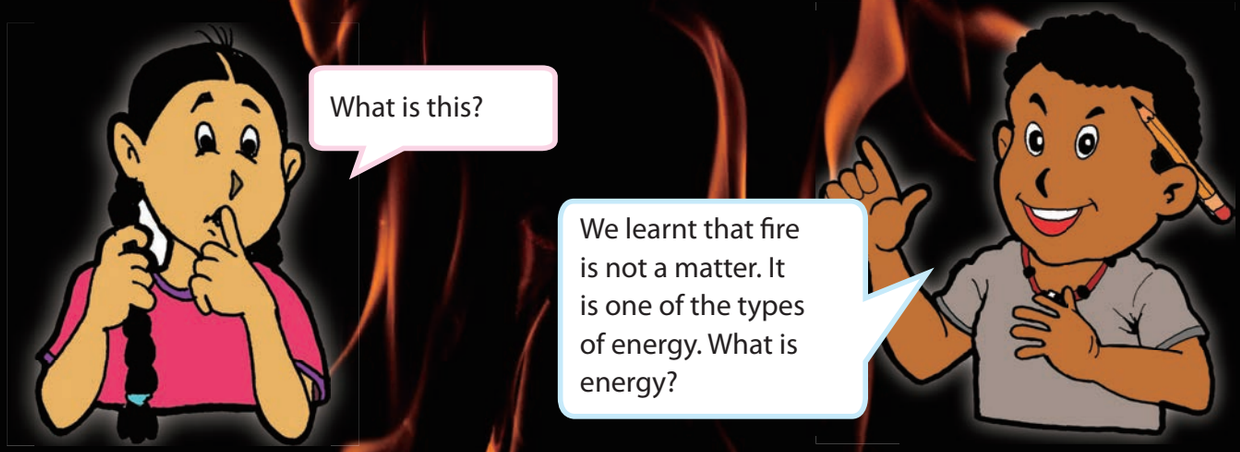
Chapter 5

Energy



5.1 Energy around Us

Lesson 1: "Energy"

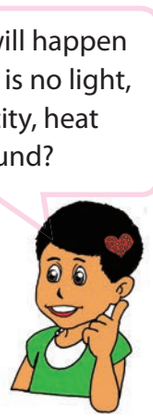
Have you heard about energy? Energy is everywhere around us. When we play rugby, watch television or cook food, energy is happening all around us.

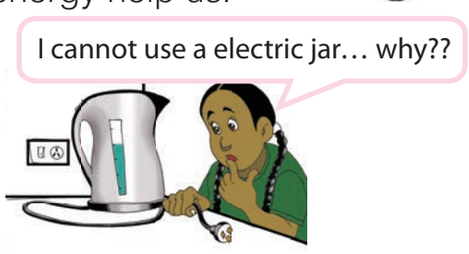
What is energy?

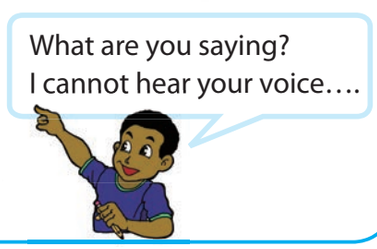
Activity : What if there is no energy?

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.







Summary

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.

Lesson 2: "Uses of Energy"

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

How do we use energy in our daily life?

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.

Summary

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.

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.

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 <u>not</u> use electrical energy?

A. Torch

B. Traffic lights

C. Candle flame

D. Mobile phone

(2) Which sentence is <u>not</u> 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.

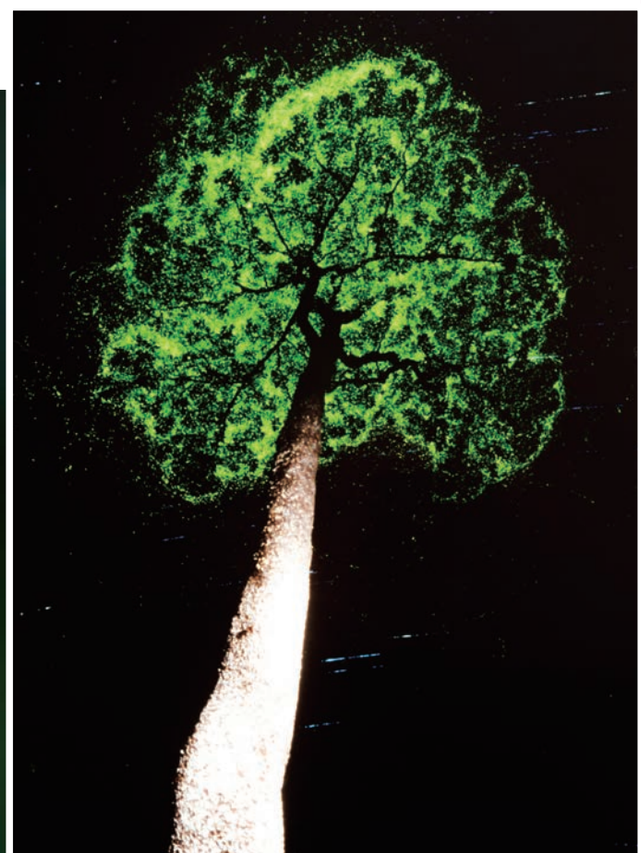
What form of energy is used to cook food?

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?

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.

Chapter Test

5. Energy

Q1

Complete each sentence with the correct word.

(1) The ability to do work is called _____.

(2) The type of energy used to make food warm is _____.

(3) Animals use _____ to communicate with each other.

(4) We can use _____ to run electric appliances.

(5) _____ 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

Q3

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

_____

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

(i)_____

(ii)_____

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

(i) _____

(ii) _____

Q4

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

_____

_____

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

_____

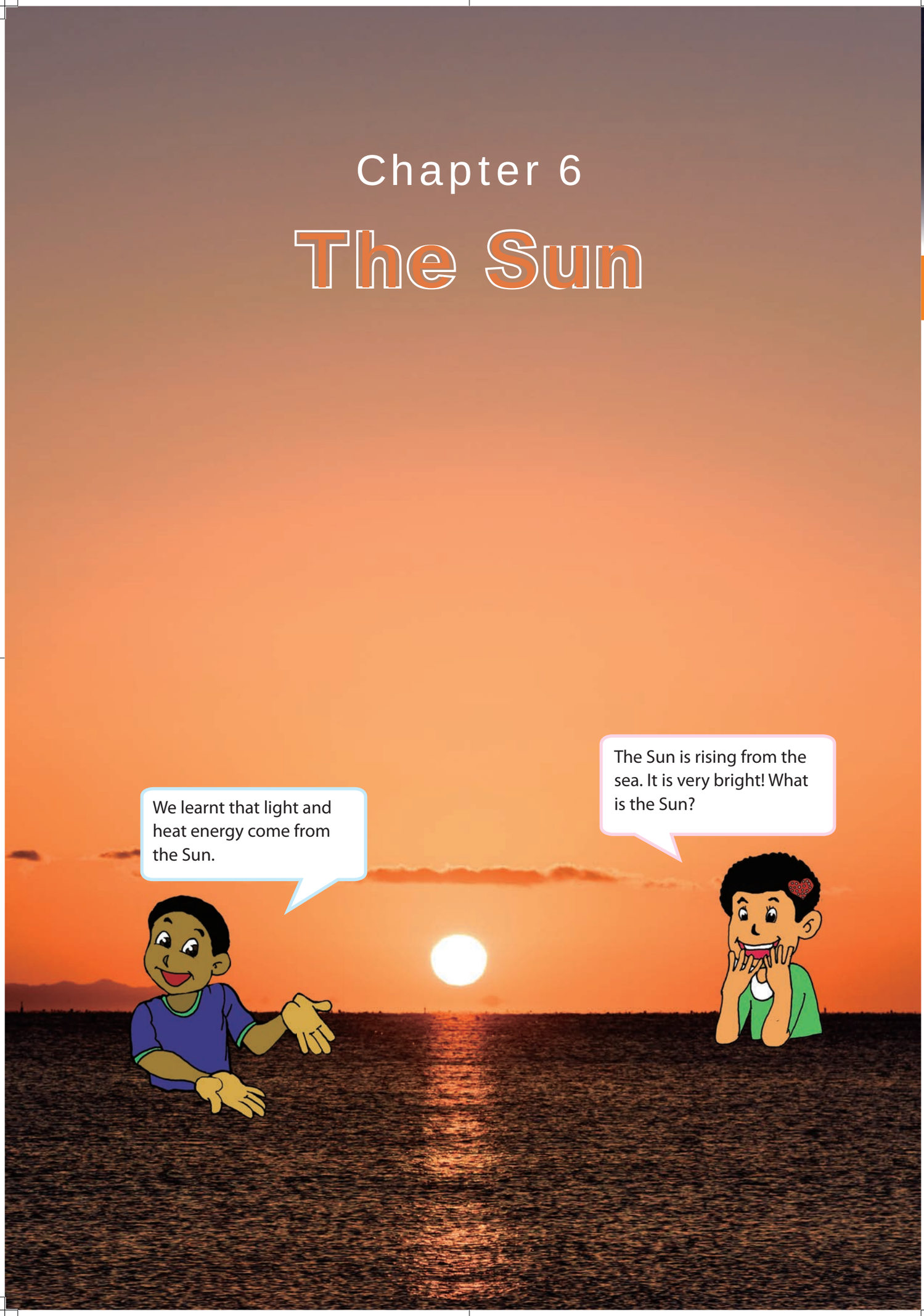
_____

_____

_____

Chapter 6

The Sun



6.1 Properties of the Sun

Lesson 1: "The Sun in the Sky"

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?

What is the Sun?

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?

