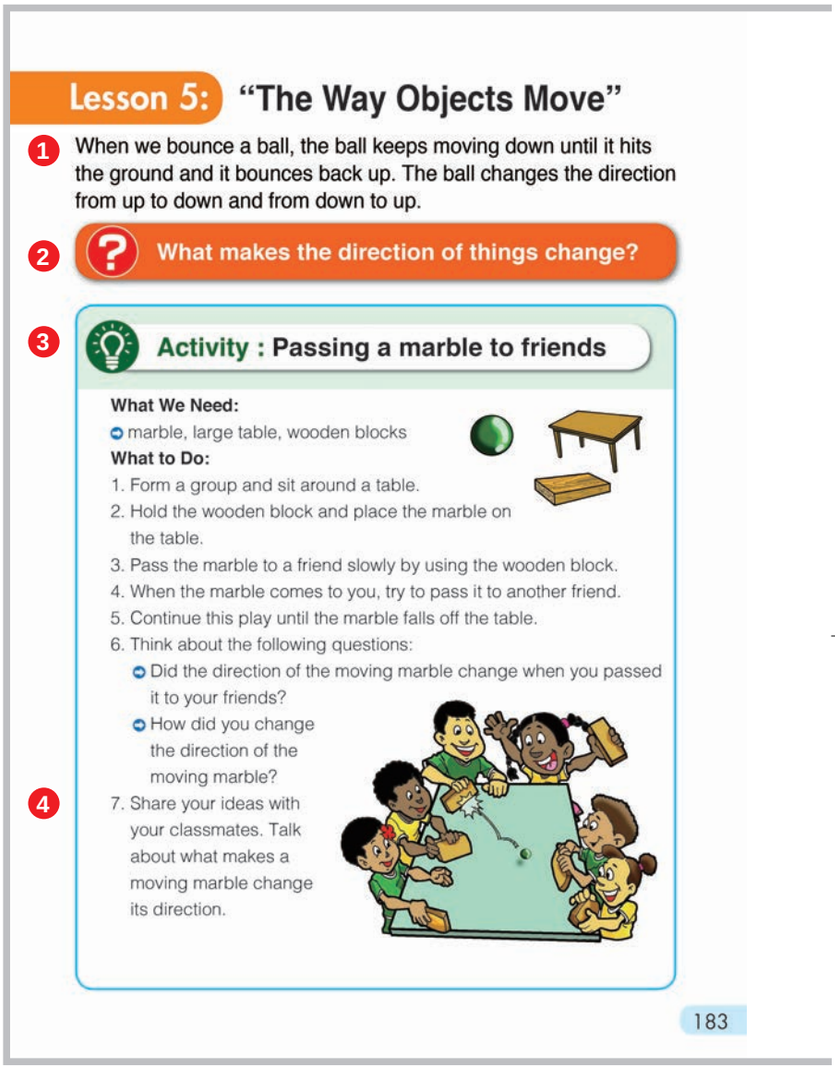
What makes the direction of things change?

3 Activity (20 min.)

- Organise the students into groups.
- Explain the steps of the activity.
- Ensure that each student uses a wood block to pass the marble from one friend to another till it falls off the table.
- Have students do the activity.
- Encourage students to focus on the change in the direction of the moving marble and how the direction changes.
- After playing, let students think about the questions in the activity.
- Ask students to discuss their ideas in a group.

4 Discussion for findings (20 min.)

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



Lesson 5: "The Way Objects Move"

1 When we bounce a ball, the ball keeps moving down until it hits the ground and it bounces back up. The ball changes the direction from up to down and from down to up.

2 What makes the direction of things change?

3 Activity : Passing a marble to friends

What We Need:
- marble, large table, wooden blocks

What to Do:
1. Form a group and sit around a table.
2. Hold the wooden block and place the marble on the table.
3. Pass the marble to a friend slowly by using the wooden block.
4. When the marble comes to you, try to pass it to another friend.
5. Continue this play until the marble falls off the table.
6. Think about the following questions:
   - Did the direction of the moving marble change when you passed it to your friends?
   - How did you change the direction of the moving marble?
4 7. Share your ideas with your classmates. Talk about what makes a moving marble change its direction.

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Teacher's Notes

- Facilitation note: In case of no marble, a small rubber ball can be used. Teachers must carefully facilitate this activity for NOT just having fun. Moreover, teachers need to have all students to be engaged in the activity. To do that, teachers can ask student to complete specific tasks, for example, form polygons such as;

 equilateral triangle  star  octagon

- When a force is applied at an angle to a moving object, the force changes the direction of the moving object. For example, in a game of football, player changes the direction of moving football by hitting the ball with his foot at an angle.

Lesson Objectives

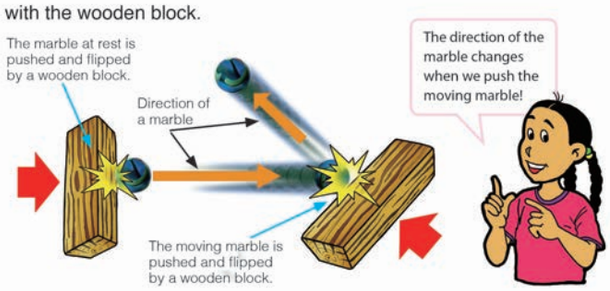
Students will be able to:
- Define direction.
- Describe how a force affects the direction of objects.

Assessment

Students are able to:
- State what direction is.
- Explain that a force can change the direction of a moving object.
- Co-operate with classmates in the activity.

Result

When we pushed and flipped the marble at rest with a wooden block, the marble started to move straight. The marble moved straight in the different direction when we pushed and flipped the moving marble with the wooden block.



Summary

Pushing and flipping are example of forces. When we push and flip a moving marble, we can change the direction of the moving marble.

This means that **a force can change the direction of a moving object.**

Direction is the path that an object takes. The direction tells us where the object is going. A force makes the direction of a moving object change.

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- Write down students' results in a table on the blackboard.
- Confirm the findings with students.
- **Based on their findings, ask** the questions as discussion point.

Q:How did you pass the moving marble to your friend? (Pushing, flipping, etc)

Q:What happened to the moving marble when you pushed or flipped the marble? (The direction of the moving marble changed, speed changed, etc.)

Q:Pushing and flipping are forces. How can a force change the moving object? (Force can change the direction of objects, etc)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: What is direction?
  Q: What does direction tell us?
  Q: How can a force change a moving object?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:
"The Way Objects Move"

Key question
What makes the direction of things change?

Activity: Passing a marble to friends
1. Did the direction of a moving marble change when you passed it to your friends?
   Yes, the direction changed.
2. How did you change the direction of the moving marble?
   By pushing and flipping it with the wood block.

Discussion
Q: How did you pass the moving marble to your friend?
Pushing, flipping, etc

Q: What happened to the moving marble when you pushed or flipped the marble?
The direction of a moving marble was changed, speed changed, etc.

Q: Pushing and flipping are forces. How can a force change the moving object? Force can change the direction of objects, etc

Summary
- A direction is the path that an object takes.
- The direction tells us where the object is going.
- When we push and flip a moving marble, we can change the direction of the moving marble.
  → **A force can change the direction of a moving object.**

Unit	Chapter : **9. Force**	Total lesson No: 80 / 94
Force and Motion	Topic : **9.1. Objects in Motion**	Textbook page: 185 - 186

Lesson 6 / 13

Lesson Title

More about Forces

Preparation

- Empty plastic bottles without caps, clay,

Lesson Flow

1 Introduction (10 min.)

- Review the previous lesson by asking:

Q:What is direction?

Q:How can a force change a moving object?

- Encourage students to think more about force by asking:

Q:A force can move, speed up, slow down, and stop a thing. It also changes the direction of things. What else can force do?

2 Introduce the key question

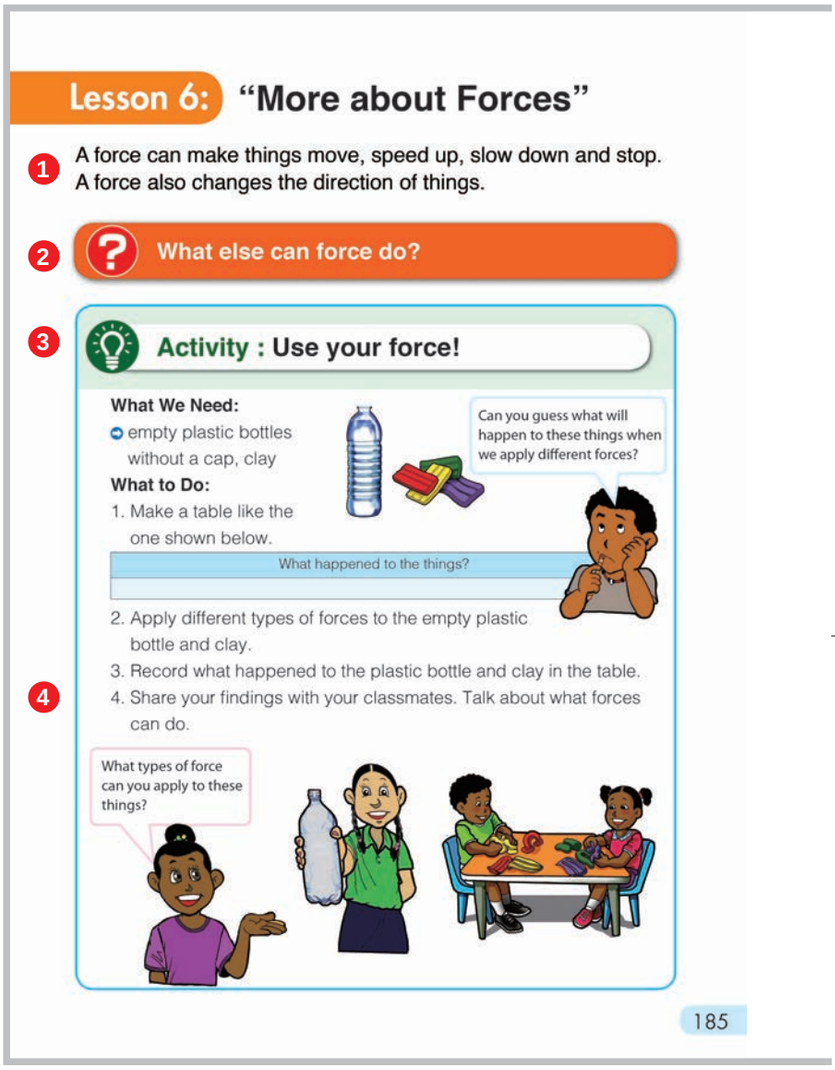
What else can force do?

3 Activity (20 min.)

- Organise students into groups.
- Explain the steps in the activity.
- Ask students to draw a table in their exercise books.
- Ask students to guess what will happen to an object when force is applied to it and to record their prediction in their exercise book.
- Have students do the activity based on their prediction and record their results in the table.
- Ask students to discuss what forces can do based on their results in a group.

4 Discussion for findings (20 min.)

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



Lesson 6: "More about Forces"

1 A force can make things move, speed up, slow down and stop. A force also changes the direction of things.

2 What else can force do?

3 Activity : Use your force!

What We Need:
- empty plastic bottles without a cap, clay

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

What happened to the things?

2. Apply different types of forces to the empty plastic bottle and clay.
3. Record what happened to the plastic bottle and clay in the table.
4. Share your findings with your classmates. Talk about what forces can do.

Can you guess what will happen to these things when we apply different forces?

What types of force can you apply to these things?

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Teacher's Notes

- The changes in the shape of an object is due to an applied force called 'deformation'.
- There are two types of deformations;
  1 Elastic deformation is the temporary change in the shape of an object produced in elastic substances by a force. Once a force is released, the original shape of an object is restored. When we pull rubber bands, its shape is deformed (expand). When we release the rubber band, its shape is recovered. When an inflated balloon is pressed, the shape of the balloon is deformed, and the original shape of the balloon is restored if a force is released. These are examples of elastic deformation.
  2. Plastic deformation is the permanent change in the shape of an object without fracture produced by a force. The undeformed shape of an object does not recover, even after a force is released. As mentioned in the textbook, pushed clay, crushed PET bottle and can are the example of the plastic deformation.
- A broken glass is the example of change in the shape of an object when a force is applied. However, we don't call it as plastic deformation. Because it is divided into several pieces. The change is not only in shape, but also in weight, hence it doesn't keep original property. Elastic or plastic deformation keep the property except for the shape.

Lesson Objectives

Students will be able to:
- Describe how a force works on the shape and size of objects.

Assessment

Students are able to:
- Explain that a force can change the shape and size of an object.
- Participate in the activity with interest.

Summary

A force can change the shape of an object. For example, we create new shapes of clay when we push, press or pull clay. When we pull a rubber band, we change its shape.

A force changes the shape of rubber band and clay.

A force can also change the size of an object. Size tells us how big or small an object is. For example, an empty bottle shrinks when we crush it. Sometimes we see crushed cans on the road because cars press the cans.

A force changes the size of the bottle and can.

Discussion

More about forces?

1.Give examples from daily life where forces may change the shape and size of things.
2.Talk about your ideas with your classmates.

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- Write down students' results in a table on the blackboard.
- Confirm the results with students.
- Based on their findings, ask the following questions as discussion point.

Q:What types of force did you apply to the objects? (Push, press, pull, crush and squeeze, etc.)

Q:What happened to the clay and the plastic bottle when you applied force to it? (It changed its shape, it became smaller, it separated into small pieces, It shrunk, etc.)

Q: Can you guess how a force can change objects? (It can change the shape and size of objects.)

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise the lesson on the blackboard.
- Ask these questions as assessment:
  Q: How can a force change an object?
- Ask students to copy the notes on the blackboard into their exercise books.

6 Further Discussion

- Let students think about the questions in 'Discussion'.
- Ask students to present their answers and confirm them with students.
- Conclude the further discussion.

Sample Blackboard Plan

Title:

"More about forces"

Key question

What else can force do?

Activity

Use your force!

What happened to things
1. Plastic bottle- it went small and changed shape, it shrunk, etc
2. Clay- changed into circle, flat, long, into small pieces, etc

Discussion

Q: What types of force did you apply to the objects?

Push, press, pull, crush and squeeze, etc

Q: What happened to the clay and the plastic bottle when you applied force to it?

It changed its shape, it became smaller, it separated into small pieces, it shrunk, etc.

Q: Can you guess how a force can change objects?

It can change the shape and size of objects.

Summary

- **A force can change the shape of an object.**
- **A force also can change the size of an object.**
- **Size** tells us how large or small an object is.

Further Discussion

Examples:

(Write down the ideas from students here!)

Lesson
7 / 13

Lesson Title

Summary and Exercise

Tips of lesson

1 Summary (20 min.)

- Recap main learning contents in this topic.
- Ask some questions to students and verify student understanding. Explain and correct learning contents again if they still have misconceptions.
- Recap by defining the term force and ask them to differentiate between a push and pull.
- Ask students what force can do.

1

Summary and Exercise

Summary 9.1 Objects in Motion

Forces

A force is a push or a pull.
- A push is a force moving something away from us.
- A pull is a force moving something towards us.

A force can make an object slow down and stop
A force that makes an object slow down and stop when two surfaces of objects are rubbed against each other is called friction.

A force can change speed
- A force can change the speed of an object.
- Speed is a measure of how fast or slow an object moves.

A ball speeds up. (With more speed)

A force can change direction
- A force can change the direction of a moving object.
- A direction is the path that an object takes.

A force can change shape and size
- A force can change the shape of an object.
- A force can also change the size of an object.

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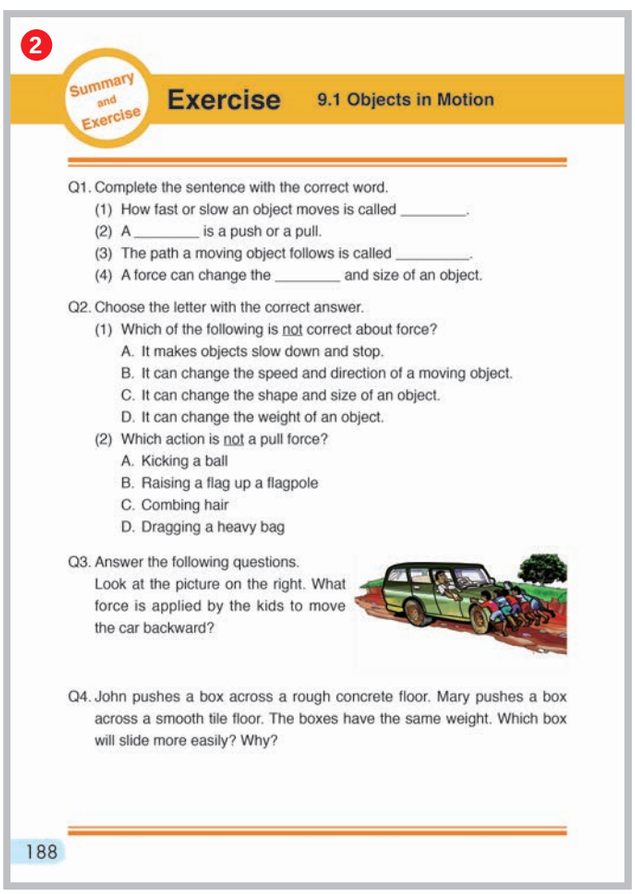
2 Exercise & Explanation (30 min.)

- Allow student to try answering questions individually to check their understanding.
- After the exercise, give them the answers of the questions and explain to justify the answers.



2

Summary and Exercise

Exercise 9.1 Objects in Motion

Q1. Complete the sentence with the correct word.
(1) How fast or slow an object moves is called _____.
(2) A _____ is a push or a pull.
(3) The path a moving object follows is called _____.
(4) A force can change the _____ and size of an object.

Q2. Choose the letter with the correct answer.
(1) Which of the following is not correct about force?
A. It makes objects slow down and stop.
B. It can change the speed and direction of a moving object.
C. It can change the shape and size of an object.
D. It can change the weight of an object.
(2) Which action is not a pull force?
A. Kicking a ball
B. Raising a flag up a flagpole
C. Combing hair
D. Dragging a heavy bag

Q3. Answer the following questions.
Look at the picture on the right. What force is applied by the kids to move the car backward?

Q4. John pushes a box across a rough concrete floor. Mary pushes a box across a smooth tile floor. The boxes have the same weight. Which box will slide more easily? Why?

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Exercise answers

Q1.
(1) **speed**
(2) **force**
We can move objects by pushing and pulling using force.
(3) **direction**
The direction tells us where the object is going.
(4) **shape**

Q2.
(1) **D**
Force makes things move, slow down and stop, it changes the speed and direction of a moving object, it also changes the shape and size of an object.
(2) **A**
Kicking is not a pull, it is a push action. When you kick a ball, you push it forward.

Q3. **The force applied is push**
The picture shows that the children are pushing the car by applying force.

Q4. Sample of answer
The box Mary pushes across a smooth tile floor. Because on a smooth tile floor has less friction

The smooth tile floor has less friction unlike the rough concrete floor which has more friction. Therefore, it was easier to push the box across the smooth tile surface.

Unit	Chapter : **9. Force**	Total lesson No: 82 / 94
Force and Motion	Topic : **9.2. Simple Machine**	Textbook page: 189 - 190

Lesson 8 / 13

Lesson Title

What is a Simple Machine?

Preparation

- Some simple machines

Lesson Flow

1 Introduction (5 min.)

- Remind students of their daily experiences of simple machines by asking:

Q:What types of tools do you use at home?

Q:Why do we use the tools in daily life?

- Explain the introductory statement in the textbook and ask:

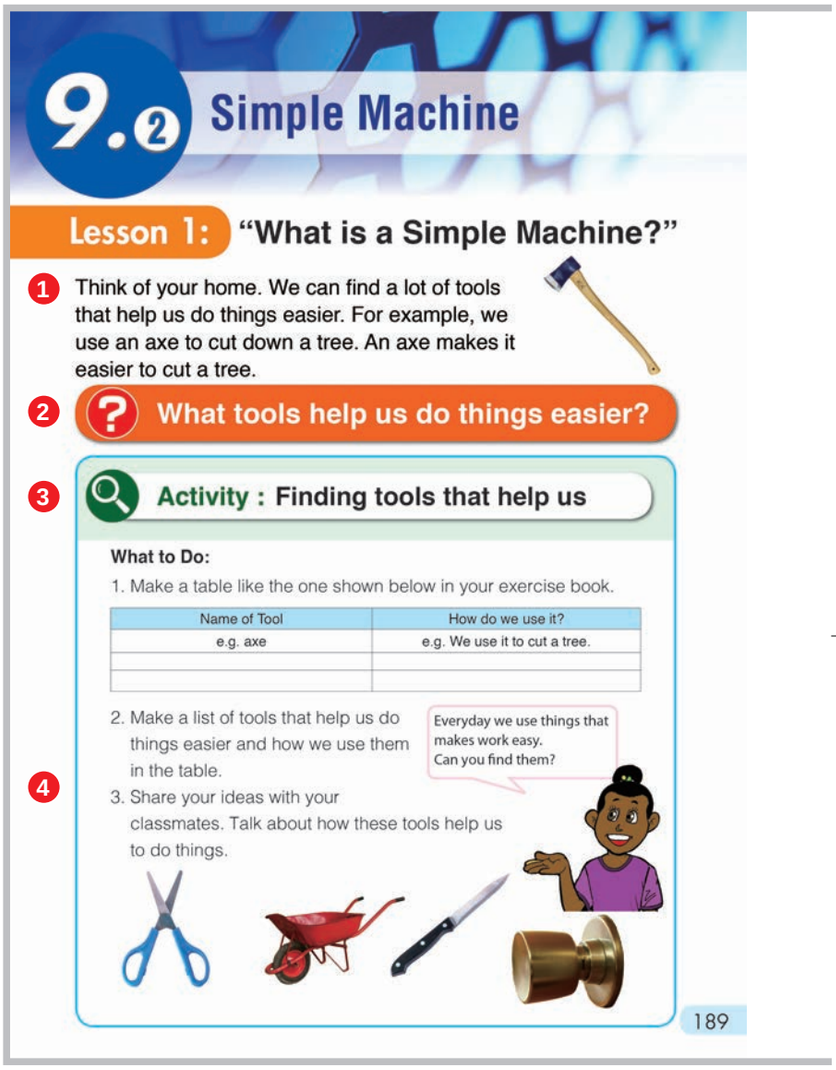
Q:Do you know any other tools that help us make work easier?

2 Introduce the key question

What tools help us do things easier?

3 Activity (25 min.)

- Organise students into groups.
- Explain the steps of the activity.
- Guide the students to think about their experiences where different types of tools have being used.
- Ask students to draw a table in their exercise books.
- Have students do the activity and record their findings in the table.
- Advise students to refer to the pictures of tools and the characters' talking in the activity for their investigation.
- Ask students to discuss name of tools and how they help us to do things based on their findings in a group.



Teacher's Notes

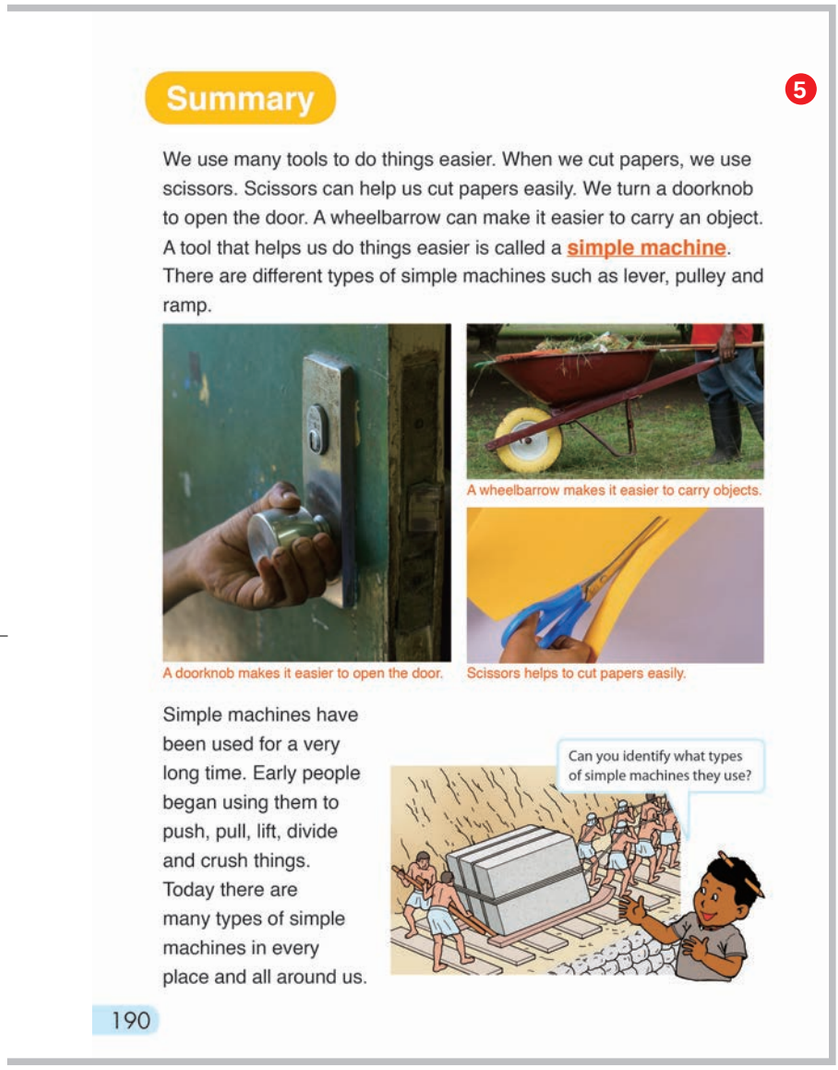
- Simple machine is a mechanical device to move heavy objects and to change direction of a force. They use 'mechanical advantage' to multiply force.
- The key features of a simple machine are summarized as follows;
  - They do not use electricity.
  - They have one or fewer moving parts.
  - They give us mechanical advantage.
  - Even though they make work easier for us, they still need input (force or effort) from a person.
  - They make tough jobs easier by changing the force, direction or speed of a movement.
  - There are usually six basic simple machines which have been used from the antient time - 1) lever, 2) wheel and axle, 3) pulley, 4) inclined plane, 5) wedge and 6) screw.
- In Gr.3, you will teach three of them such as inclined plane, lever and pulley as for the introduction of the study of the simple machine. In Gr.4, student will learn all six simple machines together.

Lesson Objectives

Students will be able to:
- Identify the simple machines in daily life.
- Define simple machines.

Assessment

Students are able to:
- List the tools that help make work easier and their uses.
- Explain what a simple machine is.
- Value and appreciate each other's ideas in discussion.



Summary

5

We use many tools to do things easier. When we cut papers, we use scissors. Scissors can help us cut papers easily. We turn a doorknob to open the door. A wheelbarrow can make it easier to carry an object. A tool that helps us do things easier is called a **simple machine**. There are different types of simple machines such as lever, pulley and ramp.

A doorknob makes it easier to open the door.

A wheelbarrow makes it easier to carry objects.

Scissors helps to cut papers easily.

Simple machines have been used for a very long time. Early people began using them to push, pull, lift, divide and crush things. Today there are many types of simple machines in every place and all around us.

Can you identify what types of simple machines they use?

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4 Discussion for findings (20 min.)

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

Q:What kinds of tools did you find? (Scissors, knife, wheelbarrow, screw driver, hammer, etc)

Q:How do we use these tools? (Cut paper, carry things, pull up things, etc)

Q:Why do we use these tools? (To make work easy, etc)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: What is a simple machine?
  Q: What are some examples of simple machines that we use in daily life.
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:

"What is a Simple Machine?"

Key question

What tools help us do things easier?

Activity

Finding tools that help us

Name of tool	How do we use it?
Axe	We use it to cut trees
Knife	Used to cut food
Hammer	Used to remove nail
……..	……..

Discussion

Q: What kinds of tools did you find?
Scissors, knife, wheelbarrow, screw driver, hammer, etc

Q: How do we use these tools?
Cut paper, carry things, pull up things, etc

Q: Why do we use these tools?
To make work easy, etc

Summary

- A tool that helps us do some things easier is called a simple machine.
- There are different types of simple machines such as lever, pulley, and ramp.
- Examples of simple machines are: door handles, a hammer, bottle openers, stairs, ladders, nail, doorstop, screw, faucet, knife, scissors, etc.

Unit	Chapter : **9. Force**	Total lesson No: 83 / 94
Force and Motion	Topic : **9.2. Simple Machine**	Textbook page: 191 - 192

Lesson 9 / 13

Lesson Title

Inclined Plane

Preparation

- Tyre, a flat wooden board

Lesson Flow

1 Introduction (10 min.)

- Review the previous lesson by asking:

Q:What is a simple machine?

Q:Give some examples of simple machines that we use in daily life.

- Explain the introductory statement in the textbook and encourage students to think about an inclined plane by asking:

Q:How do you move a heavy object to a higher place?

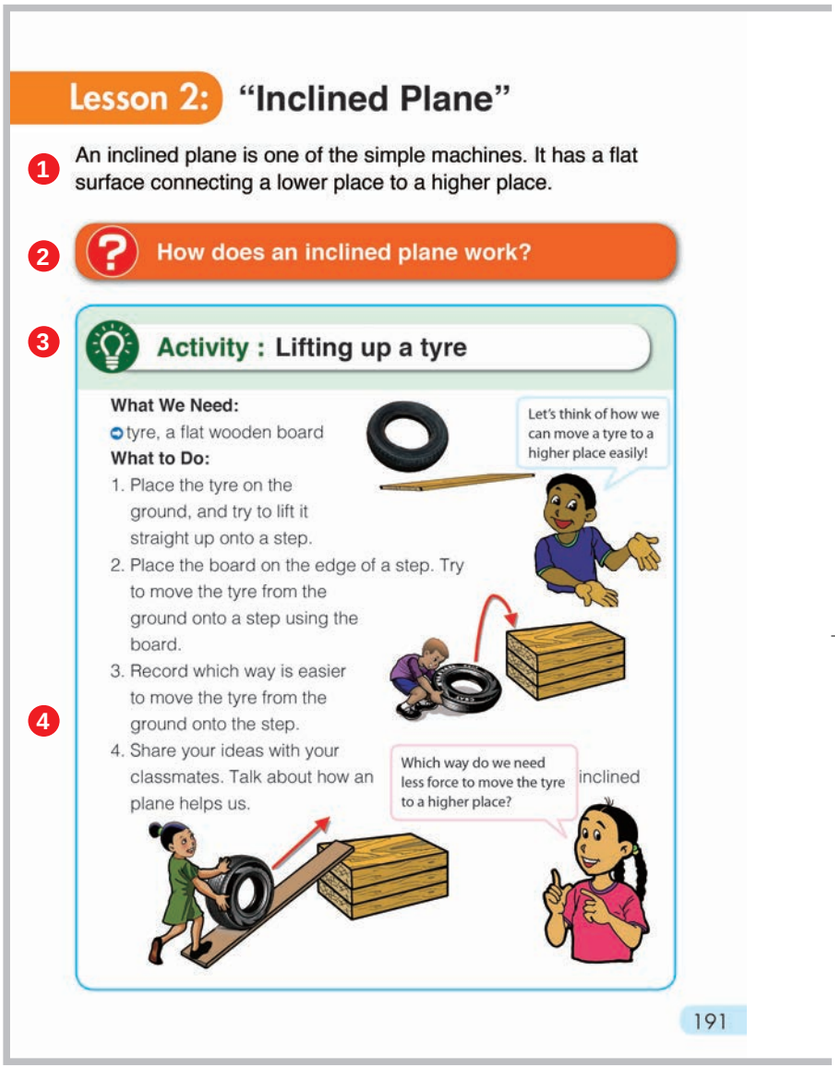
Q:How can we move a heavy object to a higher place easily?

2 Introduce the key question

How does an inclined plane work?

3 Activity (20 min.)

- Organise students into groups.
- Explain the steps in the activity.
- Inform students on the ground rules for outside activity.
- Go outside with students and set up this activity.
- Have students do the activity and record their results in their exercise books.
- Ask students to discuss how an inclined plane helps them by comparing with or without a board based on their results in a group.



Lesson 2: "Inclined Plane"

1 An inclined plane is one of the simple machines. It has a flat surface connecting a lower place to a higher place.

2 How does an inclined plane work?

3 Activity : Lifting up a tyre

What We Need:
tyre, a flat wooden board

What to Do:
1. Place the tyre on the ground, and try to lift it straight up onto a step.
2. Place the board on the edge of a step. Try to move the tyre from the ground onto a step using the board.
3. Record which way is easier to move the tyre from the ground onto the step.
4. Share your ideas with your classmates. Talk about how an plane helps us.

Let's think of how we can move a tyre to a higher place easily!

Which way do we need less force to move the tyre to a higher place?

inclined

4

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Teacher's Notes

Additional information

Some examples of inclined planes are children's slide, dump trucks, slanted road or hill, stairs, ladder, ramps at the hospital for wheel chairs, ramps at the shops and on vehicles.

- Teacher can refer to the teacher's notes on the previous lesson in the 'featurs of a simple machine'.
- Specify type of tyre to be used?
- Tyre can also be substituted with other materials that have weight such as box of books, log, others.
- Include safety rules of lifting and dropping weights of objects.

Options:

If there are no stairs, use a desk or a table and place the long board to make an incline plane.

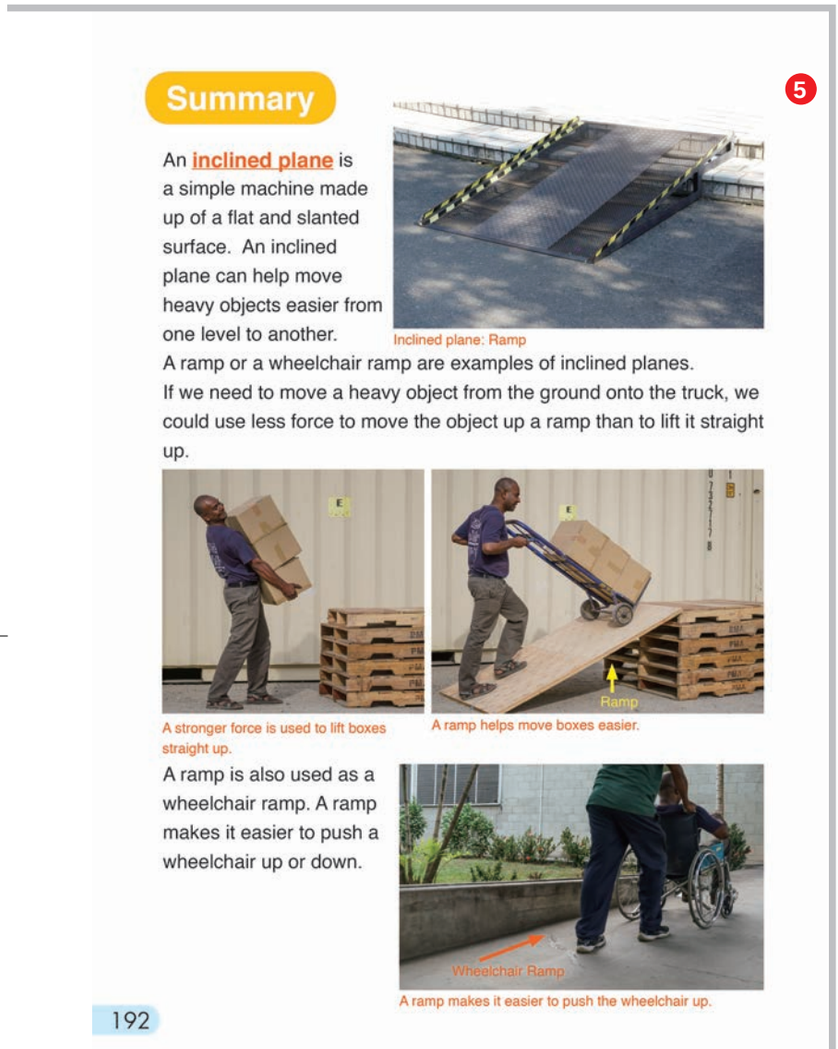
If there are no tyres you can use something heavy; example a heavy box of books, a log, half fill 20 litre container of water etc. You should improvise with anything that has weight but not too heavy for the students to move it.

Lesson Objectives

Students will be able to:
- Define an inclined plane.
- Explain the function of an inclined plane.

Assessment

Students are able to:
- Explain what an inclined place is.
- State how an inclined plane helps people to make work easier.
- Co-operate and participate well in the activity.



Summary

An **inclined plane** is a simple machine made up of a flat and slanted surface. An inclined plane can help move heavy objects easier from one level to another.

Inclined plane: Ramp

A ramp or a wheelchair ramp are examples of inclined planes.

If we need to move a heavy object from the ground onto the truck, we could use less force to move the object up a ramp than to lift it straight up.

A stronger force is used to lift boxes straight up.

Ramp

A ramp helps move boxes easier.

A ramp is also used as a wheelchair ramp. A ramp makes it easier to push a wheelchair up or down.

Wheelchair Ramp

A ramp makes it easier to push the wheelchair up.

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5

4 Discussion for findings (20 min.)

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

Q:Which way did you need more force to move the tyre to a higher place? (The way without the ramp needs more force.)

Q:Which way did you need less force to move the tyre to a higher place? (The way with the ramp needed less force.)

Q:How did the board make the work easier? (The board helped us to move a tyre easily to a higher place.)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: What is an inclined plane?
  Q: How does an inclined plane make work easier?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:

"Inclined Plane"

Key question

How does an inclined plane work?

Activity:

Lifting up a tyre

Without a board	With a board
It is hard because the tyre is heavy to lift u, etc	It is easy because we just roll the tyre up, etc

Discussion

Q: Which way did you need more force to move the tyre to a higher place?
The way without the ramp needs more force.
Q: Which way did you need less force to move the tyre to a higher place?
The way with the ramp needed less force.
Q: How did the board make the work easier?
The board helped us to move a tyre easily to a higher place.