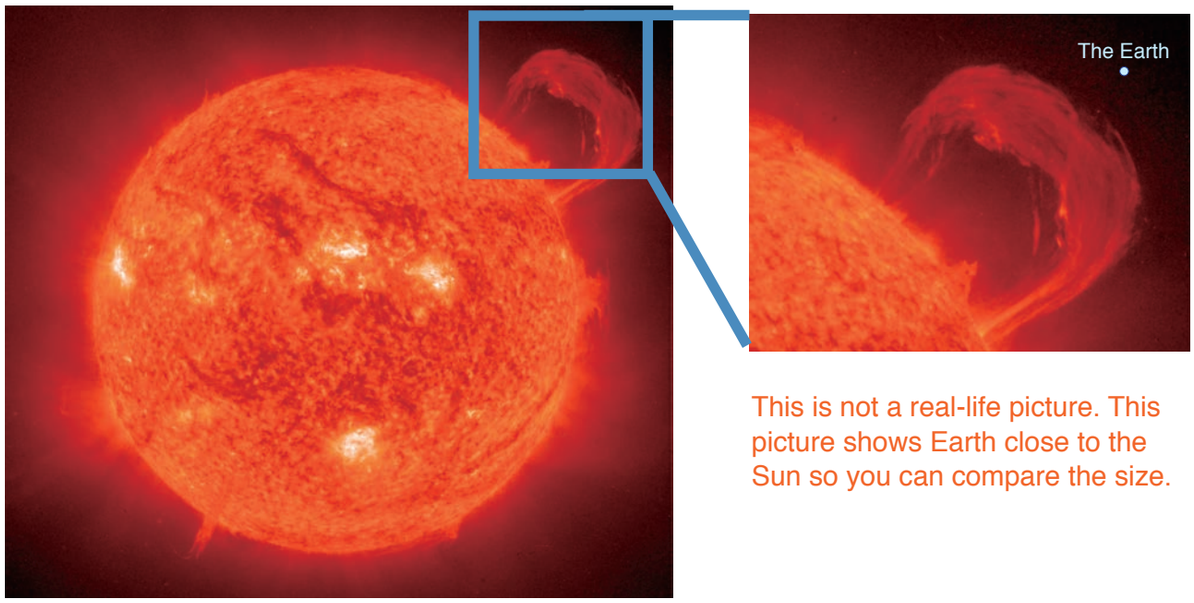
2. Think about the following questions and write your ideas in the table.
   - What do you know about the Sun?
   - If it were not for the Sun, what would happen to our Earth?

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



Summary

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.

Lesson 2: "Sunny Place and Shady Place"

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

How is a sunny place and a shady place different?

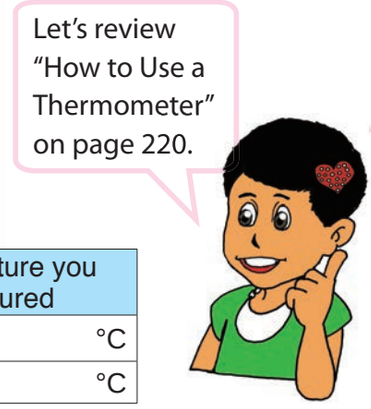
Activity : Measuring the temperature of the ground

What We Need:

- Thermometer, A4 paper

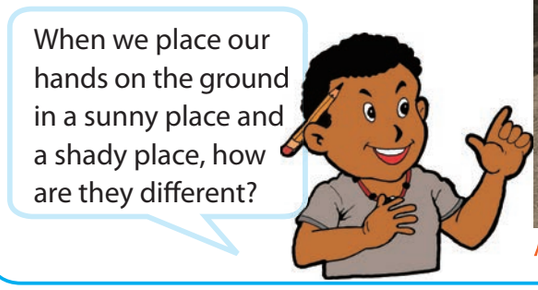
What to Do:

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

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.




A sunny place

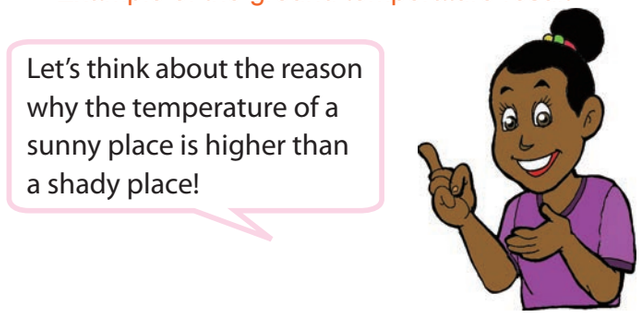

A shady place

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

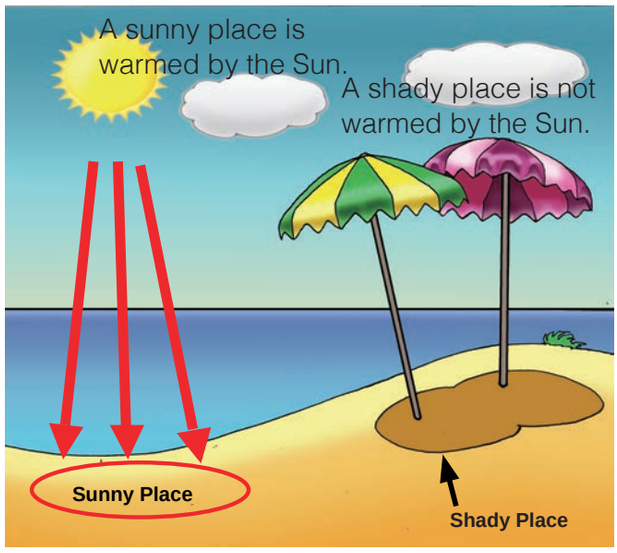
Example of the ground temperature result



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

Summary and Exercise

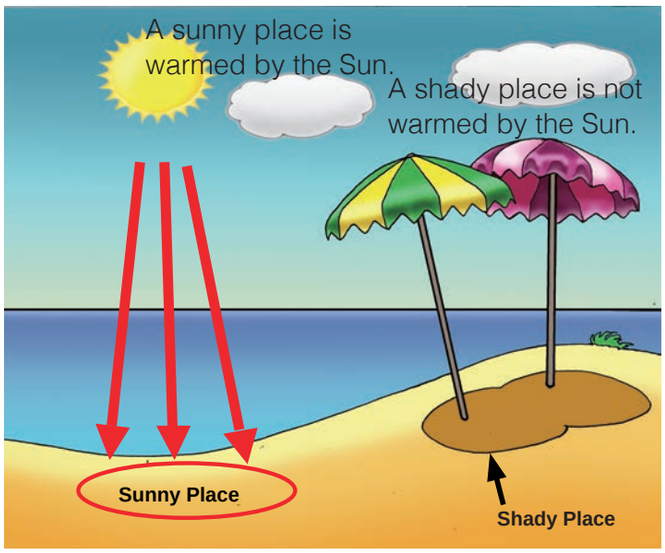
Summary 6.1 Properties of the Sun

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.



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 _____.

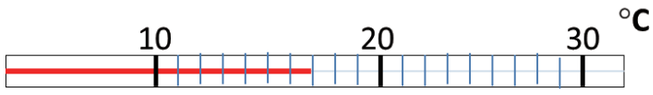
(3) The Sun's energy reaches the Earth as light and _____.

(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.

6.2 Movement of the Sun

Lesson 1: "Sun and Shadow"

When we play outside in the sun, we can find shadows on the ground. Where can we find the shadow? How is a shadow made by the Sun?

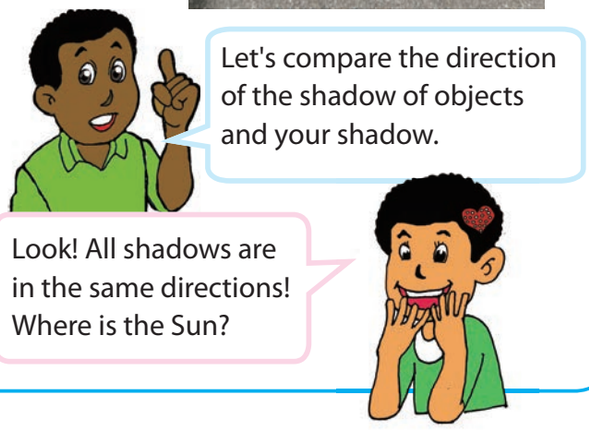
What is the relationship between the Sun and a shadow?

Activity : Observing sun and shadow

What to Do:

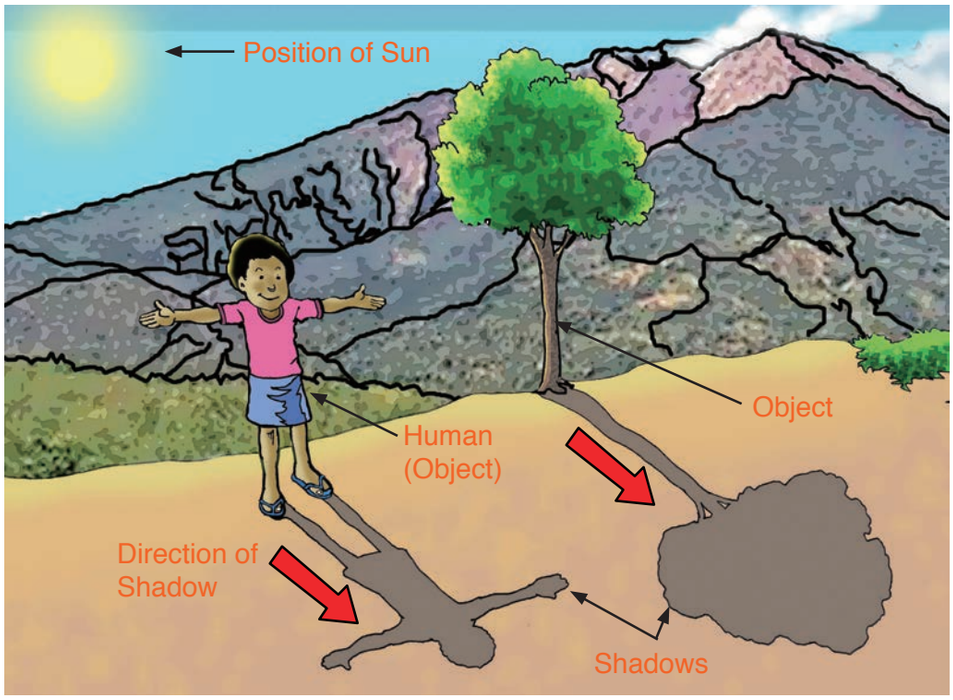
1. Find a shadow in the school yard.
2. Observe the direction of the shadow and the position of the Sun. Record your observation in your exercise book.
3. Repeat steps 1 and 2 several times.
4. Share your ideas with your classmates. Talk about the relationship between the direction of the shadow and the position of the Sun.

Do not look directly at the Sun!



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.



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?'

Lesson 2: "Movement of the Sun"

The Sun rises in the morning and sets in the evening every day.

How does the Sun move in the sky?