Summary

- An inclined plane:
  - ➤ Is a simple machine made up of a flat and slanted surface
  - ➤ Helps make it easier to move a heavy object from one level to another.
- Some examples of inclined planes: Stairs, ladder and ramp

Unit	Chapter : **9. Force**	Total lesson No: 84 / 94
Force and Motion	Topic : **9.2. Simple Machine**	Textbook page: 193 - 194

Lesson 10 / 13

Lesson Title

Lever

Preparation

- Pencil (or thin marker), stiff ruler(or wooden bar), book

Lesson Flow

1 Introduction (5 min.)

- Review the previous lesson by asking:

Q:What is an inclined plane?

Q:How does an inclined plane make work easier?

- Explain the introductory statement in the textbook and encourage students to think about a lever by asking:

Q:Have you ever heard about a lever? How does a lever help us to make work easier?

2 Introduce the key question

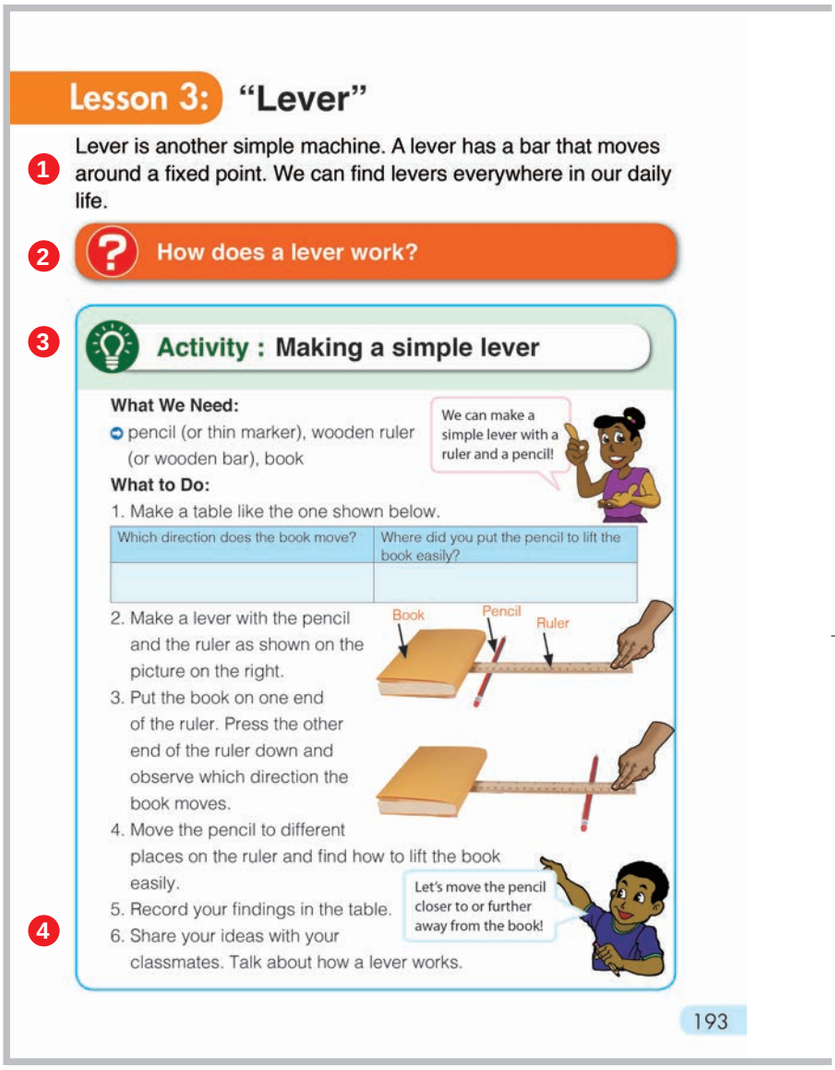
How does a lever work?

3 Activity (25 min.)

- Organise students into groups.
- Explain the steps in the activity.
- Ask students to make a table in their exercise book.
- Have students do the activity and ask them to record their results in the table.
- Advise students to refer to the pictures and the characters' talking in the activity for their investigation.
- After investigation, ask students to discuss how a lever works based on their results in a group.

4 Discussion for findings (25 min.)

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



Lesson 3: "Lever"

1 Lever is another simple machine. A lever has a bar that moves around a fixed point. We can find levers everywhere in our daily life.

2 How does a lever work?

3 Activity : Making a simple lever

What We Need:

pencil (or thin marker), wooden ruler (or wooden bar), book

We can make a simple lever with a ruler and a pencil!

What to Do:

1. Make a table like the one shown below.

Which direction does the book move?	Where did you put the pencil to lift the book easily?

2. Make a lever with the pencil and the ruler as shown on the picture on the right.
3. Put the book on one end of the ruler. Press the other end of the ruler down and observe which direction the book moves.
4. Move the pencil to different places on the ruler and find how to lift the book easily.
5. Record your findings in the table.
6. Share your ideas with your classmates. Talk about how a lever works.

Book Pencil Ruler

Let's move the pencil closer to or further away from the book!

4

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Teacher's Notes

Some examples of levers used everyday and where to identify the fulcrum.

scissors, wheelbarrow and claw hummar

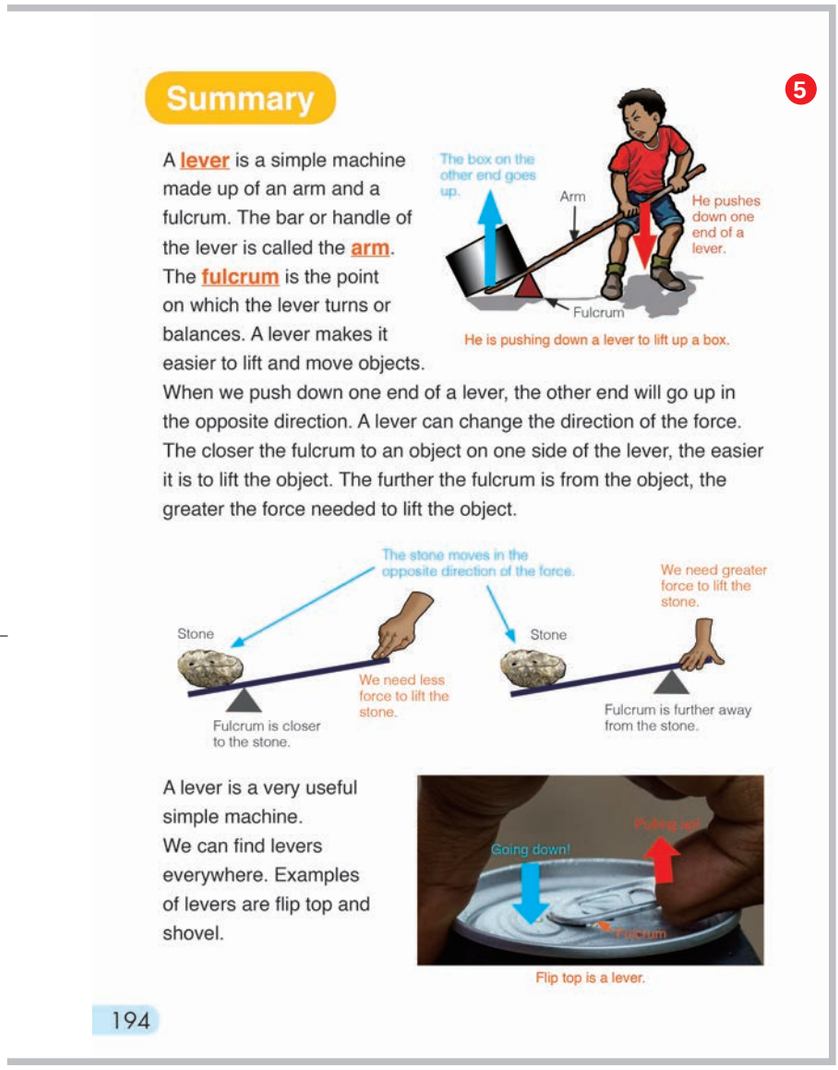
- Fulcrum is the support on which a lever moves when it is used to lift something.
- Other examples of levers are crowbar, tweezers, pliers and tongs.
- Use a real can drink to identify the fulcrum on the flip top.

Lesson Objectives

Students will be able to:
- Define a lever.
- Identify the functions of a lever.
- Observe the relationship between the position of the fulcrum and the amount of force required for to life an object.

Assessment

Students are able to:
- Explain what a lever is.
- State how a lever helps people make work easier.
- Describe how a force necessary for lifting a book is different when the position of a pencil changes.
- Participate in the discussion actively.



- Write down their findings on the blackboard.
- **Based on their findings,** ask the following questions as discussion point.

Q:Which way did the book move when you pressed the end of the ruler? (The book moved upward, it moved to the opposite direction of the force, etc)

Q:What is the difference when you put the pencil closer to or further away from a book? (Less force is needed when the pencil is closer to the book. More force is needed when the pencil is far from the book.)

Q:Do you have a good idea on how we should arrange a lever to lift the book easier? (We should put the pencil closer to the book, etc)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: What is a lever?
  Q: What is a lever made up of?
  Q: How does a lever work?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:

"Lever"

Key question

How does a lever work?

Activity

Making a simple lever

Which direction does a book move?	Where did you put a pencil to lift the book easier?
It goes up, upward, etc	closer to the book, far from hand, etc

Discussion

Q: Which way did the book move when you pressed the end of the ruler?
The book moved upward, it moved to the opposite direction of a force, etc
Q: What is the difference when you put the pencil closer to or further away from a book? Less force is needed when the pencil is closer to the book. More force is needed when the pencil is far from the book.
Q: Do you have a good idea on how we should arrange a lever to lift the book easier? We should put the pencil to closer to the book, etc

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 lever can change the direction of a force.
- The closer a fulcrum to an object, the easier it is to lift the object.
- The further a fulcrum from an object, the greater force need to lift up the object.

Unit	Chapter : **9. Force**	Total lesson No: 85 / 94
Force and Motion	Topic : **9.2. Simple Machine**	Textbook page: 195 - 196

Lesson 11 / 13

Lesson Title

Pulley

Preparation

- Pulley, rope (2-3 metres), a bottle of water (1L)

Lesson Flow

1 Introduction (10 min.)

- Review the previous lesson by asking:

Q:What is a lever?
Q:What is a lever made up of?
Q:How does a lever work?

- By showing a pulley, explain the 'Introduction' part in the textbook and encourage students to think about a pulley by asking:

Q:Have you ever seen a pulley? How does it help us?

2 Introduce the key question

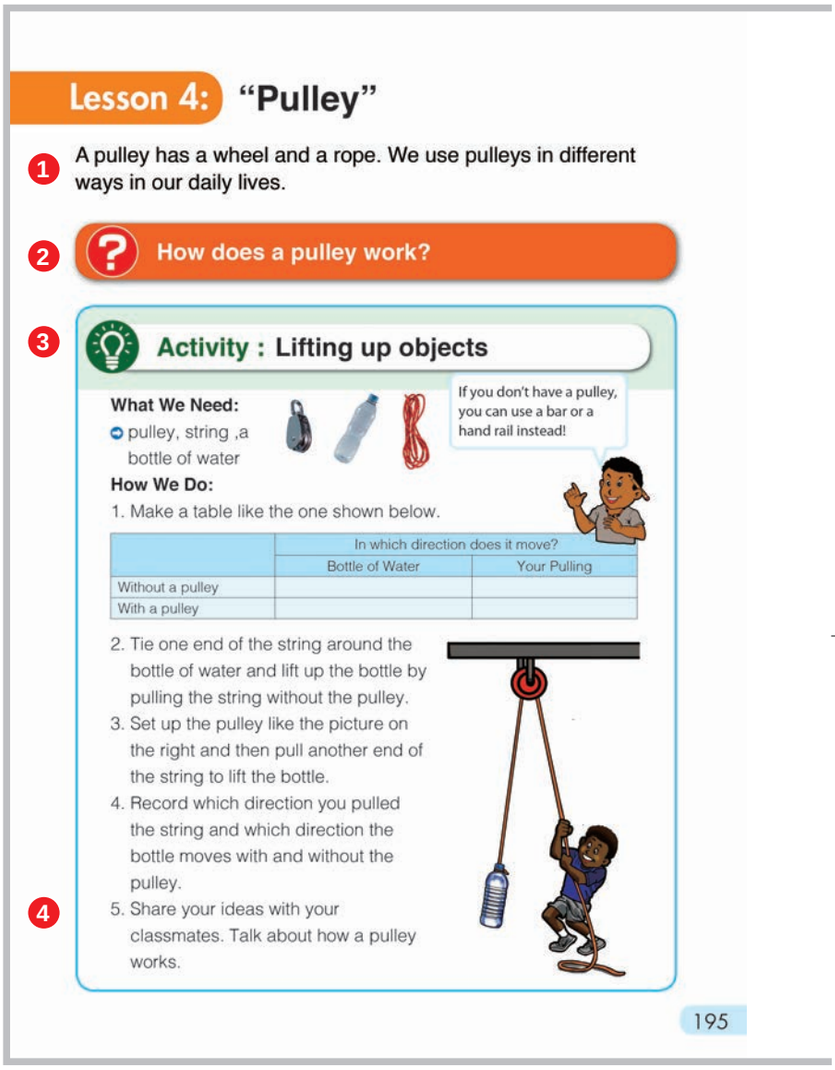
How does a pulley work?

3 Activity (20 min.)

- Organise students into groups.
- Explain the steps in the activity.
- Ask students to make a table in their exercise book.
- Have students do the activity and ask them to record their results in the table.
- Advise students to focus on which direction you pulled and which direction the bottle moved.
- After investigation, ask students to discuss how a pulley works based on their results in a group.

4 Discussion for findings (20 min.)

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



Lesson 4: "Pulley"

1 A pulley has a wheel and a rope. We use pulleys in different ways in our daily lives.

2 How does a pulley work?

3 Activity : Lifting up objects

What We Need:
pulley, string ,a bottle of water

If you don't have a pulley, you can use a bar or a hand rail instead!

How We Do:

1. Make a table like the one shown below.

	In which direction does it move?	
	Bottle of Water	Your Pulling
Without a pulley		
With a pulley		

2. Tie one end of the string around the bottle of water and lift up the bottle by pulling the string without the pulley.
3. Set up the pulley like the picture on the right and then pull another end of the string to lift the bottle.
4. Record which direction you pulled the string and which direction the bottle moves with and without the pulley.
5. Share your ideas with your classmates. Talk about how a pulley works.

4

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Teacher's Notes

WHAT IS A PULLEY?

A pulley is a simple machine made with a rope, belt or chain wrapped around a wheel. The pulley is usually used to lift a heavy object (load).

WHAT DOES A PULLEY DO?

A pulley changes the direction of the force, making it easier to lift things.

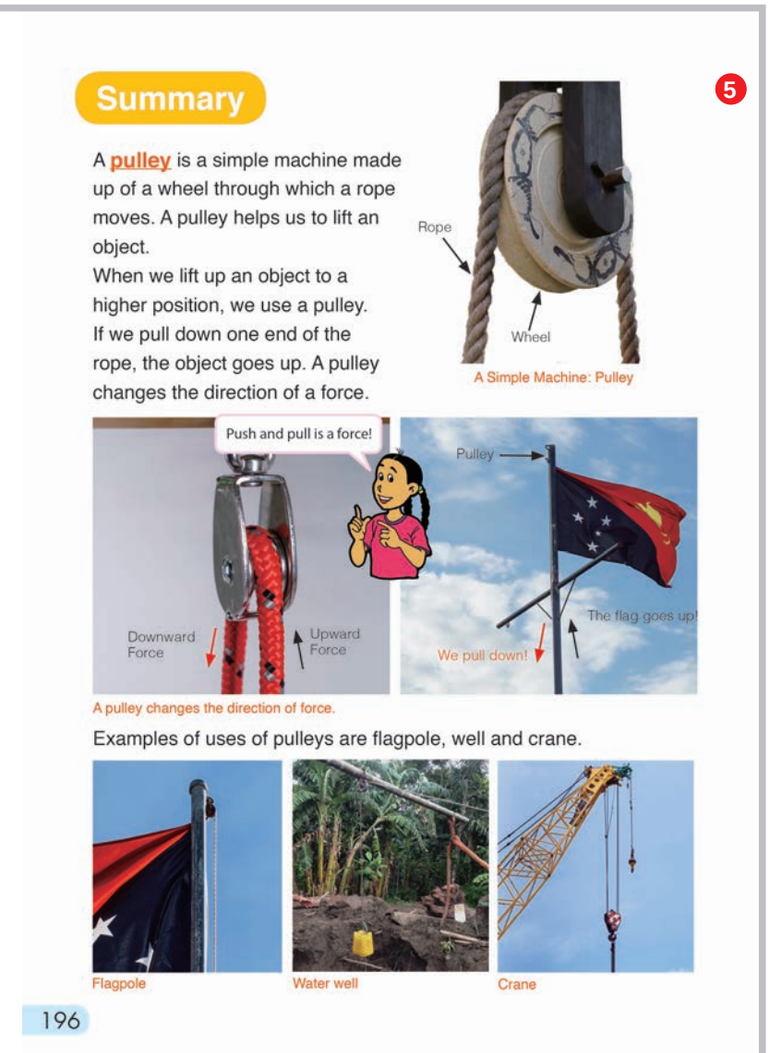
A pulley changes the direction of the lifting force. For example, if you are lifting a heavy object with a single pulley anchored to the ceiling, you can pull down on the rope to lift the object instead of pushing up. The same amount of effort is needed as without a pulley, but it feels easier because you are pulling down.

Lesson Objectives

Students will be able to:
- Define a pulley.
- Identify the functions of a pulley.
- Observe how a pulley changes the direction of force.

Assessment

Students are able to:
- Explain what a pulley is.
- State how a pulley helps people make work easier.
- Record the direction in which the bottle of water is moved with and without using a pulley.
- Investigate the pulley with interest.



Summary

A pulley is a simple machine made up of a wheel through which a rope moves. A pulley helps us to lift an object.
When we lift up an object to a higher position, we use a pulley.
If we pull down one end of the rope, the object goes up. A pulley changes the direction of a force.

Rope
Wheel
A Simple Machine: Pulley

Push and pull is a force!
Downward Force
Upward Force
Pulley
The flag goes up!
We pull down!
A pulley changes the direction of force.

Examples of uses of pulleys are flagpole, well and crane.

Flagpole
Water well
Crane

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- Write down the findings on the blackboard.
- Facilitate active students' discussion.
- Confirm their findings with students.
- **Based on their findings,** ask the following questions as discussion point.

Q:Which way did the bottle move when you pulled the rope with or without a pulley? (Without a pulley, the book moved to the same direction with pulling. With a pulley, the book moved to the opposite direction to pulling.)