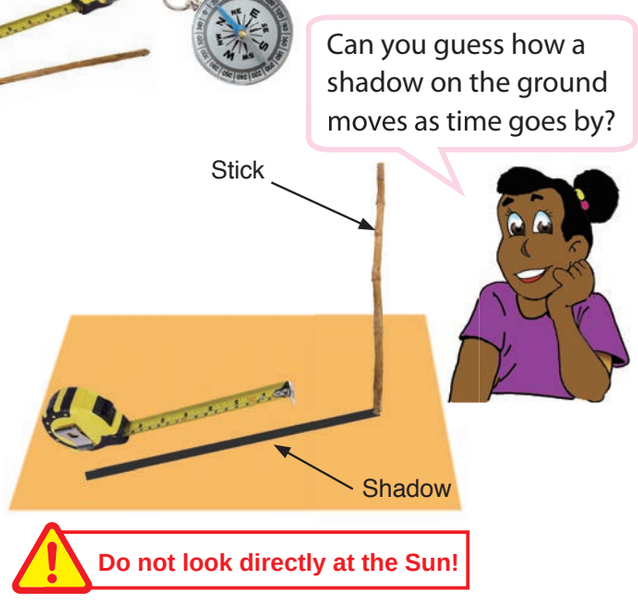
Activity : Observing the movement of shadow

What We Need:

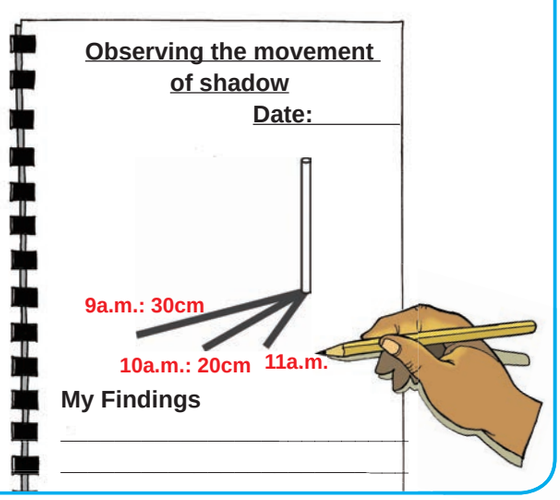
- a stick, compass, tape measure

What to Do:

1. Go out of the classroom and set up a stick on the ground.
2. Check the east and west directions with a compass.
3. Observe the shadow of the stick on the ground and draw a sketch of the shadow in your exercise book.
4. Measure the length of the shadow with a tape measure. Record the length and the time you observe in your exercise book.
5. Repeat steps 3 and 4 every hour during the day.



Do not look directly at the Sun!



Discussion

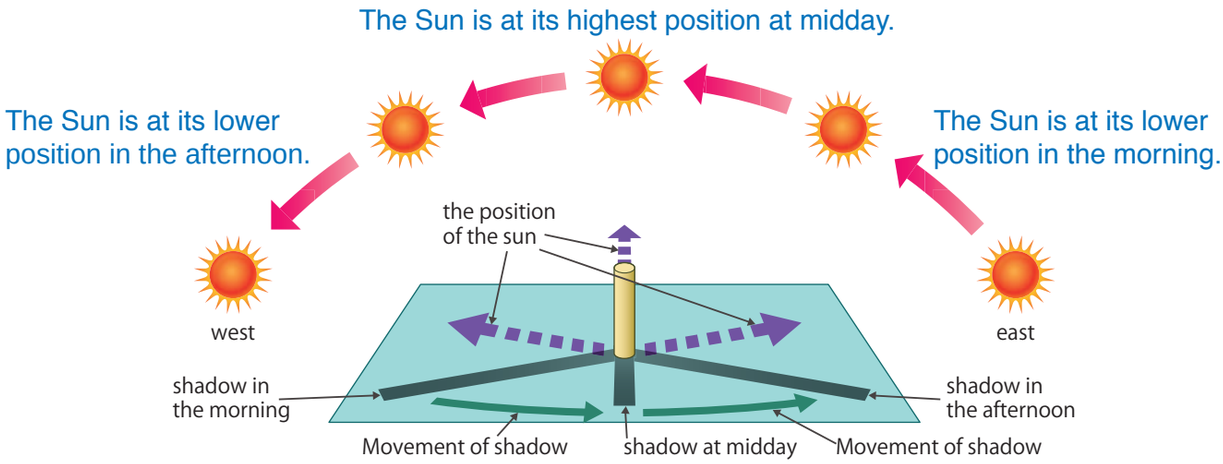
Let's discuss the following questions:

- How has the length of the shadow changed?
- How has the shadow moved? Why?
- How has the Sun moved?

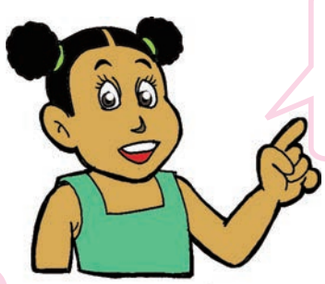
Do you remember the relationship between the position of the Sun and the direction of the shadow?

Summary

A shadow changes its length and direction as the Sun moves across the sky. In the morning and in the evening, shadows are longer and the Sun is lower in the sky. At midday, the length of the shadow is shortest and the Sun is at its highest position in the sky.
Shadows move from west to east depending on the time of the day. This is because the Sun rises in the east, moves across the sky and sets in the west.



People developed the device to tell time by observing the Sun and shadows.



This device is called "Sun Clock". A sun clock uses a shadow's position to tell the time.

Lesson 3: "Day and Night"

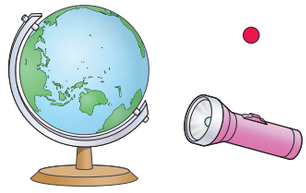
We get up in the morning. We are active during the day and sleep at night.

What causes day and night?

Activity : Which part is day or night?

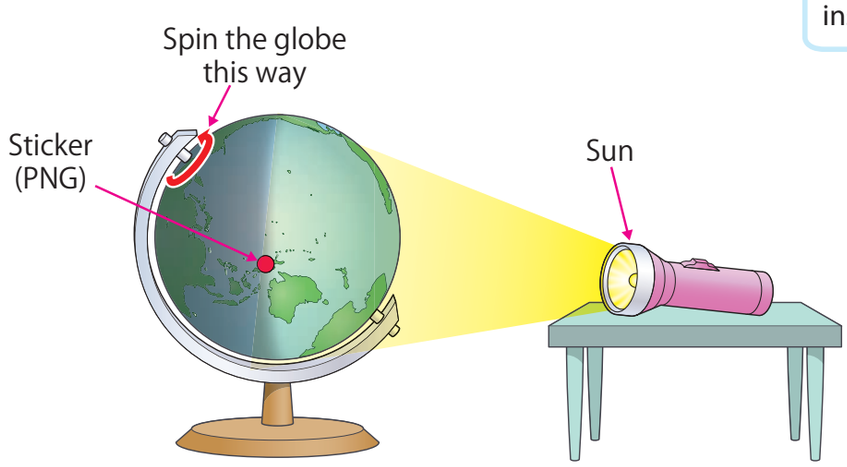
What We Need:

- globe, sticker, flashlight

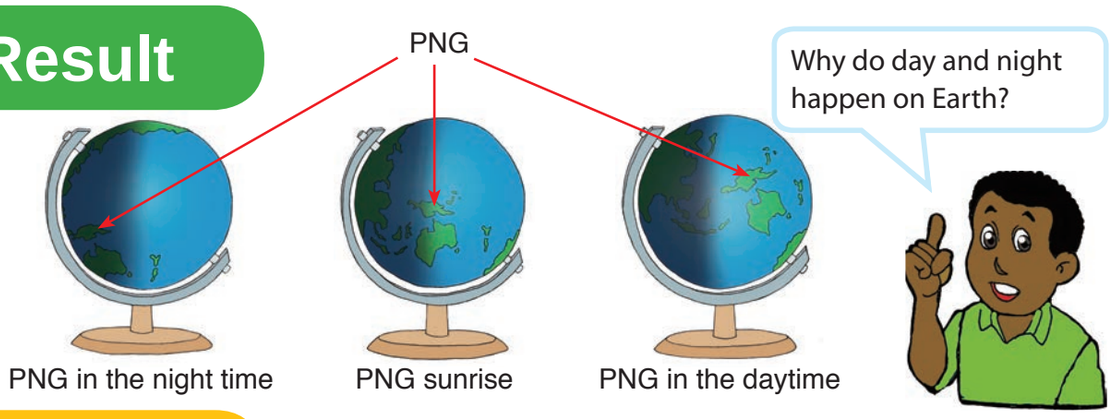


What to Do:

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.

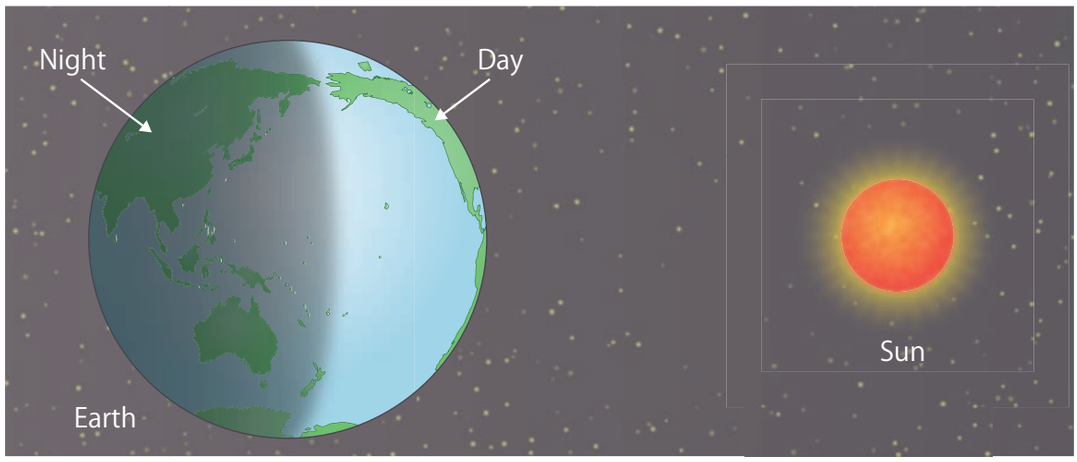


Result



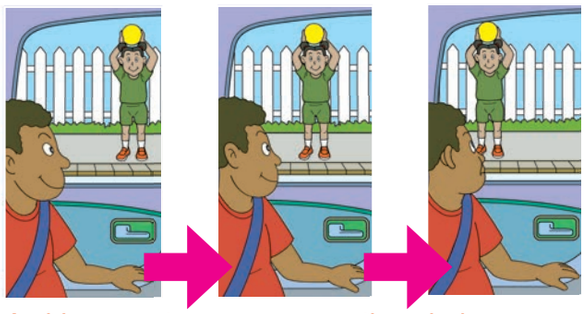
Summary

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.

Summary and Exercise

Summary 6.2 Movement of the Sun

Sun and Shadow

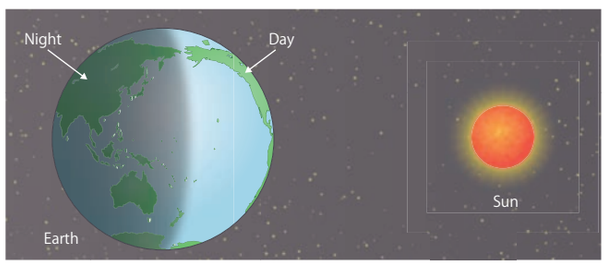
- When a shadow is made, the position of the Sun is opposite to the direction of the shadow.
- The change in the position of the Sun causes the direction of the shadows to change.

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.



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.

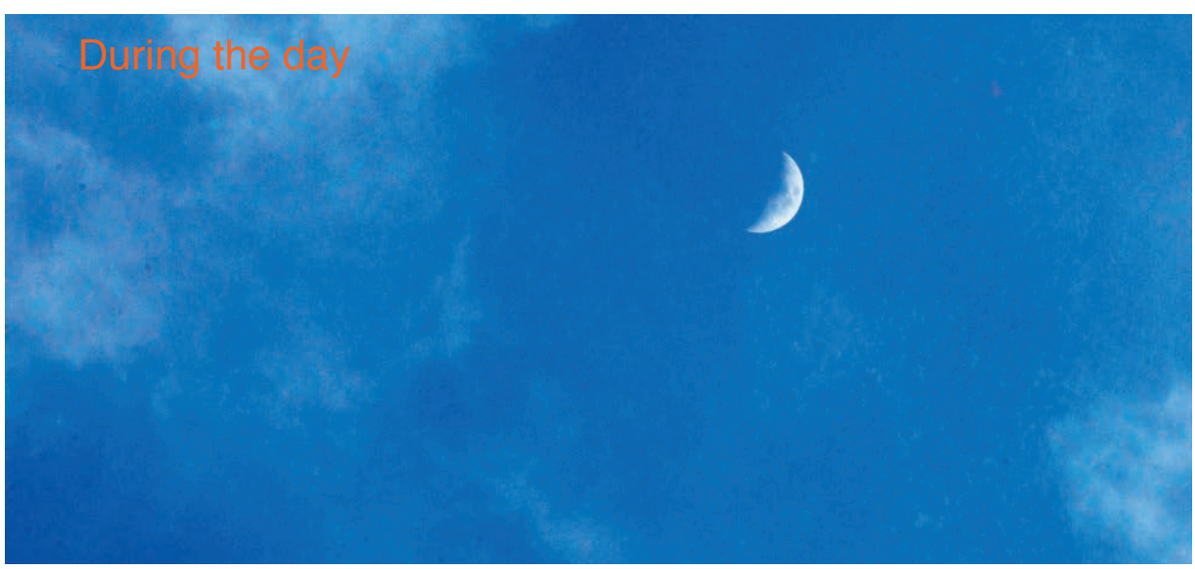
(1) What causes the shadow during a sunny day to change?

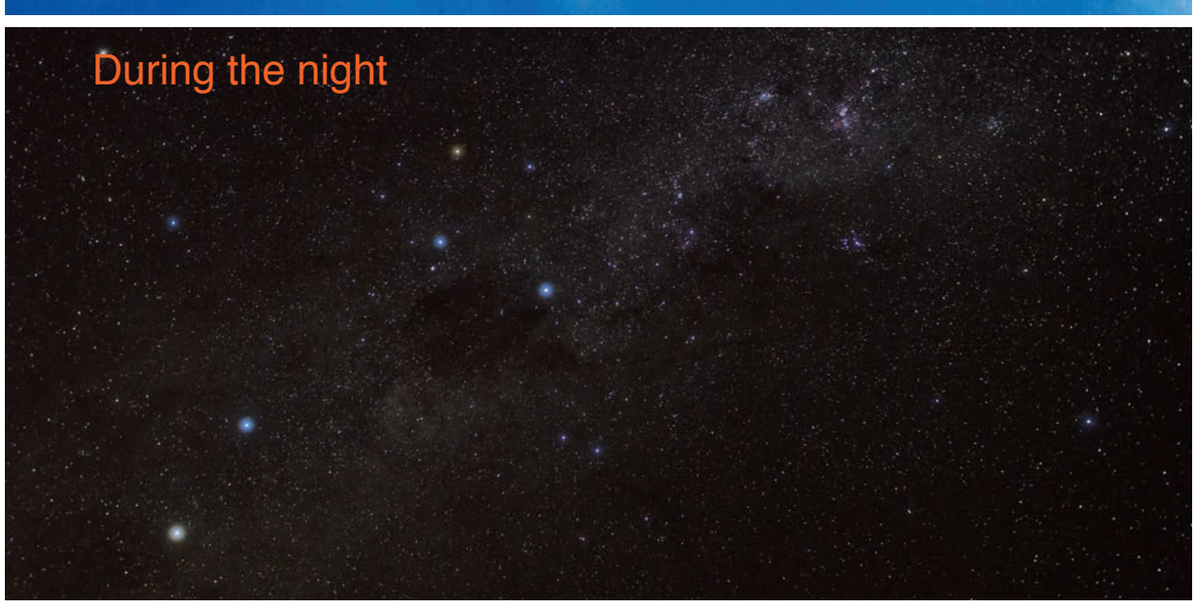
(2) Where does the shadow from an object that blocks the sunlight appear?

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

Where are the stars during the day?

Can we find stars in the sky during the day?
Do the stars escape from the sky during the day?
In fact, stars are always in the sky. During the day the Sun makes the sky too bright to see other stars. Therefore we cannot see them. After the Sun sets, the Sun does not shine in the sky and darkness comes in. We can see the light from other stars during the night.





Chapter Test

6. The Sun

Q1

Complete each sentence with the correct word.

(1) The ground of a sunny place is warmed by the _____.

(2) The measure of how warm or cool something is, is called _____.

(3) A _____ is used to measure temperature.

(4) The Sun rises in the _____ and sets in the _____.

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

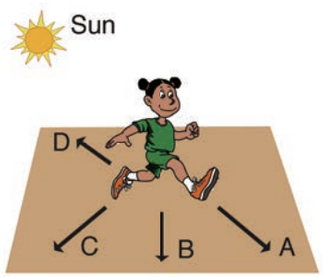
B. millimeters

C. grams

D. degree Celsius

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?



_____

_____

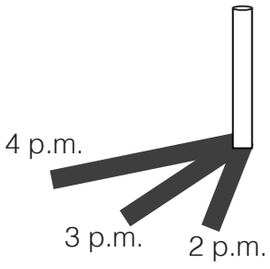
_____

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

_____

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?



_____

_____

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

_____

_____

_____

Chapter 7

Light

7.1 Properties of Light

Lesson 1: "What makes us See Objects?"

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

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

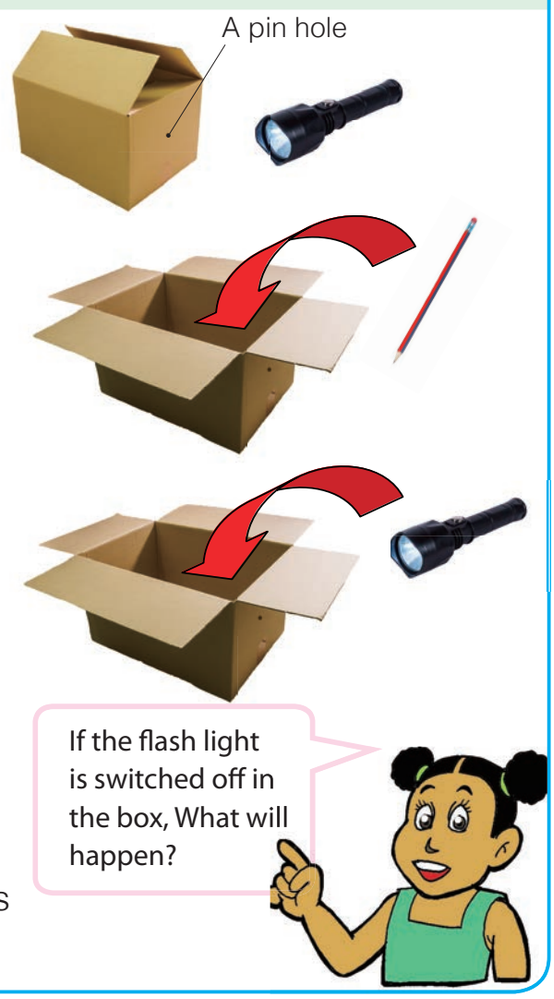
Activity : What is in the box?

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.



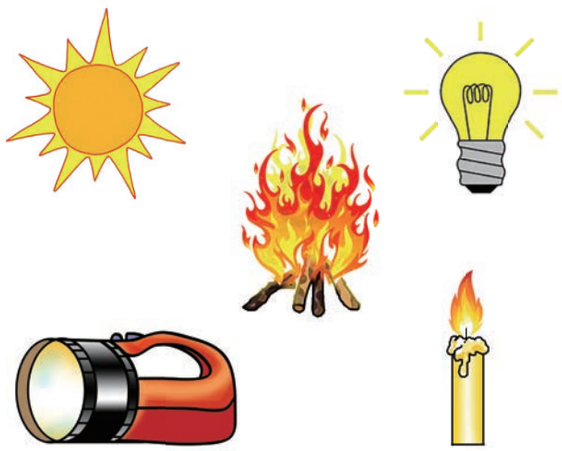
Summary

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.

The sun helps us see objects.

Light from lamps help us see objects.

Lesson 2: "How Does Light Travel?"

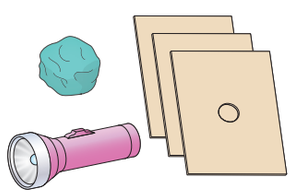
Light helps us to see objects. Without light we cannot see anything around us. But, what path does light take when it travels?

How does light travel?