Q:Which is easier for you to move a bottle to a higher place, with or without a pulley? (With a pulley)

Q:How does a pulley help? (It helps us to move an object to a higher place.)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: What is a pulley?
  Q: What is a pulley made up of?
  Q: How does a pulley work?
  Q: Where are pulleys used?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:
"Pulley"
Key question
How does a pulley work?
Activity
Lifting up objects

	In which direction does it move?	
	Bottle of water	Your pulling
Without a pulley	Straight up	Up wards with more force
With a pulley	Straight up	downwards with less force

Discussion
Q: Which way did the bottle move when you pulled the rope with or without a pulley?
Without a pulley, the book moved to the same direction with pulling. With a pulley, the book moved to the opposite direction to pulling.
Q: Which is easier for you to move a bottle to a higher place, with or without a pulley?
With a pulley
Q: How does a pulley help?
It helps us to move an object to a higher place.

Summary
- A pulley:
  - Is a simple machine made up of a wheel through which a rope moves.
  - Helps to lift an object to a higher position.
- A pulley changes the direction of a force.
- Pulleys are used in flagpoles, wells and cranes.

Unit
Force and Motion

Chapter : **9. Force**
Topic : **9.2. Simple Machine**

Total lesson No: 86 / 94
Textbook page: 197 - 199

Lesson
12 / 13

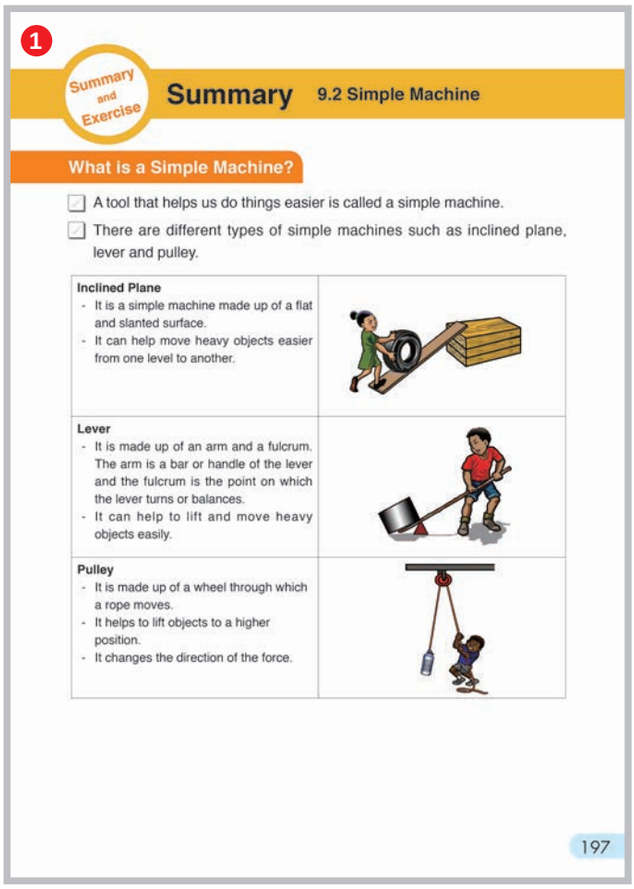
Lesson Title

Summary and Exercise

Tips of lesson

1 Summary (20 min.)

- Recap main learning contents in this topic.
- Ask some questions to students and verify students understanding. Explain and correct learning contents again if they still have misconceptions.
- Provoke student to define what simple machine is and list the different type of simple machines. Define each of them.
- Ask students to give examples of each of the different type of simple machine.



1

Summary and Exercise

Summary 9.2 Simple Machine

What is a Simple Machine?

- A tool that helps us do things easier is called a simple machine.
- There are different types of simple machines such as inclined plane, lever and pulley.

Inclined Plane - It is a simple machine made up of a flat and slanted surface. - It can help move heavy objects easier from one level to another.	
Lever - It is made up of an arm and a fulcrum. The arm is a bar or handle of the lever and the fulcrum is the point on which the lever turns or balances. - It can help to lift and move heavy objects easily.	
Pulley - It is made up of a wheel through which a rope moves. - It helps to lift objects to a higher position. - It changes the direction of the force.	

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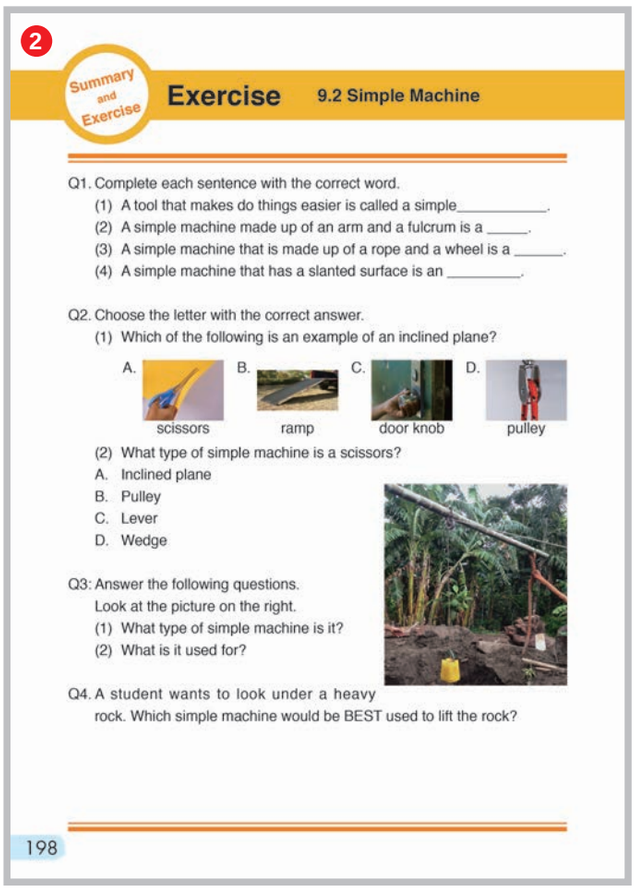
2 Exercise & Explanation (30 min.)

- Allow student to try answering questions individually to check their understanding.
- After the exercise, give them the answers of the questions and explain to justify the answers.



2

Summary and Exercise

Exercise 9.2 Simple Machine

Q1. Complete each sentence with the correct word.
(1) A tool that makes do things easier is called a simple_____.
(2) A simple machine made up of an arm and a fulcrum is a _____.
(3) A simple machine that is made up of a rope and a wheel is a _____.
(4) A simple machine that has a slanted surface is an _____.

Q2. Choose the letter with the correct answer.
(1) Which of the following is an example of an inclined plane?
A. scissors B. ramp C. door knob D. pulley
(2) What type of simple machine is a scissors?
A. Inclined plane
B. Pulley
C. Lever
D. Wedge

Q3: Answer the following questions.
Look at the picture on the right.
(1) What type of simple machine is it?
(2) What is it used for?

Q4. A student wants to look under a heavy rock. Which simple machine would be BEST used to lift the rock?

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Exercise answers

Q1.
(1) **machine**
(2) **lever**
The bar or handle of the lever is the arm and the fulcrum is the point on which the lever turns or balances.
(3) **pulley**
The pulley helps us to lift an object to a higher position.
(4) **inclined plane**
An incline plane can help move heavy objects easier from one level to another.

Q2.
(1) **B**
Scissor and wheelbarrow are levers and knife is a wedge which will be learnt in grade 4, and a ramp is an incline plane.
(2) **C**
Scissor is a lever because it has handles (arm) and a balance in the middle (fulcrum).

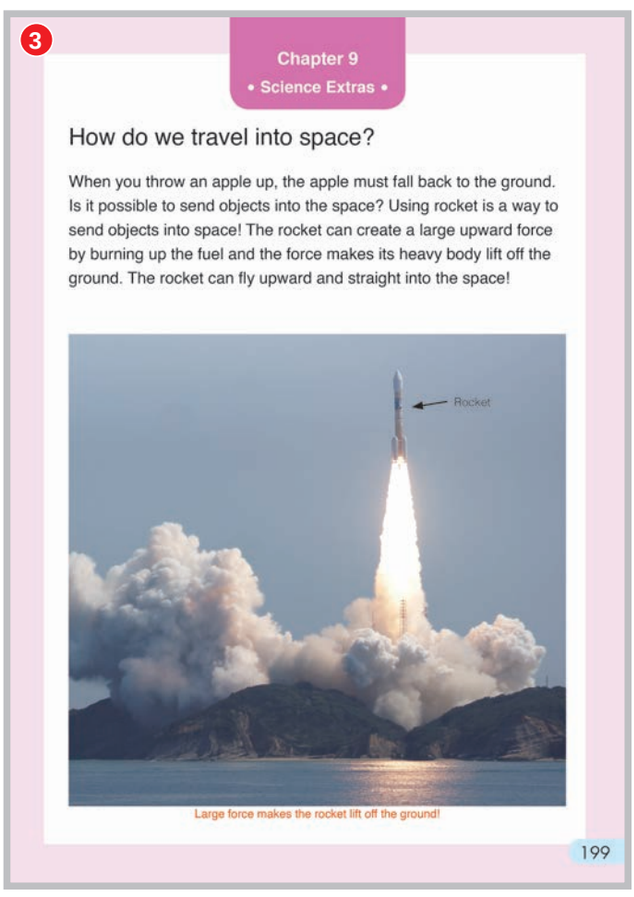
Q3.
(1) **Pulley**
(2) **It is used to lift objects such as containers and bigger objects.**
The picture shows a crane. A crane is a pulley used to lift objects such as containers or bigger objects to a higher position. This is seen at construction sites or at the wharf.

Q4. **lever**
To lift a heavy rock, you will need a crowbar or iron stick which acts as a lever to easily lift the rock.

Explanation of Science Extras

3 Science Extras (10 min.)

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



Lesson
13 / 13

Lesson Title

Chapter Test

Answer of the Chapter Test

Chapter Test

9. Force

Q1 Complete each sentence with the correct word.

(1) A push or a pull is called a ___force___.

(2) A force that makes an object slow down and stop when two surfaces of objects are rubbed against each other is called ___friction___.

(3) There are different types of simple ___machine___ such as lever, pulley and inclined plane.

(4) How fast or slow an object moves is called ___speed___.

Q2 Choose the letter with the correct answer.

(1) What must be applied to make objects move?

(A) Direction
B. Force
C. Speed
D. Distance

(2) When you release a ball from your hand, which force causes the ball to fall back to the ground?

(A) Friction
B. Gravity
C. Magnetism
D. Electricity

(3) How does a simple machine make work easier?

(A) Takes less force to move something heavy.
B. Changes the weight of something heavy.
C. Improves the way something looks.
D. Makes something become a different shape.

(4) A slide and a ramp are examples of what type of simple machine?

A. Lever
B. Pulley
C. Wedge
(D) Inclined plane

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(5) Which of the followings is not an explanation about force?

A. A force can make an object slow down.

B. A force can start to move an object.

C. A force can change the colour of an object.

D. A force can change the direction of a moving object.

Q3

(1) Look at the picture on the right. Paul pulls down on the rope of the pulley. In which direction does the bottle move?

the bottle moves in an upward direction

(2) Samuel is pushing a wheelbarrow. When he puts some heavy objects on it, does he need to apply larger force or smaller force to move the wheelbarrow?

larger force is needed to move a heavy object.

Q4

(1) How does an inclined plane make work easier?

An inclined plane can help move heavy objects easier from one level to another

(2) Friction can be useful for our life. Suggest two examples of what would happen if there is no friction in our daily life?

(example) We cannot grip a pen.

We cannot stop quickly on the ground.

We cannot grip a cup, etc.

Strand : EARTH AND SPACE
Unit : OUR EARTH

Chapter 10. The Earth

Chapter Objectives

Students will be able to understand the components of the Earth surface such as water and land structures and properties of rock and minerals.

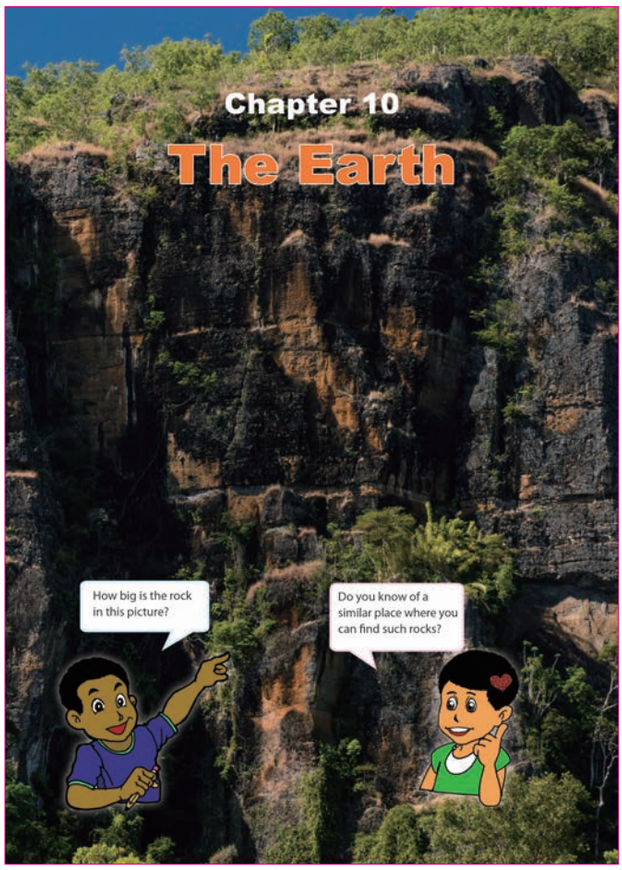
Students will be able to observe the different components in the soil.

Topic Objectives

10.1 Surface of the Earth

Students will be able to;

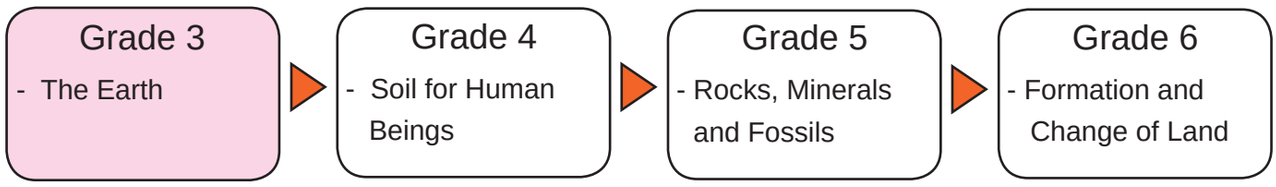
- State that water and land cover the Earth's surface.
- Describe rocks in the appearance and the hardness.
- List the components of soil such as sand, clay, water, pieces of dead parts of plants and animals.
- Compare the properties of sandy, loamy and clay soil.
- Describe the importance of soil for plants and animals to live and grow.



Picture in the chapter heading in the textbook shows a cliff of a mountain area exposing large rocks.

Related Learning Contents

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



Teaching Overview

This chapter consists of 7 lessons, each lesson is a double period.

Topic	Lesson No.	Lesson Title and Key Question	Content standard in syllabus	Textbook page number
10.1 Surface of The Earth	1	**Covering the Earth** What is the surface of the Earth covered with?	3.3.1 3.3.2 3.3.3	203 - 204
	2	**Rocks** What is a rock?		205 - 206
	3	**Soil around Us** What is soil made of?		207 - 208
	4	**Properties of Soil** What properties do soils have?		209 - 210
	5	**Importance of Soil for Plants and Animals** Why is soil important for plants and animals?		211 - 212
	6	Summary and Exercise		213 - 215
Chapter Test	7	Chapter Test		216 -217

Unit	Chapter : **10. The Earth**	Total lesson No: 88 / 94
Our Earth	Topic : **10.1. Surface of the Earth**	Textbook page: 203 - 204

Lesson 1 / 7

Lesson Title

Covering the Earth

Preparation

Nil

Lesson Flow

1 Introduction (10 min.)

- Encourage students to think about the Earth by asking the questions:

Q: Where do all living things live?
Q:What do you know about our Earth?
Q:What is the Earth? Today we're going to study about the earth.

2 Introduce the key question

What is the surface of the Earth covered with?

3 Activity (20 min.)

- Organise students into groups.
- Explain the steps of the activity.
- Have students do the activity.
- Advise students to refer to the pictures below the activity and the characters' talking for their investigation.
- Check students' activity in each group.
- Give enough time for the students to do their findings.
- After investigation, ask students to discuss what the surface of the Earth is covered with based on their findings in a group.

4 Discussion for findings (20 min.)

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

(Continue)

10.1 Surface of The Earth

Lesson 1: "Covering the Earth"

1 We live on the Earth. Plants and animals also live on the Earth. It is important for living things. What is Earth? Let's study the Earth.

2 What is the surface of the Earth covered with?

3 Activity : Earth's surface

What to Do:

1. Look at the picture below. The picture shows our Earth taken from space.
2. Think about the following questions when observing the Earth carefully:
   - We can see different colours of different parts on the Earth. The white parts show the clouds. What do the green and brown parts show?
   - What is the blue part on the Earth?
   - Which part covers the surface of the Earth more, the green and brown parts or the blue part?
3. Share your ideas with your classmates. Talk about what the surface of our Earth is covered with.

Can you find where Papua New Guinea is?

PNG is the green part and is surrounded by the blue part! What is the blue part?

4

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Teacher's Notes

Definitions:

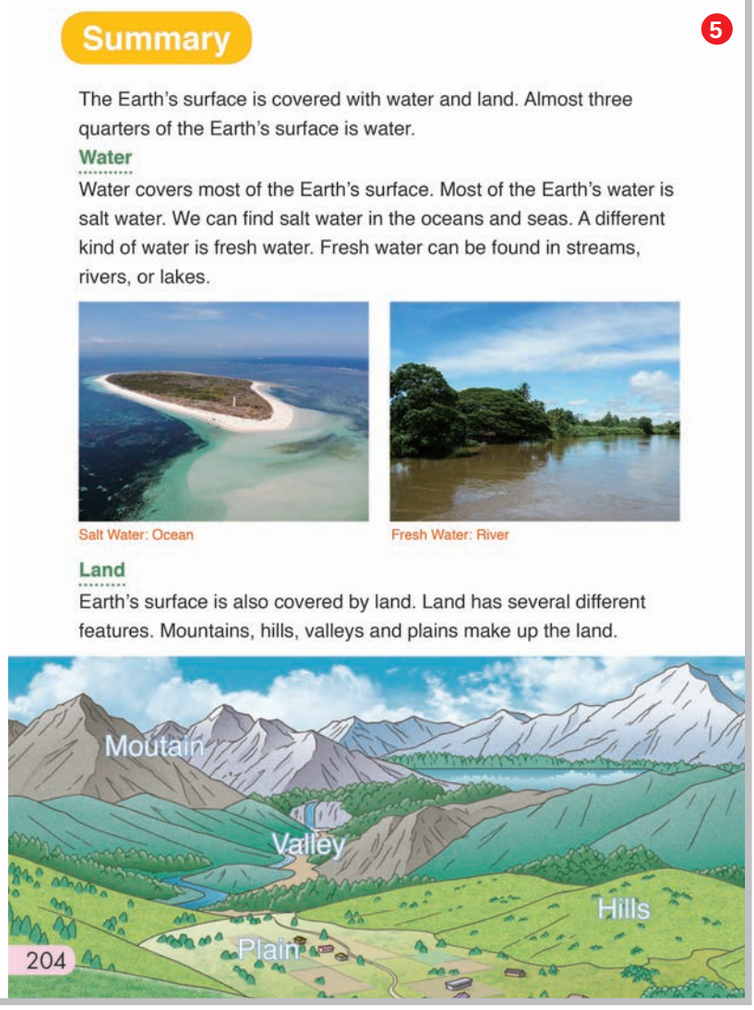
1. **Canyon**- Two steep cliffs with a valley that runs through it.
2. **Plateau**- is a **flat**, elevated landform that rises sharply above the surrounding area on at least one side.
3. **Basin**- A basin landform consists of an area of land, usually like a smaller prairie, enclosed by higher land such as **hills** and **mountains**.
4. **Tributary**- a river or stream flowing into a larger river or lake.
5. **A mountain range** or hill **range** is a series of **mountains** or hills ranged in a line and connected by high ground.
6. **Glacier**- is an accumulation of snow and ice that has grown sufficiently so that it can move downhill by the force of gravity. Pressure generated at the bottom of a glacier is high enough to cause ice to melt, even in very cold freezing temperatures. This permits a glacier to move very slowly downhill.