Activity : Light Travelling

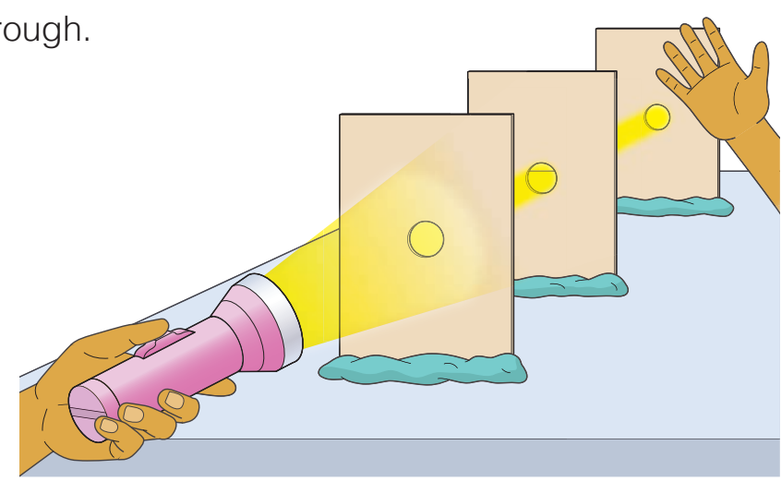
What We Need:

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



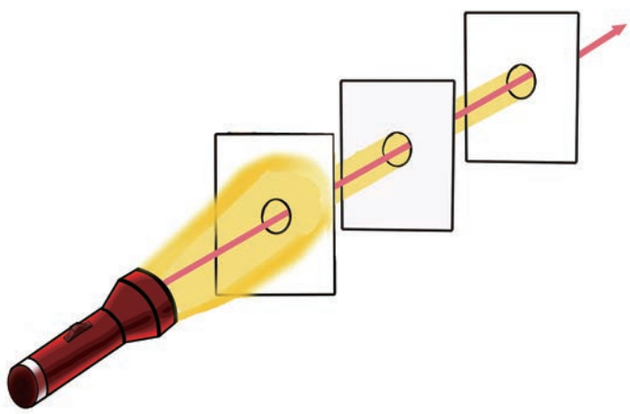
What to Do:

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.

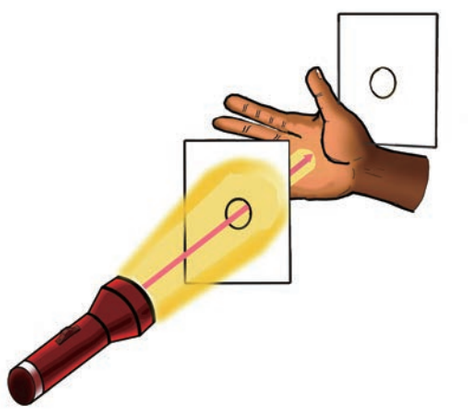


Summary

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.

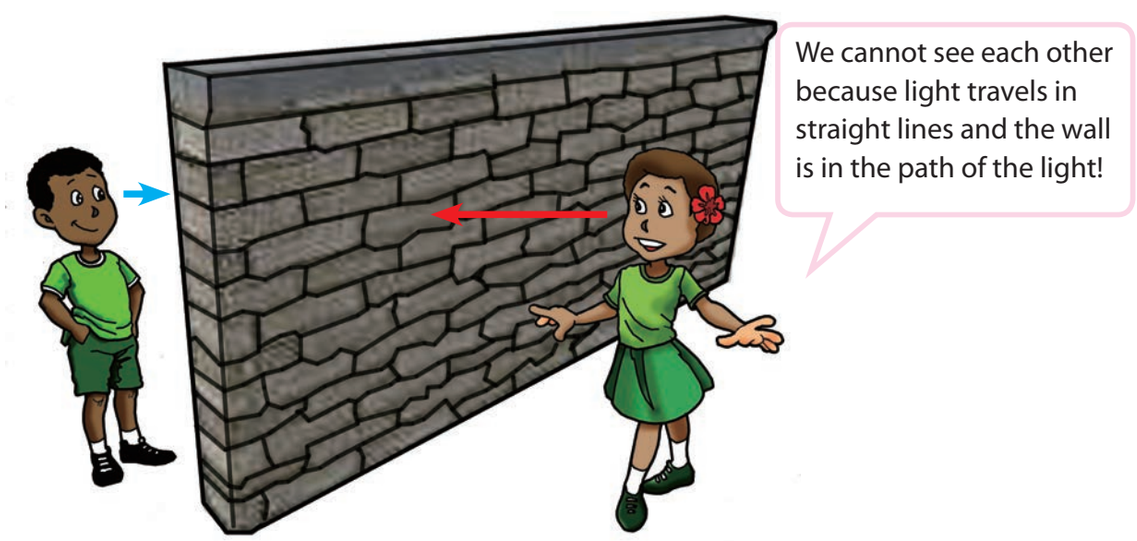


Light can travel through all the holes when the holes are in a straight line.



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.



Lesson 3: "Light Passing Through Objects"

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.

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

Activity : Can light pass through?

What We Need:

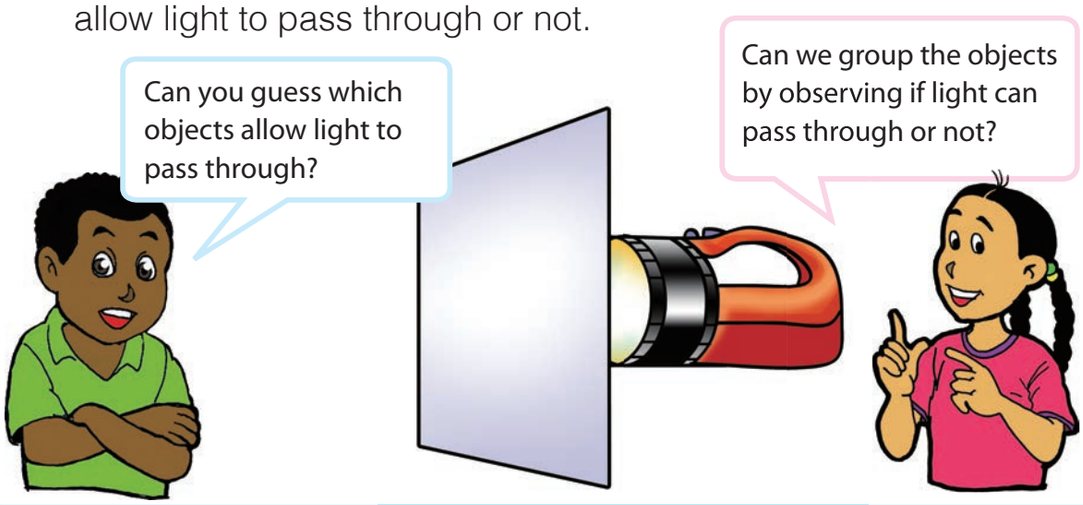
- water, glass cup, tissue paper, plastic bag, stone, book, other objects you want to check, flashlight

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.

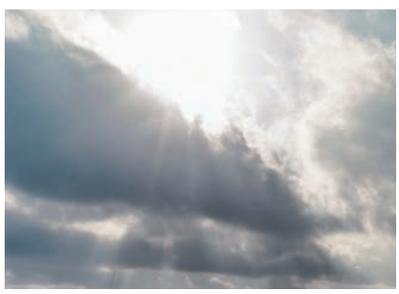


Summary

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

Lesson 4: "Formation of Shadow"

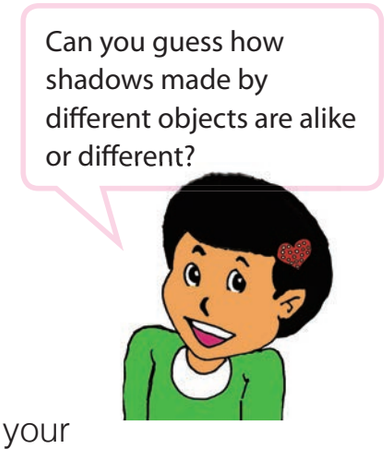
There are three kinds of objects; transparent, translucent and opaque. How are shadows made when light is blocked by these objects? Are all shadows alike or different?

How is a shadow made?

Activity : Shadows made by different objects

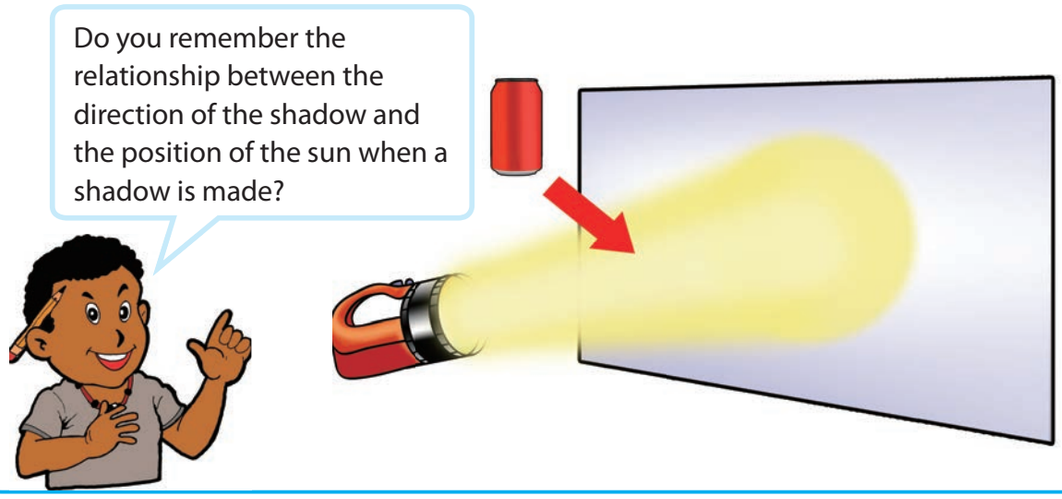
What We Need:

- 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.



Result

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

Examples of Results

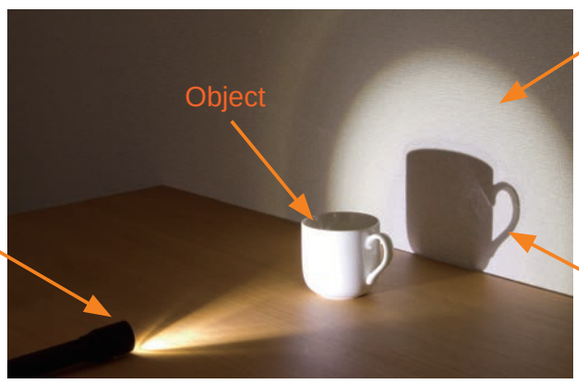

An opaque object


A translucent object


A transparent object

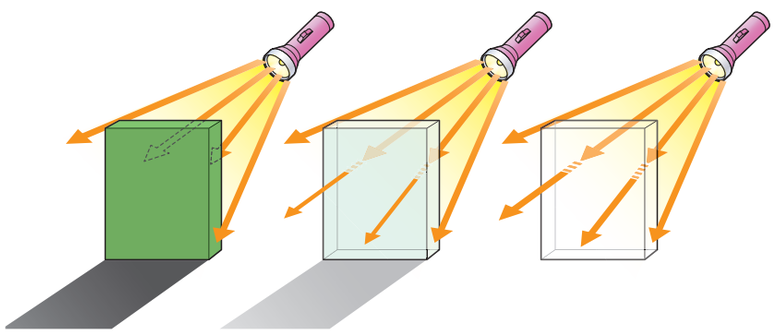
Summary

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.



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

Lesson 5: "Shape and Size of Shadow"

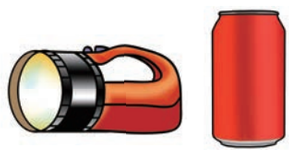
When we observe a shadow on the ground during the day its shape and size changes. The shape and size of a shadow is not always the same.

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

Activity : Changing the shape and size of a shadow

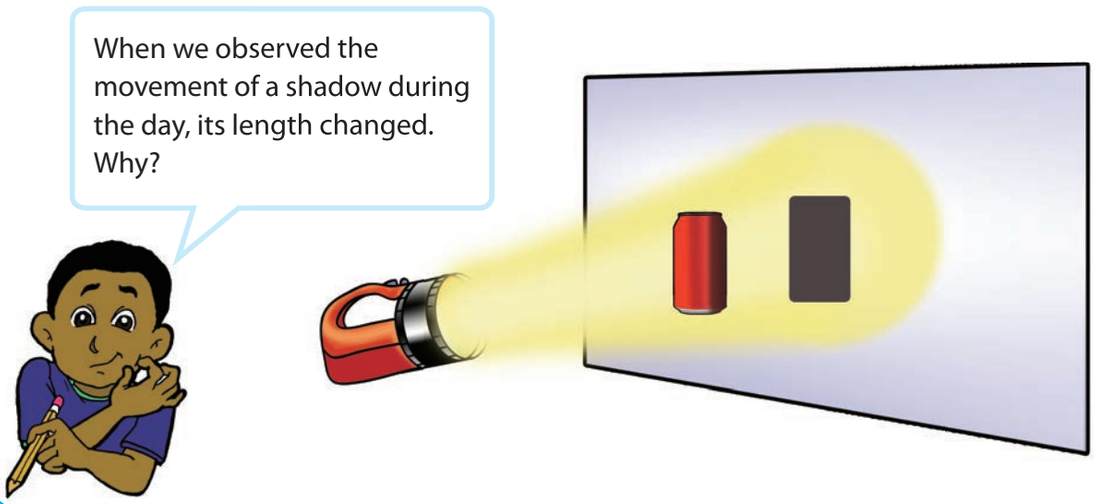
What We Need:

- tin can, flashlight



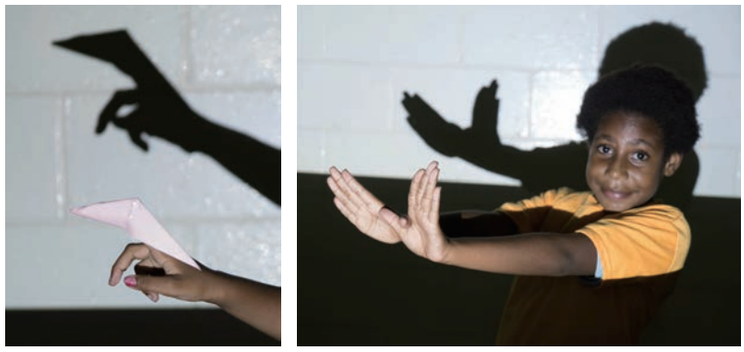
What to Do:

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.



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.

A flashlight closer to a can | Starting position of the flashlight | A flashlight further form a can

Lesson 6: "Light Reflection"

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

Why can we see the objects around us?

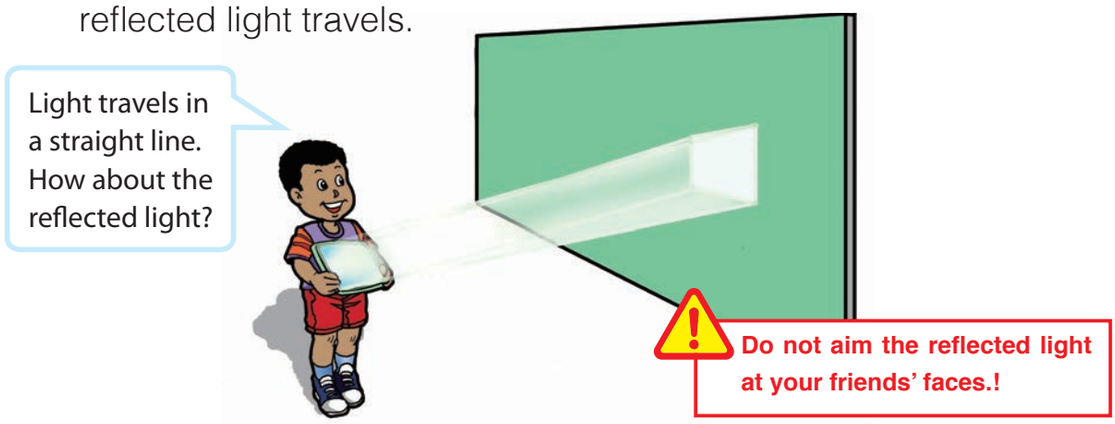
Activity : Light reflected by Mirror

What We Need:

- mirror

What to Do:

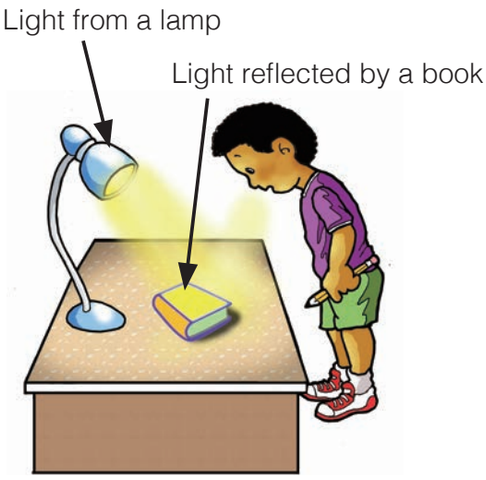
1. Think about what will happen to the light after it is reflected off a mirror.
2. Go out of the classroom with a mirror.
3. Reflect the sunlight using the mirror and aim it at the wall.
4. Decide targets on the wall and shine the reflected light on the targets by moving the mirror.
5. Observe how the 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.



Summary

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.

Lesson 7: "Gathering Light"

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

What will happen if light is gathered?

Activity : Observing brightness and warmth of Light

What We Need:

- hand lens, black paper

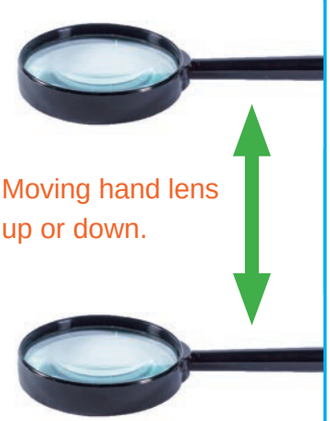
Do not look at the Sun through the lens.

What to Do:

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

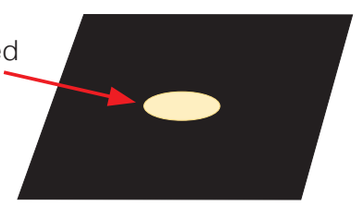
Size of Light	Brightness	Change in Paper
Biggest		
Smallest		

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 place your hand between the lens and the paper.

The light gathered by a hand lens



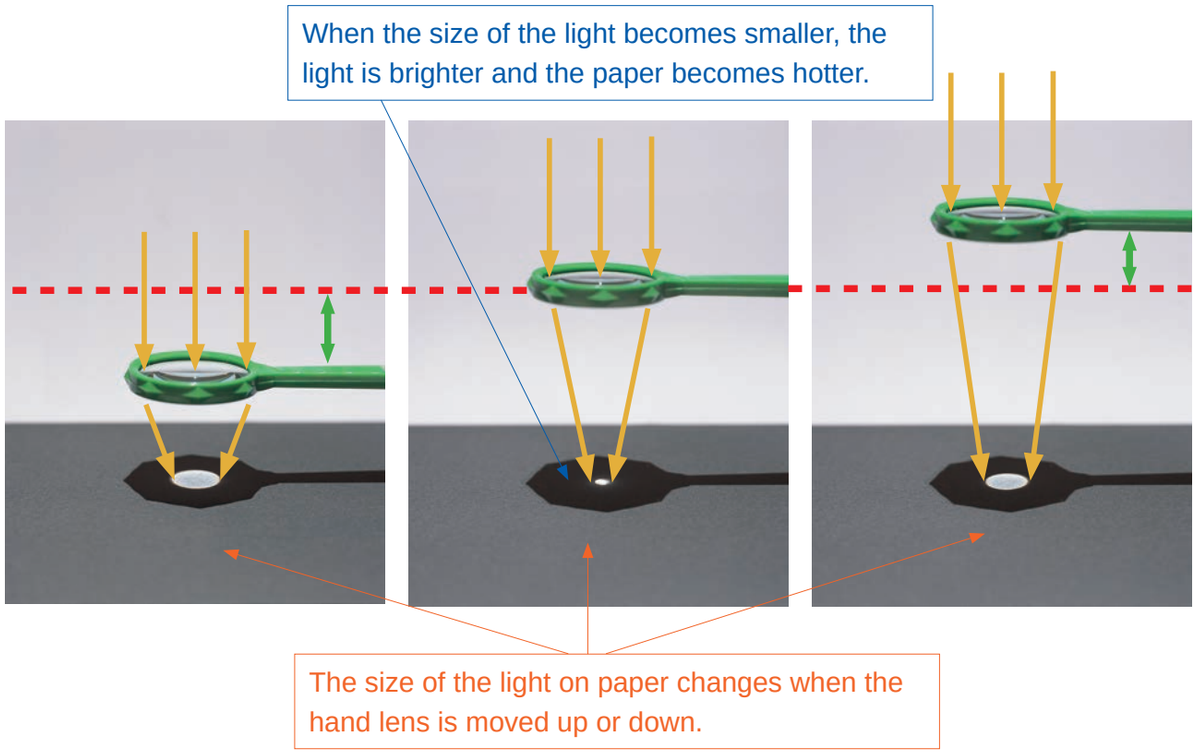
Result

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.



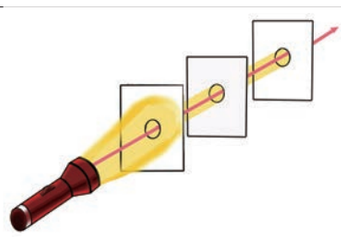
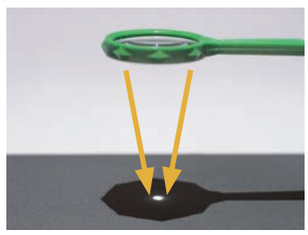
Summary and Exercise

Summary 7.1 Properties of Light

Light

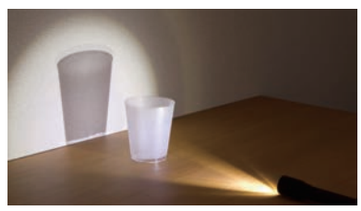
- Light is a form of energy that helps us to see things.
- Light comes from a light source.