Lesson Objectives

Students will be able to:
- Identify what covers the Earth's surface.
- Describe the different kinds of water and the different features of land.

Assessment

Students are able to:
- Explain that the Earth's surface is covered by water and land.
- State the different kinds of water on the Earth such as salt and fresh water.
- State the different features of land such as mountains, hills and valleys.
- Active participation and discussion with classmates.



Summary 5

The Earth's surface is covered with water and land. Almost three quarters of the Earth's surface is water.

Water

Water covers most of the Earth's surface. Most of the Earth's water is salt water. We can find salt water in the oceans and seas. A different kind of water is fresh water. Fresh water can be found in streams, rivers, or lakes.

Salt Water: Ocean

Fresh Water: River

Land

Earth's surface is also covered by land. Land has several different features. Mountains, hills, valleys and plains make up the land.

204

- Facilitate active students' discussion.
- Confirm findings with students.
- **Based on their findings,** asks the following questions.

Q:What covers the Earth's surface? (Water and land)

Q:What covers most of the Earth's surface? (Water. That includes salt water and fresh water.)

Q:Where can we find fresh water? (In rivers, streams and lakes)

Q:Where is salt water found? (In oceans and seas)

Q:What do you find on land? (Mountains, forests, hills, valleys and flat places)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: What is the surface of the Earth covered with?
  Q: What kinds of water can we find on the Earth?
  Q: What are different features of land?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:

"Covering the Earth"

Key question

What is the surface of the Earth covered with?

Activity: Earth's Surface

1. What are the green and brown parts?
Green parts is land covered with plants, Brown parts is land not covered by plants.etc
2. What is the blue part on the Earth?
Water, oceans, sea, etc
3. Which part covers more of the Earth's surface?
The blue part covers most of the Earth's surface.

Discussion

Q: What covers the Earth's surface?
Water and land
Q: What covers most of the Earth's surface? Water. That includes salt water and fresh water.
Q: Where can we find fresh water?
In rivers, streams and lakes
Q: Where is salt water found?
In oceans and seas
Q. What do you find on land?
Mountain, forest, hill, valley, flat places etc.

Summary

- Earth's surface is covered with land and water.
- Water:
  - Water covers most of the earth's surface.
  - There are two kinds of water; salt and fresh water.
  - Most of Earth's water is salt water.
  - Salt water can be found in oceans and sea.
  - Fresh water can be found in river or lake
- Land
  - Land has different features such as: Mountains, hills, valleys and flat places make up land.

Unit	Chapter : **10. The Earth**	Total lesson No: 89 / 94
Our Earth	Topic : **10.1. Surface of the Earth**	Textbook page: 205 - 206

Lesson 2 / 7

Lesson Title

Rocks

Preparation

- Different kinds of rock samples, Hand lens, coloured pencils

Lesson Flow

1 Introduction (10 min.)

- Review previous lesson by asking:

Q:What is the surface of the Earth covered with?

Q:What kinds of water can we find on the Earth?

Q:What are different features of land?

- By showing two different rocks, encourage students to think about the rocks by asking:

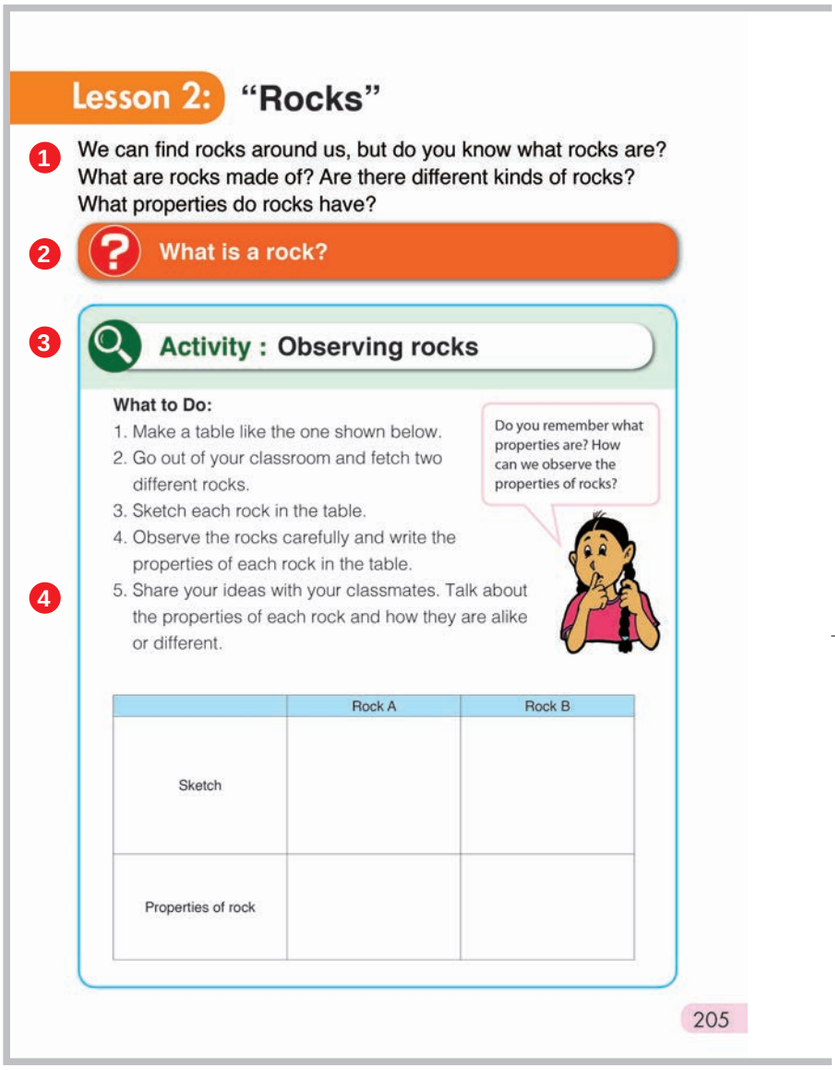
Q:What are these? How are they different or alike? What are they made of?

2 Introduce the key question

What is a rock?

3 Activity (30 min.)

- Organise students into some groups.
- Explain the steps of the activity.
- Inform students on the ground rules for outside activity.
- Let students go outside and fetch some different kinds of rocks.
- Ask students to sketch the rocks and record the properties of rocks.
- Check students' activity in each group.
- After observation, ask students to discuss what properties each rock has and how they are alike or different based on their findings in a group.



Lesson 2: "Rocks"

1 We can find rocks around us, but do you know what rocks are? What are rocks made of? Are there different kinds of rocks? What properties do rocks have?

2 What is a rock?

3 Activity : Observing rocks

What to Do:

1. Make a table like the one shown below.
2. Go out of your classroom and fetch two different rocks.
3. Sketch each rock in the table.
4. Observe the rocks carefully and write the properties of each rock in the table.
5. Share your ideas with your classmates. Talk about the properties of each rock and how they are alike or different.

4

Do you remember what properties are? How can we observe the properties of rocks?

	Rock A	Rock B
Sketch		
Properties of rock		

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Teacher's Notes

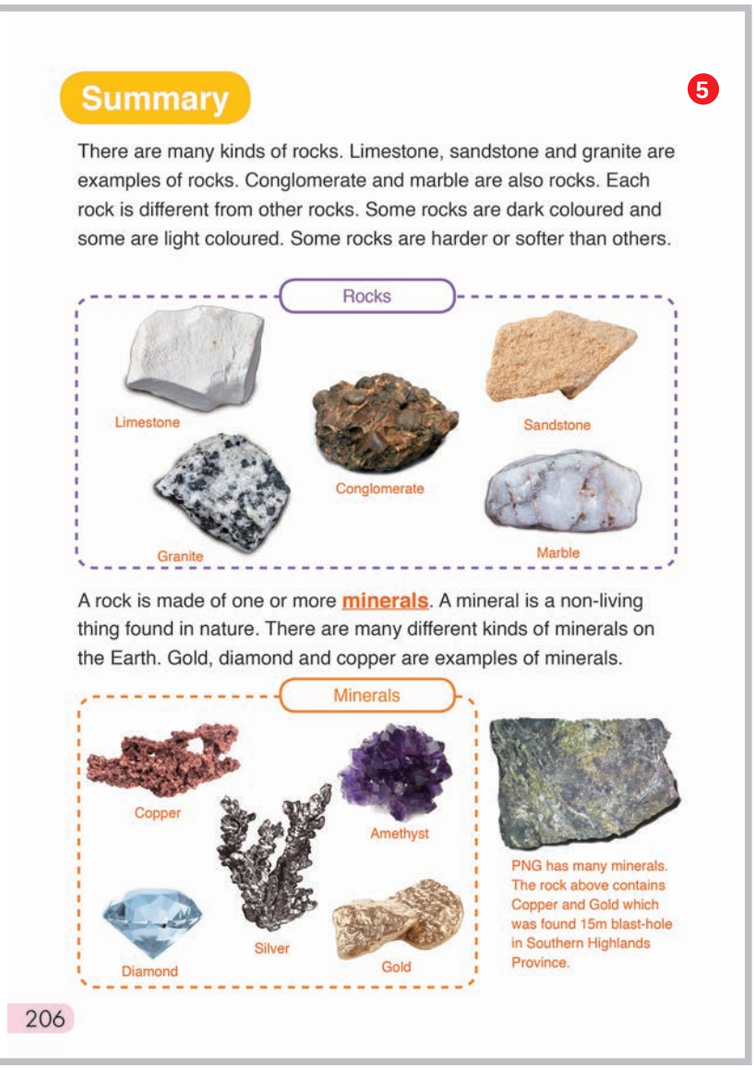
- Refer to teacher's guide for Grade 5, Chapter 'Rocks, Minerals and Fossils' for more information.
- Students may use 'stone' when they call objects introduced in the textbook. Generally, the word 'stone' is used for both rocks and minerals. However, they should be distinguished scientifically, the textbook uses 'rock' and 'mineral' to clearly differentiate them.
- A rock is a mixture of naturally occurring substance made up of two or more minerals in general.
- A mineral is a pure substance meaning it is composed of the same substance throughout.
- Note for minerals introduced in the textbook
  - Copper is a typical common metal used in our daily life. It is one of the major exports in PNG.
  - Gold is known as the most valuable metal being used 5,000 years ago. It was used as currency, but about a half of total annual production of gold is used for jewellery now a day. It is the top export-product in PNG.
  - Diamond is a crystal of carbon which has the highest hardness among substance in nature. Diamonds are used in jewellery. A diamond in a jewellery shown in the textbook is a polished one. It is also used as a grinder or a cutter in industries because of its hardness.

Lesson Objectives

Students will be able to:
- Observe the properties of rocks using their senses.
- Identify the different kinds of minerals.

Assessment

Students are able to:
- List the properties of rocks such as colour, texture and the size of minerals in a table.
- State the different kinds of minerals.
- Investigate the properties of rocks with interest.



Summary 5

There are many kinds of rocks. Limestone, sandstone and granite are examples of rocks. Conglomerate and marble are also rocks. Each rock is different from other rocks. Some rocks are dark coloured and some are light coloured. Some rocks are harder or softer than others.

Rocks

Limestone

Sandstone

Conglomerate

Granite

Marble

A rock is made of one or more **minerals**. A mineral is a non-living thing found in nature. There are many different kinds of minerals on the Earth. Gold, diamond and copper are examples of minerals.

Minerals

Copper

Amethyst

Silver

Diamond

Gold

PNG has many minerals. The rock above contains Copper and Gold which was found 15m blast-hole in Southern Highlands Province.

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4 Discussion for findings (20 min.)
- Ask students to present their findings from the activity.
- Write students findings on the blackboard.
- Facilitate active students' discussion.
- **Based on their findings,** ask the following questions as discussion points.

Q:How are Rock A and Rock B different? (They look different in terms of texture, colour, size and weight, etc)

Q:Are Rock A and Rock B the same kind of rocks or not? Why do you think so? (They are different rocks. Texture, hardness, colour, size of particles are different, etc)

Q:How can we group rocks? (We can group rocks based on their properties, etc)

- Conclude the discussion

5 Summary (10 min.)
- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask the these questions as assessment:
  Q: How can we group rocks?
  Q: What are rocks made of?
  Q: What is a mineral?
  Q: What are examples of minerals?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Black board Plan

Title:
"Rocks"
Key question
What is a rock?
Activity: Observing rocks

	Rock A	Rock B
Properties of Rocks	Smooth Heavy Brown Big Contain small particles	Rough Light White Small

Discussion
Q: How are Rock A and Rock B different?
They look different in terms of texture, colour, size and weight, etc
Q: Are Rock A and Rock B the same kind of rocks or not? Why do you think so?
They are different rocks. Texture, hardness, colour, size of particles are different, etc
Q: How can we group rocks?
We can group rocks based on their properties, etc.

Summary
- There are many kinds of rocks.
- Rocks can be grouped based on their properties such as colour, hardness and the size of particles.
- Examples of rocks: Limestone, sandstone, granite, conglomerate and marble
- A rock is made of one or more minerals.
- A mineral is a non-living thing found in nature.
- There are many different kinds of minerals on the Earth such as Gold, diamond and copper.

Unit	Chapter : **10. The Earth**	Total lesson No: 90 / 94
Our Earth	Topic : **10.1. Surface of the Earth**	Textbook page: 207 - 208

Lesson 3 / 7

Lesson Title

Soil around Us

Preparation

- Clear plastic bottle, Soil, Water

Lesson Flow

1 Introduction (10 min.)

- Review previous lesson:

Q:How can we group rocks?
Q:What are rocks made of?
Q:What is a mineral?
Q:What are examples of minerals?

- By showing soil, encourage students to think about soil and ask.

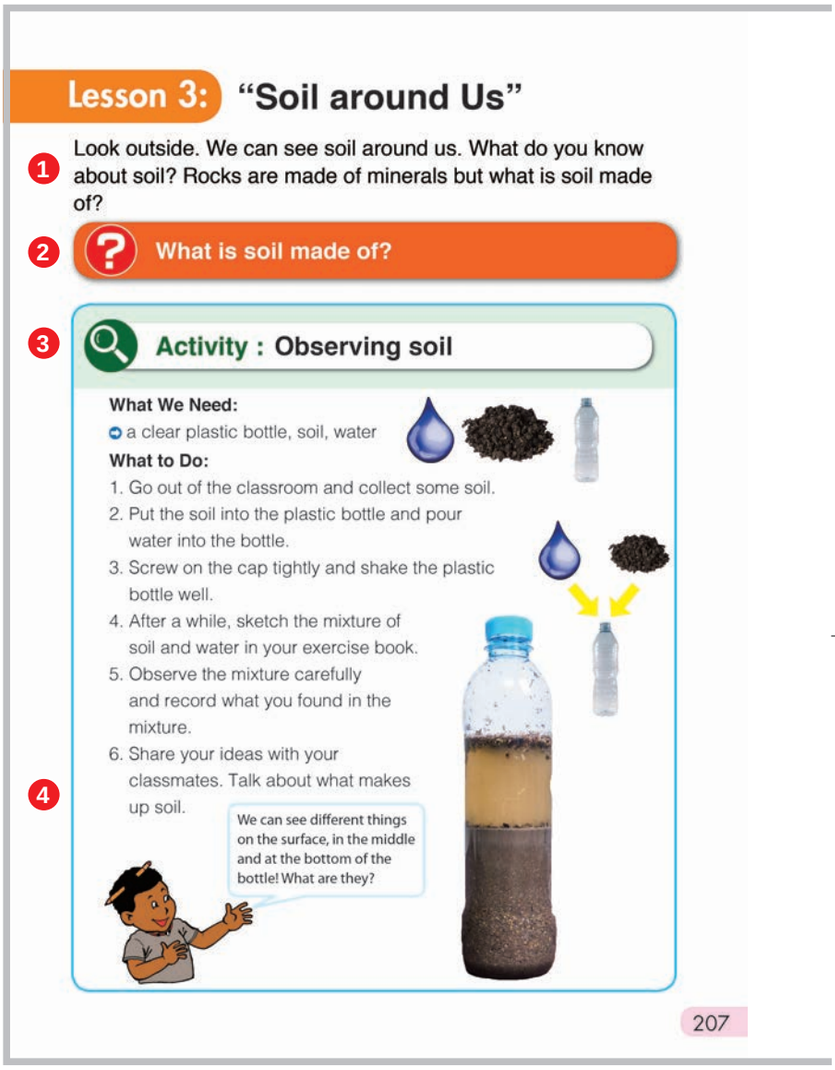
Q:Rocks are made of minerals but what is soil made of?

2 Introduce the key question

What is soil made of?

3 Activity (20 min.)

- Organise students into groups.
- Explain the steps of the activity.
- Have students to do the activity.
- Let them observe carefully what happens when water is poured into the plastic bottle before shaking it. (Bubbles represent air in soil can be observed.)
- After shaking, leave the bottle for about 10-15 minutes until the components settle down.
- Let students predict what makes up a soil while they are waiting for the settling of soil.
- Have students observe the mixture and record what they find in it.
- Ask students to discuss what makes up soil in a group.



Lesson 3: "Soil around Us"

1 Look outside. We can see soil around us. What do you know about soil? Rocks are made of minerals but what is soil made of?

2 What is soil made of?

3 Activity : Observing soil

What We Need:
- a clear plastic bottle, soil, water

What to Do:
1. Go out of the classroom and collect some soil.
2. Put the soil into the plastic bottle and pour water into the bottle.
3. Screw on the cap tightly and shake the plastic bottle well.
4. After a while, sketch the mixture of soil and water in your exercise book.
5. Observe the mixture carefully and record what you found in the mixture.
6. Share your ideas with your classmates. Talk about what makes up soil.

4

We can see different things on the surface, in the middle and at the bottom of the bottle! What are they?

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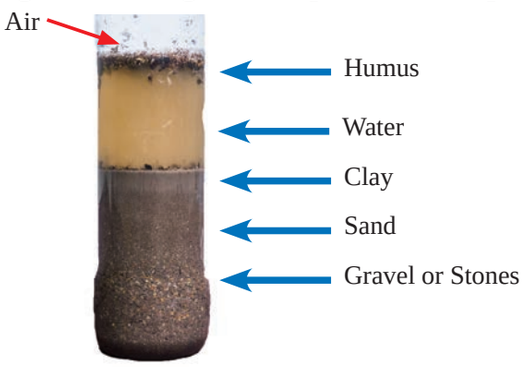
Teacher's Notes

A diagram showing an example of the components of soil



Components of soil

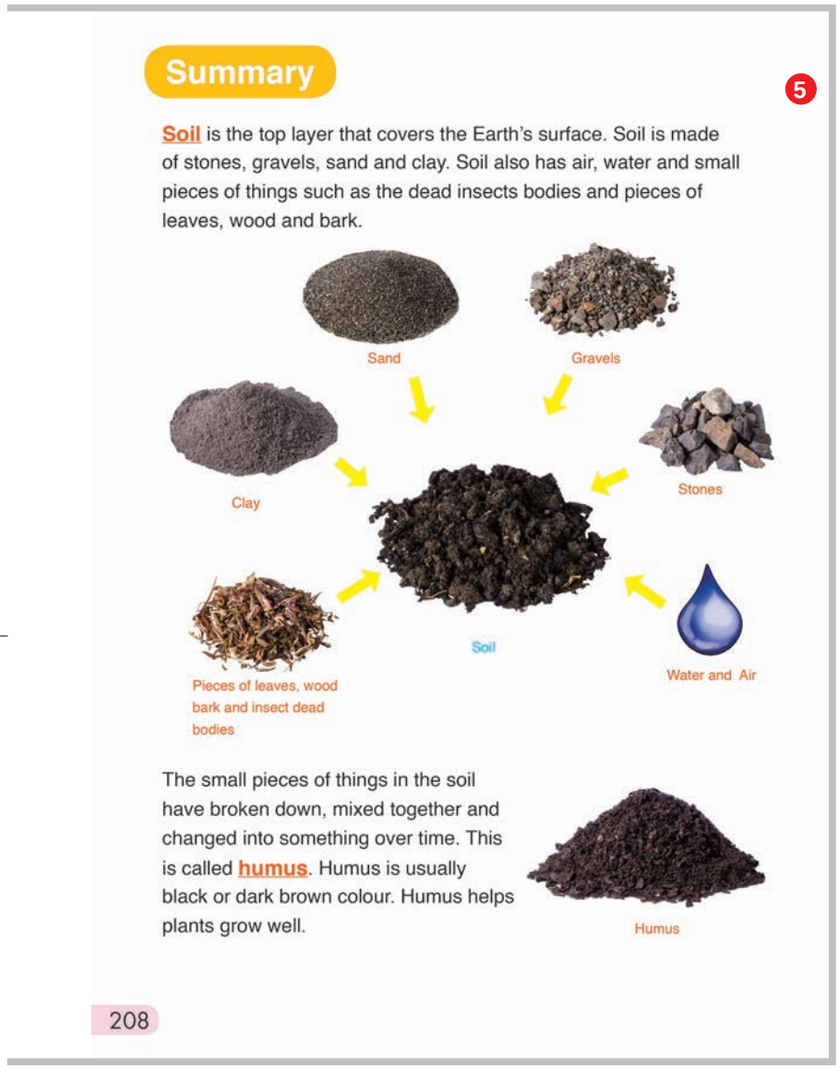
Soil is a mixture of weathered (grounded up and chemically changed) rock and organic matter. Living and dead plant material, manure, etc. This mixture is not solid, but contains many holes or pores. These holes contain air or water, depending upon the type of soil and the weather. In clay soil after rain many holes are full of water, but in sandy soil the water drains away leaving most holes full of air.

Lesson Objectives

Students will be able to:
- Identify the components of soil.
- Observe a mixture of soil and water.

Assessment

Students are able to:
- Describe what soil is made from such as stones, gravels, sand, clay, air, water and small pieces of dead insects' bodies, pieces of a leaves, wood and bark.
- Record what makes up soil based on observation in a table.
- Eager to investigate the components of soil.



Summary

5

Soil is the top layer that covers the Earth's surface. Soil is made of stones, gravels, sand and clay. Soil also has air, water and small pieces of things such as the dead insects bodies and pieces of leaves, wood and bark.

The small pieces of things in the soil have broken down, mixed together and changed into something over time. This is called **humus**. Humus is usually black or dark brown colour. Humus helps plants grow well.

Humus

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4 Discussion for findings (20 min.)

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

Q:What happened when water was added to the soil? (Bubbles were seen, bubbles came from the soil, etc)

Q:What did you find on or near the surface of the water? (Dead plants and animals, etc)

Q:What did you find at the bottom of the water? (Gravels, stones, clay, sand, etc)

Q:What is soil made of? (Air, stones, sand, clay, dead plants and animals, etc)

- Conclude the discussion

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: What is soil?
  Q: What is soil made of?
  Q: What is humus?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:

"Soil around us"

Key question

What is soil made of?

Activity

Observing Soil

What did you observe?
1. Bubbles
2. stones
3. Dead plants 4. Water 5. Dead animals, etc

Discussion

Q: What happened when water was added to the soil?

Bubbles were seen, bubbles came from the soil, etc.

Q: What did you find on or near the surface of the water?

Dead plants and animals, etc.

Q: What did you find at the bottom of the water?

Gravels, stones, clay, sand, etc.

Q: What is soil made of?

Air, stones, sand, clay, dead plants and animals, etc.

Summary

- A soil is the top of layer that covers Earth's surface.
- Soil is made of the following things: Sand, clay, pebbles, stones, water, air, dead insects bodies and pieces of a leaf, wood, bark
- Humus is small pieces of things broken down, mixed together and changed into something over time.

Unit	Chapter : **10. The Earth**	Total lesson No: 91 / 94
Our Earth	Topic : **10.1. Surface of the Earth**	Textbook page: 209 - 210

Lesson 4 / 7

Lesson Title

Properties of Soil

Preparation

- 3 types of soil, water, 3 plastic bottles, cloth and rubber bands

Lesson Flow

1 Introduction (10 min.)

- Review previous lesson by asking:

Q:What is soil?

Q:What is soil made of?

- By showing three kinds of soil, encourage students to think about the properties of soil and ask:

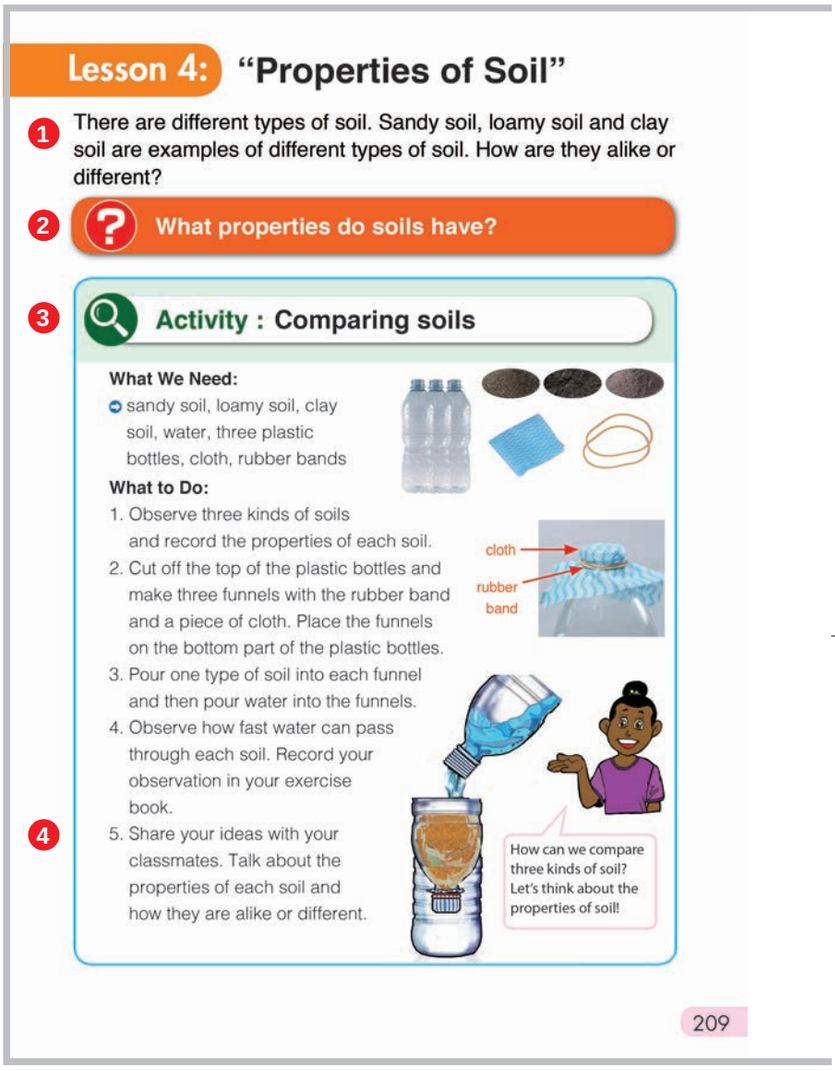
Q:These are sandy soil, loamy soil and clay soil. How are they alike or different?

2 Introduce the key question

What properties do soils have?

3 Activity (20 min.)

- Organise students into groups.
- Explain the steps of the activity.
- Instruct students to pay attention to the cut edge of the bottle during activity.
- Have students do the activity and record their observations in their exercise books.
- Advise students to refer to the illustrations and the character talking in the activity for their investigation.
- Water must be poured into three funnels at the same time in order to compare how fast water can pass through the soils.
- After investigation, ask students to discuss the properties of each soil and how they are alike or different in a group.



Lesson 4: "Properties of Soil"

1 There are different types of soil. Sandy soil, loamy soil and clay soil are examples of different types of soil. How are they alike or different?

2 What properties do soils have?

3 Activity : Comparing soils

What We Need:

sandy soil, loamy soil, clay soil, water, three plastic bottles, cloth, rubber bands

What to Do:

1. Observe three kinds of soils and record the properties of each soil.
2. Cut off the top of the plastic bottles and make three funnels with the rubber band and a piece of cloth. Place the funnels on the bottom part of the plastic bottles.
3. Pour one type of soil into each funnel and then pour water into the funnels.
4. Observe how fast water can pass through each soil. Record your observation in your exercise book.
5. Share your ideas with your classmates. Talk about the properties of each soil and how they are alike or different.

4

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Teacher's Notes

Table showing properties of the three types of soil

Properties	Sandy	Loamy	Clay
Colour	White or light grey	Black	White, brown, red or yellow
How it feels	Dry	Soft and dry	Sticky and smooth
Size of particles	Large	Different sizes (medium)	Small
If any	Drains out water very quickly	- Made up of humus - More fertile - Has a tight hold on water, but let water pass through well	Holds a lot of water. Water passes slowly.

- Soil colour is produced by the minerals present and by the organic matter content.
- Loamy soil retains a moderate (average) amount of water because of its medium size particles.

Lesson Objectives

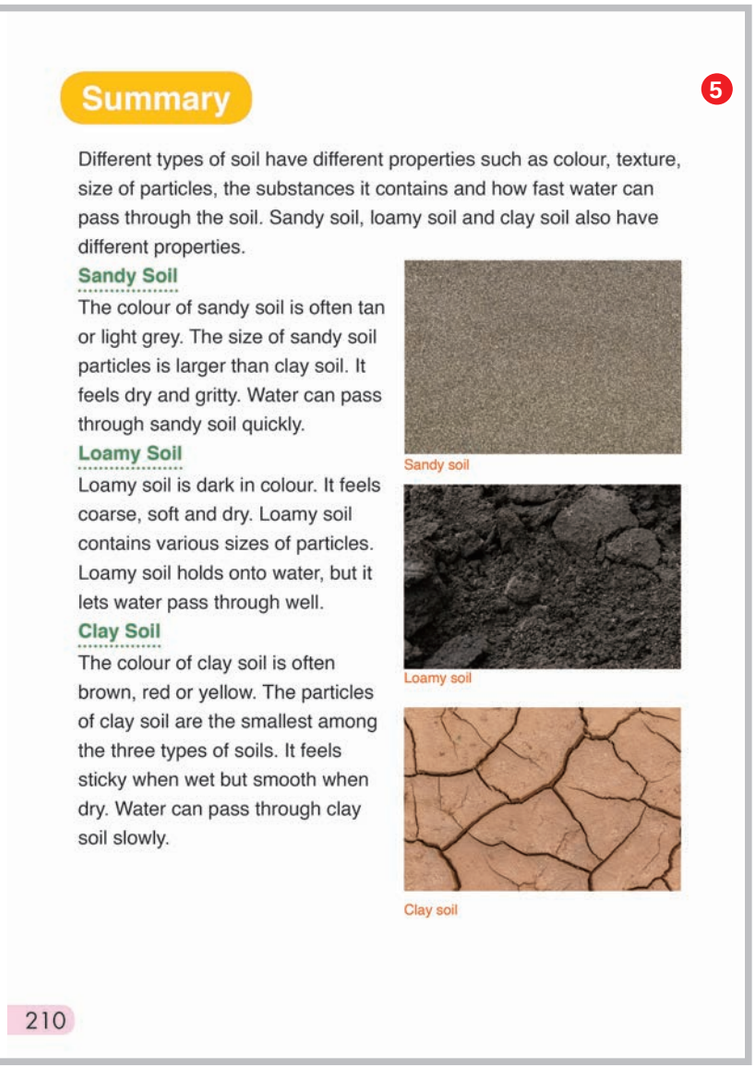
Students will be able to:

- Identify the properties of sandy, clay and loamy soil.
- Observe how fast water passes through each type of soil.

Assessment

Students are able to:

- Describe the properties of sandy, clay and loamy soil based on colour, texture, the size of particles and how fast water can pass through them.
- Compare the speed of water that can pass through sandy, clay and loamy soil.
- Investigate the properties of soil with interest.



Summary

Different types of soil have different properties such as colour, texture, size of particles, the substances it contains and how fast water can pass through the soil. Sandy soil, loamy soil and clay soil also have different properties.

Sandy Soil

The colour of sandy soil is often tan or light grey. The size of sandy soil particles is larger than clay soil. It feels dry and gritty. Water can pass through sandy soil quickly.

Loamy Soil

Loamy soil is dark in colour. It feels coarse, soft and dry. Loamy soil contains various sizes of particles. Loamy soil holds onto water, but it lets water pass through well.

Clay Soil

The colour of clay soil is often brown, red or yellow. The particles of clay soil are the smallest among the three types of soils. It feels sticky when wet but smooth when dry. Water can pass through clay soil slowly.

Sandy soil

Loamy soil

Clay soil

210

5

4 Discussion for findings (20 min.)

- Ask students to present their findings from the activity.
- Write students findings on the blackboard.
- **Based on their findings,** ask the following questions as discussion points.

Q:How are three kinds of soil different?
(The colour, texture and the size of particles are different.)

Q:Which soil can water pass through fastest or slowest? (Fastest: Sandy soil, Slowest: Clay soil)

Q:Can you guess why water can pass through sandy soil faster than clay soil? (This is because the size of particles are different. Sandy soil particles are larger than clay soil particles.)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: How can we classify different types of soil?
  Q: Explain the properties of sandy, clay and loamy soil.
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:

"Properties of Soil"

Key question

What properties do soils have?

Activity: Comparing Soils

Results:

1. The properties of each soil:

Sandy soil: White or light grey, rough, dry, etc

Loamy soil: Black, Soft and dry, different size, etc

Clay soil: brown, red or yellow, wet, small, etc

2. How fast did water pass through?

Sandy soil: Water can pass through fastest.

Loamy soil: Water can pass through, but slower.

Clay soil: Water cannot pass through.

Discussion

Q: How are three kinds of soil different?

The colour, texture and the size of particles are different.

Q: Which soil can water pass through fastest or slowest?

Fastest: Sandy soil, Slowest: Clay soil

Q: Can you guess why water can pass through sandy soil faster than clay soil?

This is because the size of particles are different. Sandy soil particles are larger than clay soil particles.

Summary

- There are different kinds of soil such as sandy, loamy and clay soil.
- Soils can be classified based on their properties such as:
  - Colour
  - Size of particles
  - Texture
  - Substances it contains
  - How fast water can pass through

Types of Soil	Properties
Sandy	(Write the properties)
Loamy	(Write the properties)
Clay	(Write the properties)

Unit	Chapter : **10. The Earth**	Total lesson No: 92 / 94
Our Earth	Topic : **10.1. Surface of the Earth**	Textbook page: 211 - 212

Lesson 5 / 7

Lesson Title

Importance of Soil for Plants and Animals

Preparation

- Nil

Lesson Flow

1 Introduction (10 min.)

- Review previous lesson by asking:

Q:How can we classify different types of soil?

Q:Explain the properties of sandy, clay and loamy soil.

- Encourage students to think about the importance of soil and ask:

Q:Soil is a non-living thing. How do living things depend on soil?

2 Introduce the key question

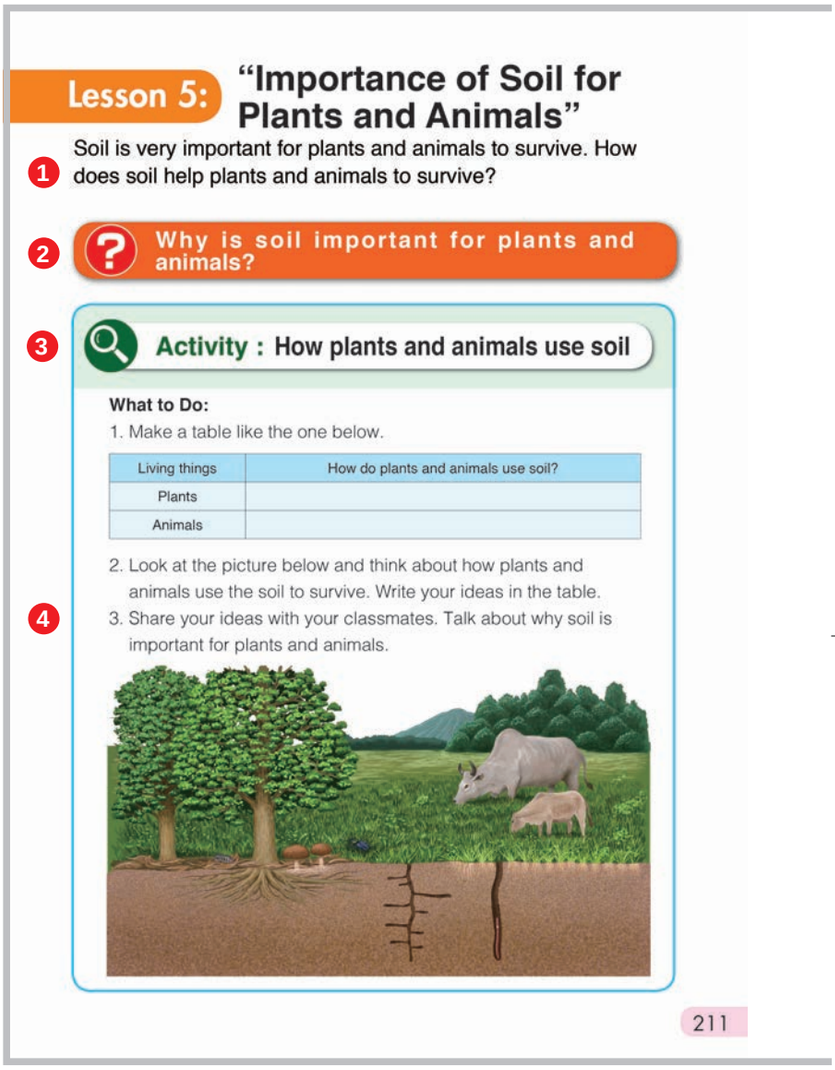
Why is soil important for plants and animals?