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.

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?

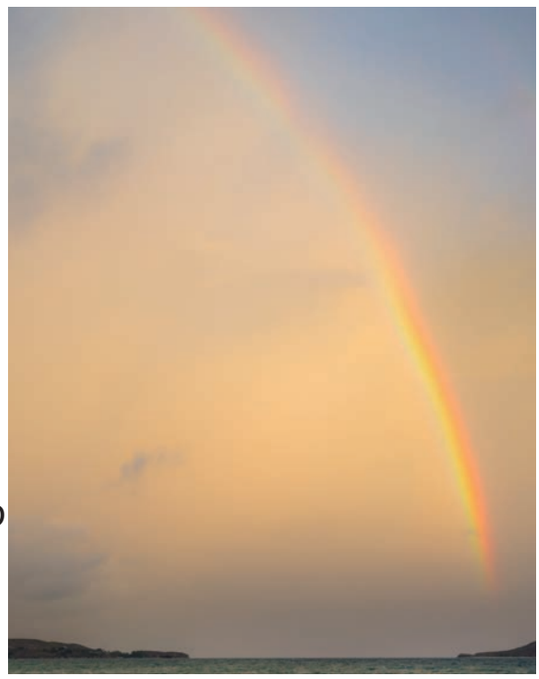
Sun Mirror Diamond Flashlight




(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?

What is a rainbow?


Rainbow in the sky

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.

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.

Chapter Test

7. Light

Q1

Complete each sentence with the correct word.

(1) An object that produces light is called _____ of light.

(2) The _____ provides both heat and light for the earth.

(3) A _____is formed when objects block the light path.

(4) _____ 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.

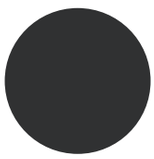
B. The light is reflected off the mirror.

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?

A.	B.	C.	D.
			

Q3

(1) Write two examples of sources of light.

_____

(2) Write two examples of transparent and opaque objects.

Transparent objects: _____

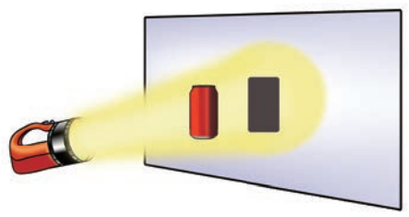
Opaque objects: _____

(3) State what hand lens can do with light?

_____

Q4

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



_____

_____

(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.

_____

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_____

Chapter 8

Magnet

8.1 Properties of Magnet

Lesson 1: "Magnet around Us"

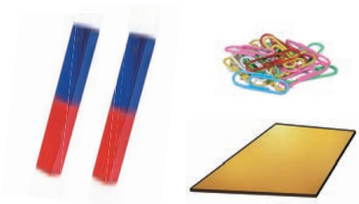
We can find magnets around us. But what are magnets? Let's investigate the wonders of magnets!

What is a magnet?

Activity : What can magnets do?

What We Need:

- two bar magnets, clips, thread, cardboard

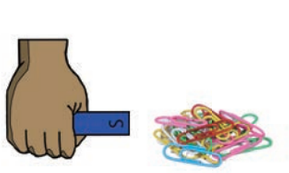


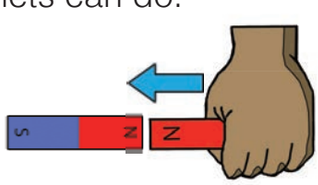
What to Do:

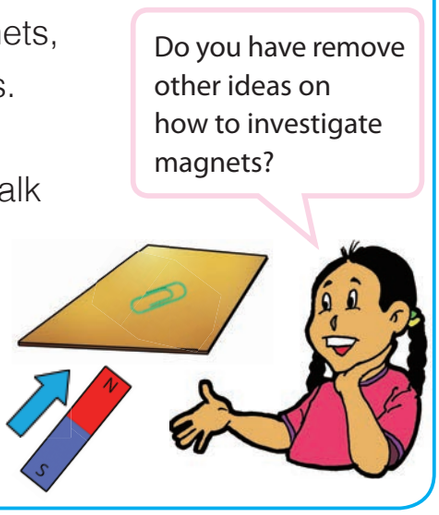
1. Make a table like the one shown below.

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.







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

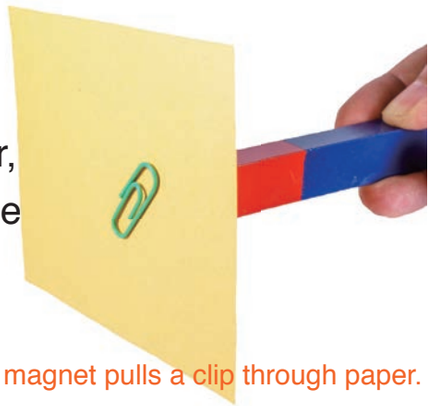
Ring magnet

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.

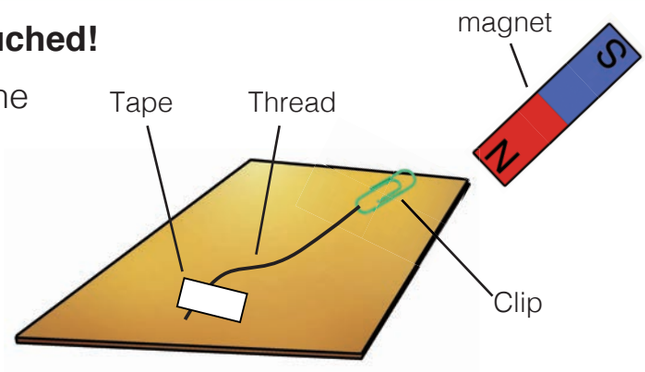


A magnet pulls a clip through paper.

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?



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

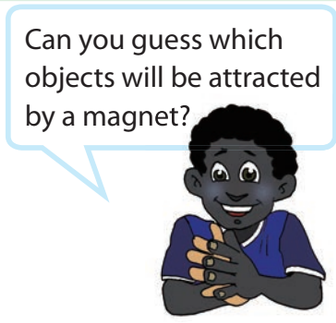
You observed that magnet can attract clips. But can it attract everything?

What things are attracted to a magnet?

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



What to Do:

1. Make a table like the one shown below.

Objects	Prediction	Objects attracted or not attracted to magnet

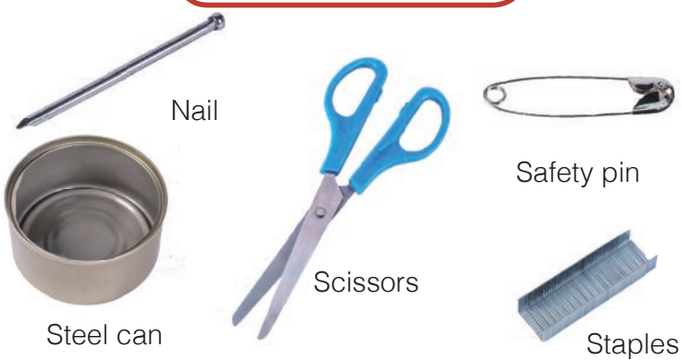
2. Think about what objects are attracted to the magnet or not.
3. Give it a try based on your ideas. Classify objects into two groups; objects attracted to the magnet and objects that are not attracted to the magnet.
3. Write the name of the objects in each group in the table.
4. Share your ideas with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

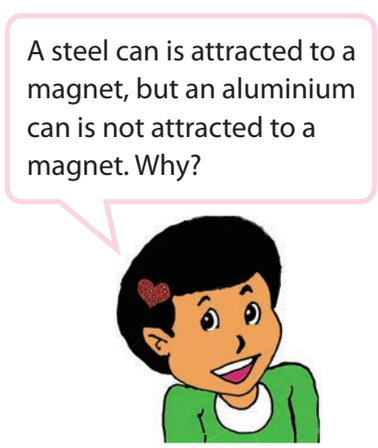
Summary

A magnet attracts magnetic objects.

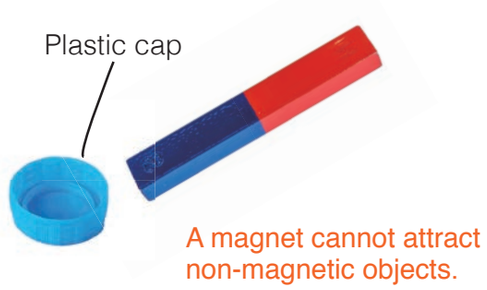
Magnets can attract some objects. An object that is attracted to a magnet is called a **magnetic object.** Most magnetic objects are made of iron. A magnet attracts iron objects even though their shape, colour and size are different.

Magnetic objects





Some objects are not attracted to a magnet. An object not attracted to a magnet is called a **non-magnetic object.** Non-magnetic objects are made from paper, plastic, glass, or wood.



A magnet cannot attract non-magnetic objects.

Non-magnetic objects

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

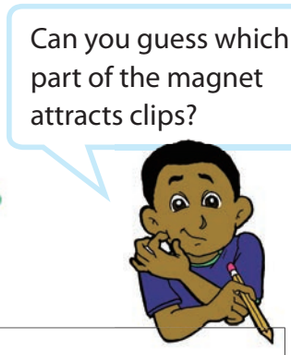
A magnet can attract magnetic objects. Do all parts of a magnet attract magnetic objects?

Which part of the magnet can attract more magnetic objects?

Activity : Attracting as many clips as possible

What We Need:

- bar magnet, clips

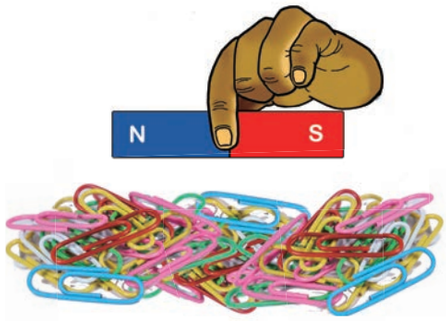


What to Do:

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

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.