3 Activity (20 min.)

- Organise students into groups.
- Explain the steps of the activity.
- Ask students to make a table in their exercise books.
- Have students do the activity and ask them to record their findings in the table.
- Advise students to refer to the pictures in the activity for their investigation.
- After investigation, ask students to discuss why soil is important for plants and animals based on their findings in a group.

4 Discussion for findings (20 min.)

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



Lesson 5: "Importance of Soil for Plants and Animals"

1 Soil is very important for plants and animals to survive. How does soil help plants and animals to survive?

2 Why is soil important for plants and animals?

3 Activity : How plants and animals use soil

What to Do:

1. Make a table like the one below.

Living things	How do plants and animals use soil?
Plants	
Animals	

2. Look at the picture below and think about how plants and animals use the soil to survive. Write your ideas in the table.
3. Share your ideas with your classmates. Talk about why soil is important for plants and animals.

4

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Teacher's Notes

Soil is abiotic component of plant's and animal's environment (habitat). Importance (Functions) of soils are summarized as follows;

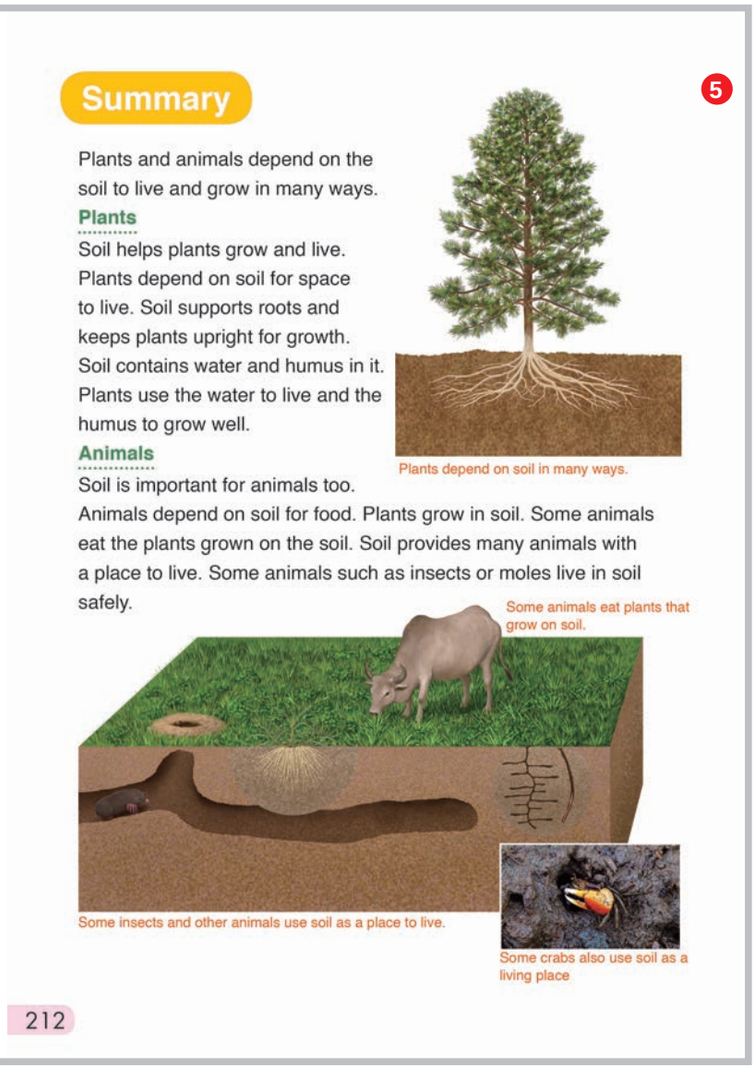
- Medium for plant growth:
  - Soils provide plants with essential minerals and nutrients.
  - Soils provide air for gaseous exchange between roots and atmosphere.
  - Soils protect plants from erosion and other destructive physical, biological and chemical activities.
  - Soils hold water (moisture) and maintain adequate aeration.
- Habitat for many insects and other organisms:
  - Insects and microbes (very tiny single cell organisms) live in the soils and depend on soils for food and air.
  - Soils are homes to a diverse range of organisms such as worms and termites. They provide the needed moisture and air for breakdown of organic matter.
  - They provide a home for many organisms such as insects to lay and hatch eggs and rodents to give birth to new off spring.

Lesson Objectives

Students will be able to:
- Describe how plants and animals depend on soil to survive.

Assessment

Students are able to:
- Explain the different ways that plants and animals depend on soil.
- List how plants and animals use soil in a table.
- Value the importance of soil for living things.



Summary

Plants and animals depend on the soil to live and grow in many ways.

Plants

Soil helps plants grow and live. Plants depend on soil for space to live. Soil supports roots and keeps plants upright for growth. Soil contains water and humus in it. Plants use the water to live and the humus to grow well.

Plants depend on soil in many ways.

Animals

Soil is important for animals too. Animals depend on soil for food. Plants grow in soil. Some animals eat the plants grown on the soil. Soil provides many animals with a place to live. Some animals such as insects or moles live in soil safely.

Some animals eat plants that grow on soil.

Some insects and other animals use soil as a place to live.

Some crabs also use soil as a living place

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- Write students findings on the blackboard.
- Facilitate active students' discussion.
- **Based on their findings,** ask the following questions as discussion points:

Q:How do plants use soil? (They use soil for support, getting water or nutrients, etc.)

Q:How do animals use soil? (They use soil for food by eating plants that grow in soil, for living places to stay safe, etc.)

Q:Why is soil so important for plants and animals? (This is because they depend on soils to live, grow and survive.)

- Conclude the discussion.

5 Summary (10 min.)

- Ask the students to open their textbooks to the summary page and explain it.
- Summarise today's lesson on the blackboard.
- Ask these questions as assessment:
  Q: Why is soil important for plants and animals?
  Q: How do plants depend on soil?
  Q: How do animals depend on soil?
- Ask students to copy the notes on the blackboard into their exercise books.

Sample Blackboard Plan

Title:

"Importance of soil for plants and animals."

Key question

Why is soil important for plants and animals?

Activity

How plans and animals use soil?

Living Things	How do Plants and Animals depend on soil?
Plants	For food, and space to live
Animals	For food and shelter

Discussion

Q: How do plants use soil?

They use soil for support, getting water or nutrients, etc.

Q: How do animals use soil?

They use soil for food by eating plants that grow in soil, for living places to stay safe, etc.

Q: Why is soil so important for plants and animals?

This is because they depend on soils to live, grow and survive.

Summary

- Plants and animals depend on soils to live and grow in many ways.
- Plants depend on soil for:
  1. Space to live
  2. Supporting roots and keeping plants upright for growth.
  3. Water to live and the humus to grow well.
- Animals depend on soil for:
  1. Food
  2. Shelter and safety.

Unit	Chapter : **10. The Earth**	Total lesson No: 93 / 94
Our Earth	Topic : **10.1. Surface of the Earth**	Textbook page: 213 - 215

Lesson 6 / 7

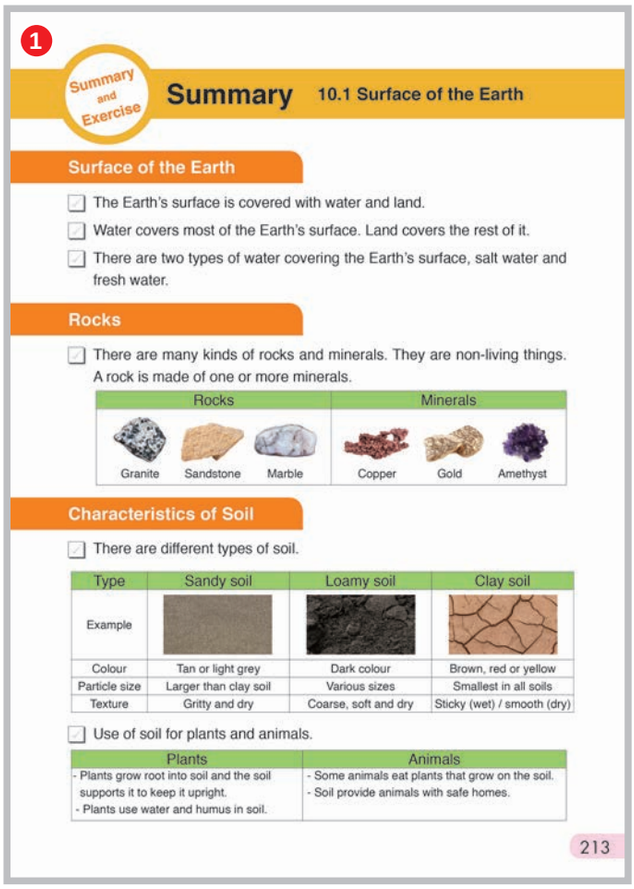
Lesson Title

Summary and Exercise

Tips of lesson

1 Summary (15 min.)

- Recap main learning contents in this chapter.
- Ask some questions to students and verify student understanding. Correct their misconception if they still have, by explain the learning contents again.
- Recap that land has various structures such as mountain, valley and plateau that is mainly masses of rocks and minerals.
- Recap different kind of soil have different properties such as colour, texture and size of its particles.



1

Summary and Exercise

Summary 10.1 Surface of the Earth

Surface of the Earth

- The Earth's surface is covered with water and land.
- Water covers most of the Earth's surface. Land covers the rest of it.
- There are two types of water covering the Earth's surface, salt water and fresh water.

Rocks

- There are many kinds of rocks and minerals. They are non-living things. A rock is made of one or more minerals.

Rocks			Minerals		
Granite	Sandstone	Marble	Copper	Gold	Amethyst

Characteristics of Soil

- There are different types of soil.

Type	Sandy soil	Loamy soil	Clay soil
Example			
Colour	Tan or light grey	Dark colour	Brown, red or yellow
Particle size	Larger than clay soil	Various sizes	Smallest in all soils
Texture	Gritty and dry	Coarse, soft and dry	Sticky (wet) / smooth (dry)

- Use of soil for plants and animals.

Plants	Animals
- Plants grow root into soil and the soil supports it to keep it upright. - Plants use water and humus in soil.	- Some animals eat plants that grow on the soil. - Soil provide animals with safe homes.

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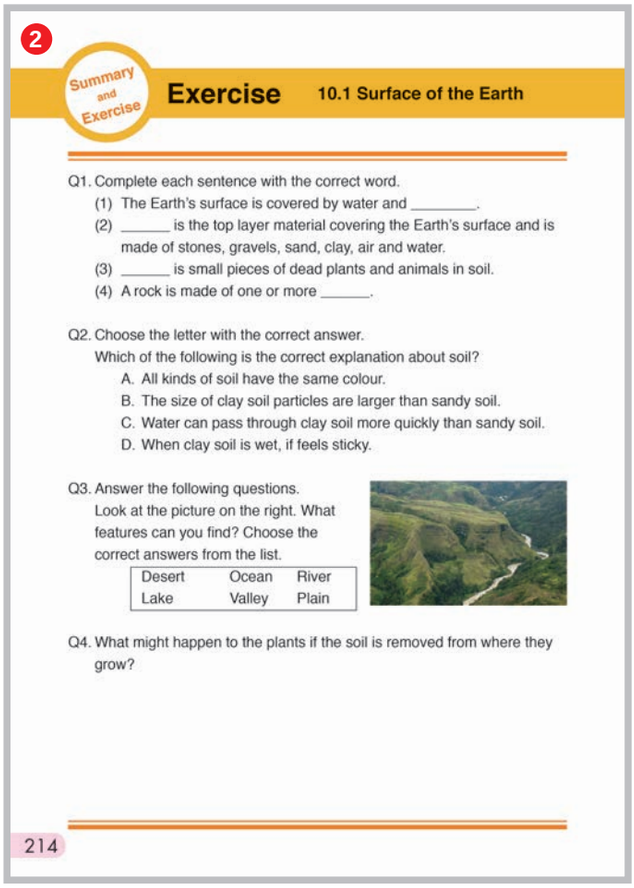
2 Exercise & Explanation (35 min.)

- Go through with students the instructions of the exercise.
- Provide enough time for students to attend to the questions in response to their understanding.
- After the test, give them the answers of the questions and explain how to solve using their scientific understanding and ideas.
- After the test, provide the answers of the questions to students and explain to justify the answers along with students' answers.



2

Summary and Exercise

Exercise 10.1 Surface of the Earth

Q1. Complete each sentence with the correct word.
(1) The Earth's surface is covered by water and _____.
(2) _____ is the top layer material covering the Earth's surface and is made of stones, gravels, sand, clay, air and water.
(3) _____ is small pieces of dead plants and animals in soil.
(4) A rock is made of one or more _____.

Q2. Choose the letter with the correct answer.
Which of the following is the correct explanation about soil?
A. All kinds of soil have the same colour.
B. The size of clay soil particles are larger than sandy soil.
C. Water can pass through clay soil more quickly than sandy soil.
D. When clay soil is wet, if feels sticky.

Q3. Answer the following questions.
Look at the picture on the right. What features can you find? Choose the correct answers from the list.

Desert	Ocean	River
Lake	Valley	Plain

Q4. What might happen to the plants if the soil is removed from where they grow?

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Exercise answers

Q1.
(1) **land**
(2) **soil**
(3) **humus**
(4) **minerals**

Q2.
(1) **D**
- Different soils have different colours. For example, light colour soil contains more amount of light coloured grains than dark coloured grains. While dark coloured soil contains more amount of dark coloured grains than light coloured grains.
- Clay soil particles are smaller than sandy soil particles.
- Sand particles are larger than clay particles. Large particles that are loosely spaced, such as sand, allow water to move through the soil quickly.

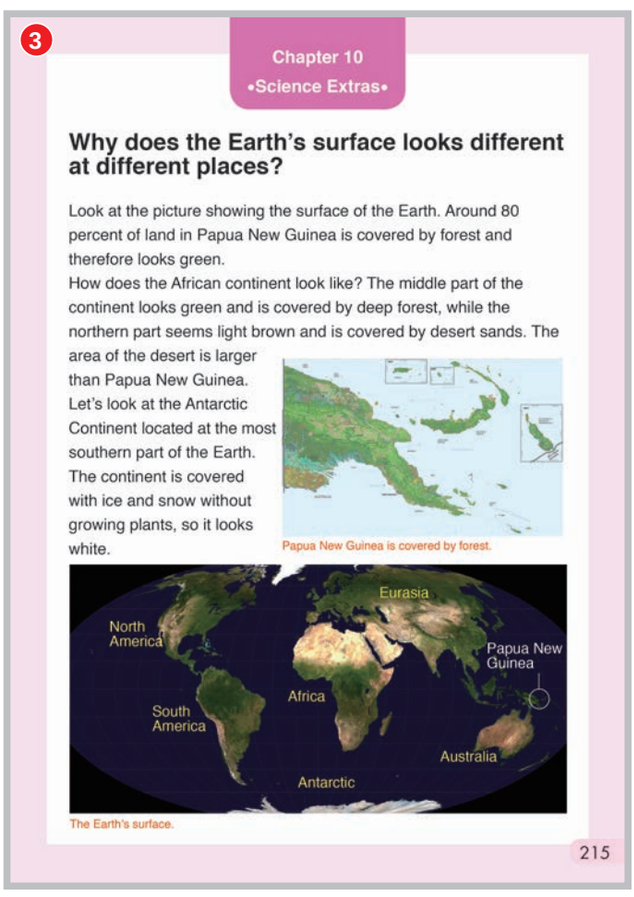
Q3. **River, Valley**
Let students focus on the land structures.

Q4. Sample of the answers
Plants are not able to keep upright without soil because soil supports plant's roots.

Plants would die without soil because plants get water and nutrients to survive from soil.

Explanation of column

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


3

Chapter 10
•Science Extras•

Why does the Earth's surface looks different at different places?

Look at the picture showing the surface of the Earth. Around 80 percent of land in Papua New Guinea is covered by forest and therefore looks green.
How does the African continent look like? The middle part of the continent looks green and is covered by deep forest, while the northern part seems light brown and is covered by desert sands. The area of the desert is larger than Papua New Guinea.
Let's look at the Antarctic Continent located at the most southern part of the Earth. The continent is covered with ice and snow without growing plants, so it looks white.

Papua New Guinea is covered by forest.

The Earth's surface.

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Lesson
7 / 7

Lesson Title

Chapter Test

Answer of the Chapter Test

Chapter Test

10. The Earth

Q1 Complete each sentence with the correct word.

(1) The surface of the Earth is covered by ___water___ and land.
(2) A rock is made of one or more ___minerals___.
(3 Soil is mainly classified as loamy, sandy and ___clay___ soil.
(4) Soil can be classified by its ___colour___, size of particles and the substances it contains.
(5) Mountains, hills, valleys and flat places make up the ___land___.

Q2 Choose the letter with the correct answer.

(1) Which of the following is not a component of soil?
A. Humus
B. Rocks
C. Minerals
(D.) Plastic

(2) Which of the following is not provided by soil for plants?
A. Space to take root in
B. Water to survive
C. Humus to grow well
(D.) Sunlight to make food

(3) What kind of soil has the largest particle size?
(A.) Sand
B. Loam
C. Clay
D. All have the same particle size

(4) What do all rocks have in common? They have the;
A. Same size.
B. Same colour.
(C.) One or more minerals.
D. Same shape.

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Q3

(1) A student observed a mixture of soil and water as shown on the right. What are the things floating on the water?

Humus (dead plants and animals)

(2) There are three main types of soil; sand, loam and clay. Sticky soil holds a lot of water. Which type of soil mostly makes sticky soil?

Clay

Q4

(1) How do animals help soil?

They help the soil by digging in it and breaking it into small pieces. This keeps air in the soil and makes space for water to get into the soil.

(2) Look at the two rocks shown below.
Are Rock A and Rock B the same kind of rock? Write your answer with reasons.

	
Rock A	Rock B

Rock A and B are different kind of rocks. Both have different colour patterns and their texture looks different.

Science Tool Box

1. How to use a Balance
2. How to use a Thermometer
3. How to use a Compass
4. How to draw a sketch

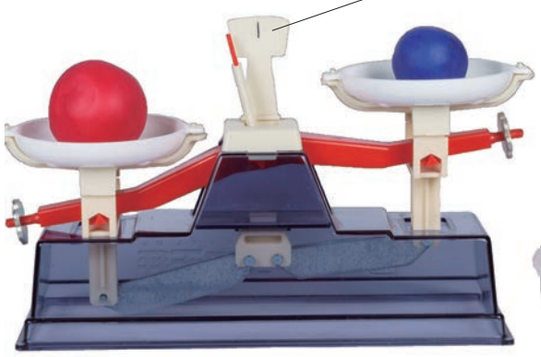
I would like to use the science tools in the lesson!

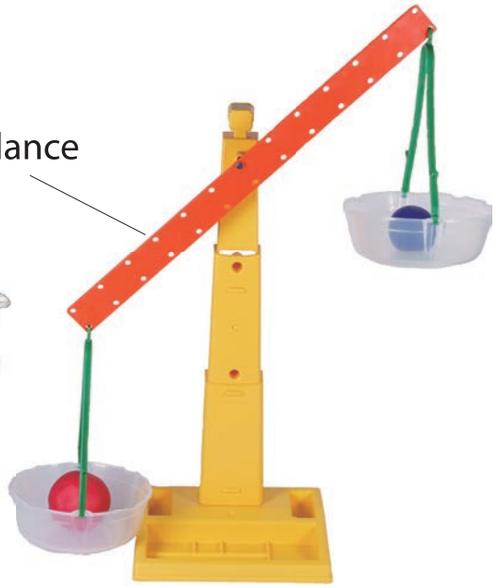
Let's check and learn how to use the science tools here.

Thermometer

Compass

Balance





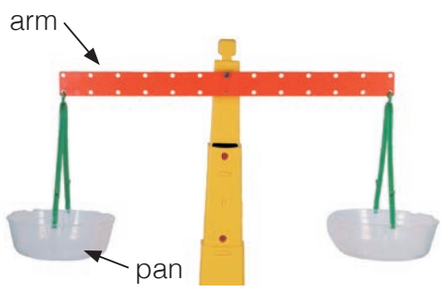
How to use a Balance

1. What is a balance?

A balance is an instrument that is used to compare weight. Weight is a property of matter in an object. A balance has two pans, on the left and right of the arm. To compare the weight of two objects, place an object on the left and another on the right pan. The arm tilts down to the heavier side. If two objects have equal weight, then the left and right pans are balanced.

Balance

This type of balance has similar function.



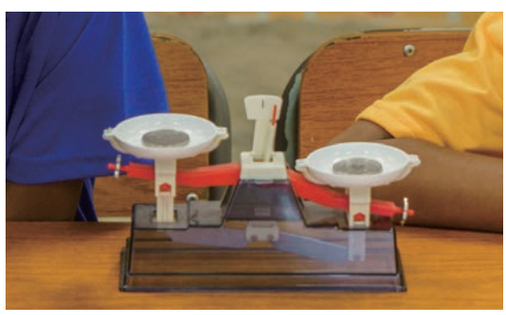
2. Comparing the weight of coins

STEP 1:

Check that the empty pans are balanced. If it needs to be adjusted, move the slider or adjuster until the pans are balanced.

STEP2:

Place a coin on the left pan and another coin on the right pan. When the arm tilts down to the right, then it means the coin on the right pan is heavier than the left side. If the left and right pans are balanced, the two coins have the same weight.



How to use a Thermometer

1. What is a thermometer?

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

2. Measuring temperature

STEP 1:

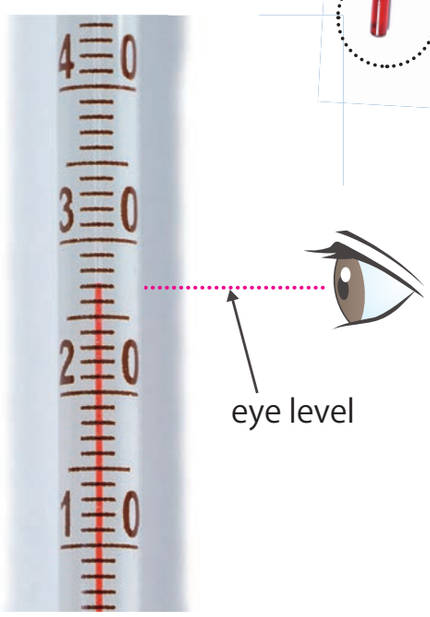
Place the bulb in the place where you want to measure the temperature. Make sure that there are no bright lights or direct sunlight shining on the bulb.

STEP2:

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.

STEP3:

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:

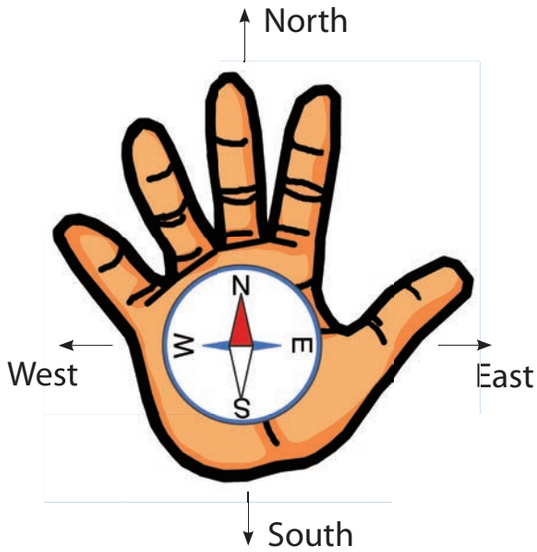
When you want to face North, place a compass flat on your palm and hold in front of your chest as shown in the picture on the right.

STEP2:

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

STEP3:

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.

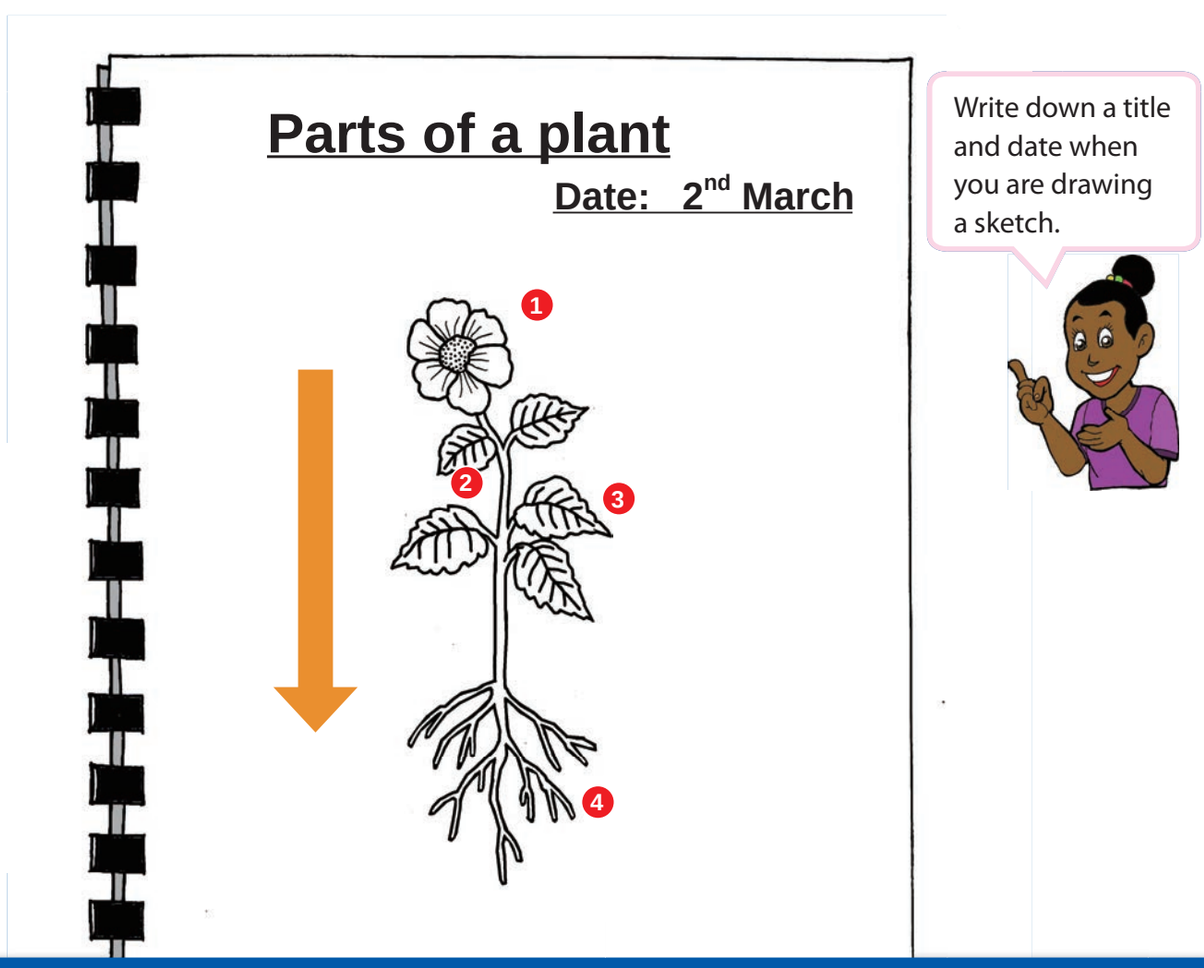


How to draw a sketch

Scientific sketch is NOT an artwork. The sketch requires precise drawing. If the plant has two leaves, the sketch should have two leaves only as they are.

The principle of sketch is “top to bottom” and “front side to back side”. For example, look at the sample below;

STEP 1: **Start by drawing the flower of the plant.**
STEP 2: **Next draw the stem.**
STEP 3: **Next the leaf. Draw from front leaves to back.**
STEP 4: **Lastly draw the root.**



Glossary

Amphibian is an animal whose body is covered with moist skin. 88

Axis in the Earth is an imaginary straight line that passes through the North pole and South pole of the Earth. 130

Balance is a tool to compare the weight of matters. 36

Bird is an animal that has feathers and wings. 88

Compass is an instrument you use for finding directions. 168

Direction is the path that an object takes. The direction tells us where the object is going. 184

Energy is the ability to do work. Energy can change and move things. ... 110

Environment is everything that makes up our surroundings. 12

Man-made environment is the environment that is made of man-made things. 14

Natural environment is the environment made of natural things. 14

Nonmagnetic object is an object that is not attracted by a magnet. 160

Fibrous root is a root that has many smaller roots that spread out in different directions. 76

Fish is an animal that lives in water and has scales and gills. 88

Force is a push or a pull. 176

Forest is a place with many trees that grow close together. 22

Friction is force that makes an object slow down and stop when two surfaces of objects are rubbed against each other. 180

Fulcrum is the point on which the lever turns or balances. 194

Gravity is the force that pulls objects toward Earth's centre. 176

Herbs are plants that have soft and green stems. 78

Humus is tiny bit of dead plants and animals in soil. 208

Inclined plane is a simple machine made up of a flat and slanted surface. 192

Insect is an animal that has 6 legs and hard outer covering. 88

Leaf is a part of plants made up of a leaf stalk, a leaf blade, and veins. 70

Glossary

Leaf blade is the main flat area of the leaf. 80

Leaf margin is shape of leaf edges. 80

Leaf vein is a tube that can help carry water and nutrients throughout the leaf. 80

Lever is a simple machine made up of arm and fulcrum. 194

Light is energy that we can see. 138

Living things are things that grow, change and breathe, can move by themselves and produce new living things. 16

Magnet is an object that attracts magnetic object. 158

Magnetic object is made of iron and attracts to a magnet. 160

Magnetic poles are the parts where a magnet attracts objects most strongly. All magnets have north and south pole. 162

Mammal is an animal that has fur or hair and breathe by lungs. 88

Man-made things are things made by people. 14

Matter is everything around us. 32

Mineral is a non-living thing found in nature such as gold, diamond and copper. 206

Mixture is something made of two or more kinds of matters. 58

Natural things are things that come from nature and not made by people. Plants, animals, soil, air and water. 14

Non-living things are things that do not grow, change, breathe and cannot produce new ones. 16

Nutrient is a material in the soil that living things need to grow 72

Object is a thing that we can see and touch. 41

Ocean is the vast body of salt water. 22

Opaque objects do not let any light travel through them. 142

Property is anything that we learn about a matter such as weight, size, colour, and texture. 34

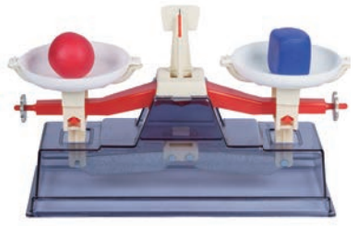
Basic Science Instruments

Basic science instruments introduced in the textbook are listed below.

1

2

3



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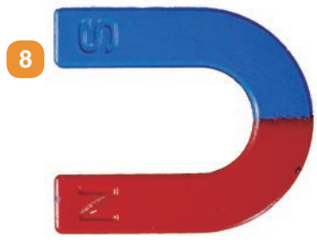

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1. **Magnifying lens**
2. **Measuring cylinder**
3. **Beaker**
4. **Balances**
5. **Thermometer**
6. **Compass**
7. **Bar magnet**
8. **Horseshoe magnet**

Science Grade 3 Teacher's Manual Development Committee

The Science Teacher's Manual was developed by Curriculum Development Division (CDD), Department of Education in partnership with Japan International Cooperation Agency (JICA) through the Project for Improving the Quality of Mathematics and Science Education (QUIS-ME Project). The following stakeholders have contributed to manage, write, validate and make quality assurance for developing quality Textbook and Teacher's Manual for students and teachers of Papua New Guinea.

Joint Coordinating Committee members for QUIS-ME Project

Dr. Uke Kombra, Secretary for Education - Chairperson, Mr. Walipe Wingi, Deputy Secretary - Deputy Chairperson, Mr. Baran Sori, Mr. Samson Wangihomie, Mr. Titus Romano Hatagen, Dr. Eliakim Apelis, Mr. Godfrey Yerua, Mrs. Annemarie Kona, Mr. Camilus Kanau, Mr. Joseph Moide, Mr. Peter Kants, Mr. Maxton Essy, Mr. Steven Tandale, Ms. Hatsie Mirou, Mr. Paul Ainui, Mr. Packiam Arulappan, Mr. Allen Jim, Mr. Nopa Raki, Mr. Gandhi Lavaki, Mr. John Kakas, Ms. Philippa Darius, Mr. Alex Magun, Ms. Mary Norrie, Mr. James Namari, Ms. Kila Tau, Mr. Moses Hatagen Koran, Ms. Colette Modagai, Ms. Dorothy Marang, Mr. Dan Lyanda, Representatives from Embassy of Japan and JICA PNG Office, Mr. Akinori Ito, MPS, Mr. Chiko Yamaoka and other Project Experts

Steering Committee members for QUIS-ME Project

Mrs. Annemarie Kona, First Assistant Secretary - Chairperson, Mr. Steven Tandale - Assistant Secretary, CDD - Deputy, Chairperson, Ms. Hatsie Mirou, Mr. Paul Ainui, Mr. Gandhi Lavaki, Mr. John Kakas, Ms. Philippa Darius, Mr. Alex Magun, Ms. Mary Norrie, Mr. James Namari, Ms. Kila Tau, Mr. Moses Hatagen Koran, Ms. Mary Phillips, Mr. Nopa Raki, Mr. Geoff Gibaru, Ms. Jean Taviri, Mr. Akinori Ito, MPS, Mr. Chiko Yamaoka, Mr. Satoshi Kusaka, Mr. Ryuihi Sugiyama, Mr. Kenichi Jibutsu, Ms. Masako Tsuzuki, Dr. Kotaro Kijima, Ms. Kyoko Yamada and Representatives from Textbook writers and JICA PNG Office

Curriculum Panel

Mr. Steven Tandale, Mr. Gandhi Lavaki, Ms. Philippa Darius, Mr. Alex Magun, Mr. John Kakas, Ms. Mirou Avosa, Ms. Mary Norrie, Mr. Gilbert Ikupu, Mr. John Wek, Ms. Betty Bannah, Mr. Vitus Witnes, Ms. Clemencia Dimain and Ms. Celine Vavetaovi

Editorial Supervisors

Mr. Ryuichi Sugiyama, Mr. Kenichi Jibutsu, Prof. Masakazu Kita, Dr. Kotaro Kijima, Mr. Susumu Komazawa, Mr. John Kakas and Mr. Moses Hatagen Koran

Content Supervisors

Prof. Hiroaki Ozawa, Ass. Prof Kazuyuki Tamura and Prof. Yasuhiko Makino

Writers & Proofreaders (Curriculum officers & Textbook writers - Science Working Group)

Mr. John Kakas - Science Working Group Leader, Ms. Collette Modagai, Mr. Moses Hatagen Koran, Mr. Emmanuel Ragu, Mr. Jimmy Pulpulis, Mr. Michael Kwadogi, Ms. Sandra Uramani, Ms. Brenda Kautu, Ms. Raphaella Barau and Ms. A'alia Nissar

Chief Proofreader, Illustrations, Photos & Desktop Publishing

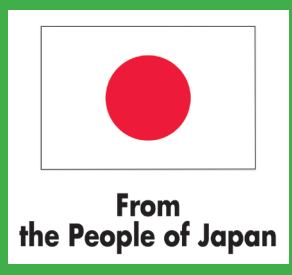
Mr. Alex Magun (Chief Proofreaders), Mr. Micheal John, Ms. Atsuko Yano, Mr. Fumihiko Kobori, Nihon Graphics Co.,Ltd. (Illustrations), Mr. Angus Fraser, Mr. Rocky Roe, Wildlife Conservation Society, Piku Biodiversity Network Inc., Mr. Chiko Yamaoka, Dr. Kotaro Kijima, Mr. Masaki Kubo, JICA Volunteers, Aflo, amana images, ARTEFACTORY, CORVET, Getty Images, NaRiKa, NASA, NICT, NNP, OASIS, PIXTA, PPS (Photos), Mr. David Gerega, Mr. Vitus Witnes (Graphic designers), HIZU INC., Mr. Haruo Yoshida, Ms. Ayako Sakano (Desktop Publishing) and Gakko Tosho Co.,Ltd. (Photos and illustrations)

Validation Team (Science working group & Teachers from pilot schools)

Mrs. Anne Afaisa, Ms. Esther Yambukia, Mr. Freeman Kefoi, Ms. Heidi Supa, Ms. Ikai Koivi, Ms. Jill Koroi, Ms. Kila Vela Ymana, Ms. Lino Eaki, Ms. Louisa Kaekae, Ms. Lucy Paul, Ms. Margaret Itoro, Ms. Martha Dimsock, Mr. Tom Ovia and Mrs. Wilfreda Efi

Cooperation

Japan International Cooperation Agency (JICA), Department of National Planning & Monitoring (DNPM), PNG Conservation & Environment Protection Authority (CEPA-JICA Biodiversity Project), PNG Forest Authority (PNGFA-JICA, PNG-FRIMS Project), Piku Biodiversity Network Inc., Okayama University, Naruto University of Education, Gakko Tosho Co.,Ltd. , Bank of Papua New Guinea, Gaire Primary School, Iobuna Kouba Primary School, Koki Primary School, Koiari Park Primary School, St. John Primary School, St. Peter Primary School, St. Therese Primary School, Sogeri Primary School, Tubuseria Primary School and Wardstrip Primary School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