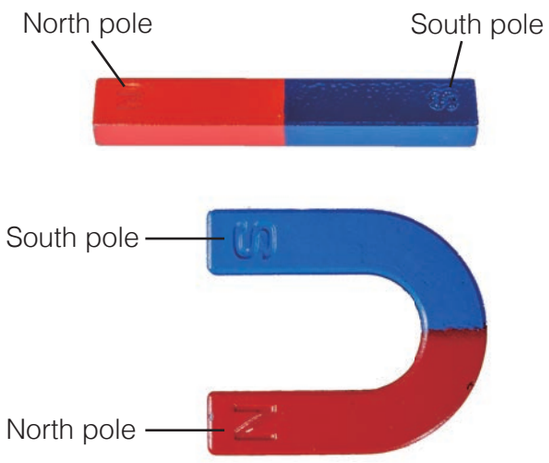


Summary

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?

Lesson 4: "Properties of Poles of Magnets"

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

What happens if the poles are placed near each other?

Activity : Testing the properties of the poles of a magnet

What We Need:

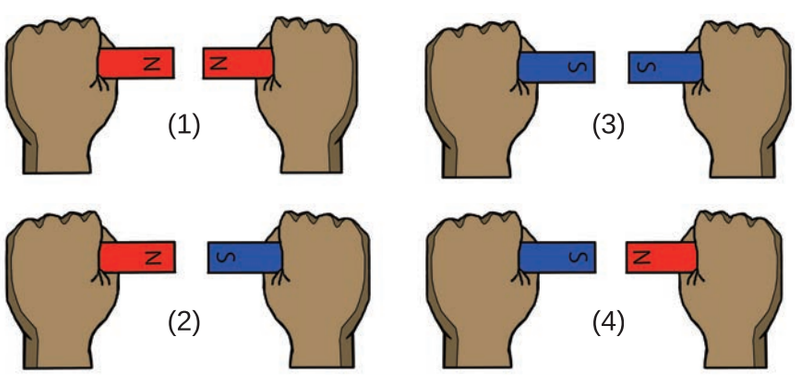
- 2 bar magnets

What to Do:

1. Make a table like the one shown below.

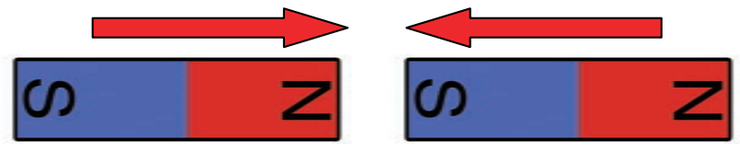
Poles	What happened
(1) North pole and North pole	
(2) North pole and South pole	
(3) South pole and South pole	
(4) South pole and North pole	

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.



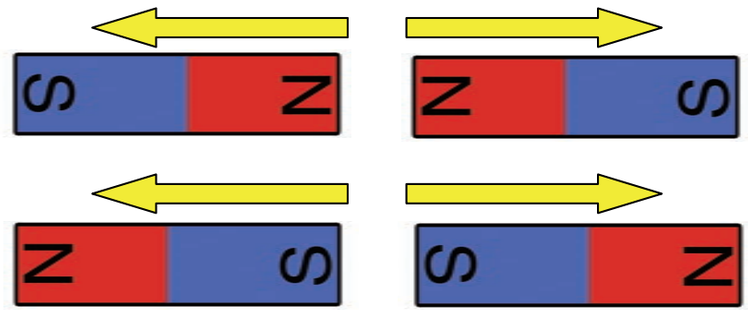
Summary

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.**

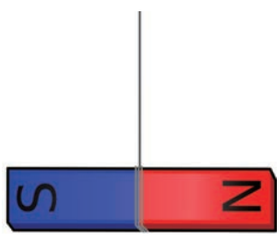


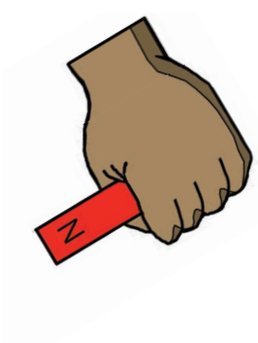
Like poles repel each other.

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?





Lesson 5: "Making a Magnet"

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.

Does an object attracted by a magnet becomes a magnet?

Activity : Can a nail become a magnet.

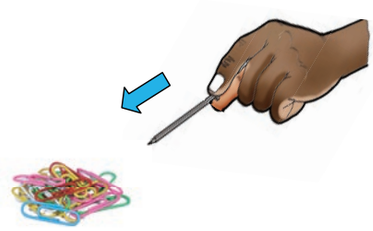
What We Need:

- bar magnet, iron nails, clips

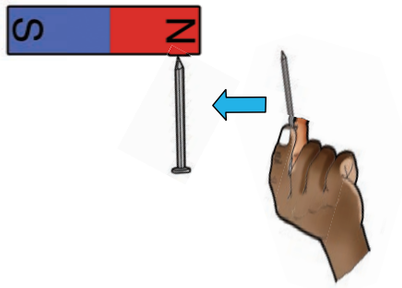
What to Do:

1. Make a table like the one shown below.

	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	



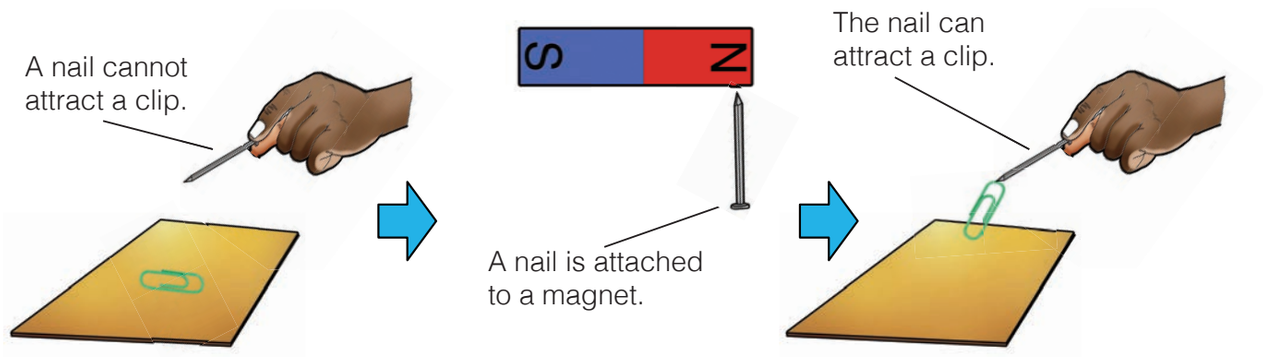
2. Bring the nail close to the clips and observe whether the clips will be attracted to the nail or not. Record your observations in the table.
3. Place the nail on the magnet and then attach another nail to the first nail. Observe what happens to the nails. Record your observations in the table.



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.

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.

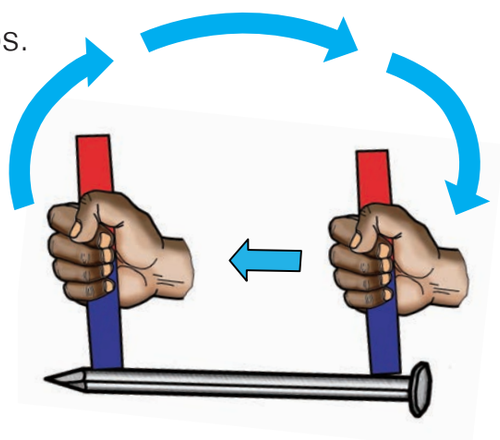
Summary

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

Try it!

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!



Lesson 6: "Which Way?"

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

How can we find the direction using a magnet?

Activity : The direction a magnet points to

What We Need:

- bar magnet, water, plastic basin, plastic tray

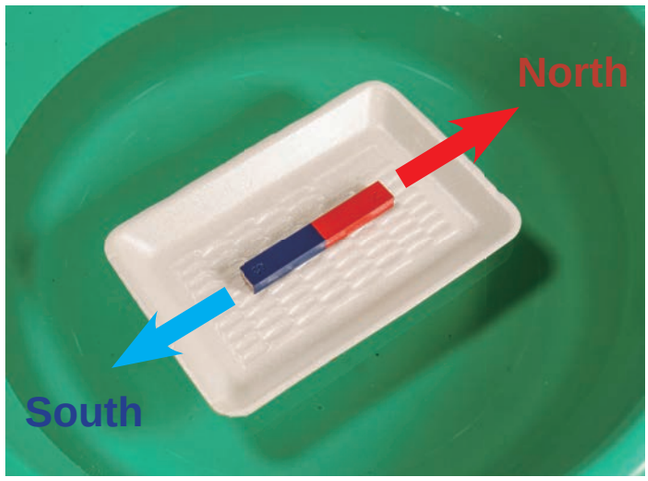


What to Do:

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.

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.

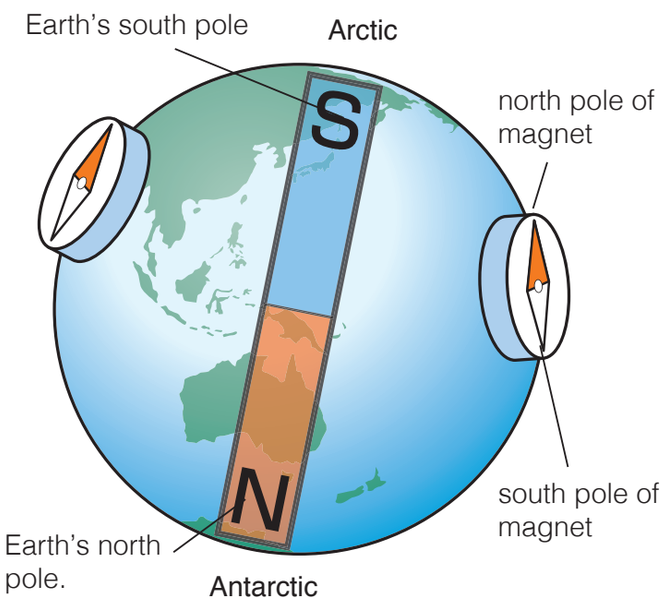


The north pole of the magnet always points North.

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.

Summary and Exercise

Summary 8.1 Properties of Magnet

Properties of Magnet


Bar magnet

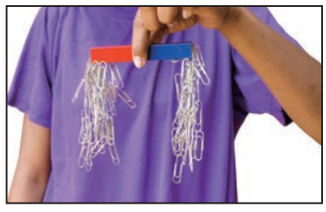

Horseshoe magnet


Circular magnet

- Magnets can attract magnetic objects that are made of iron.
- Objects not attracted to a magnet are called non-magnetic objects.

Magnetic objects			Non-magnetic objects			
 Nail	 Safety pin	 Steel can	Plastic spoon	 Glass cup	 Pencil	 Aluminium can

- The parts where a magnet attracts objects more strongly are called poles.
- All magnets have two poles, the north pole and south pole.

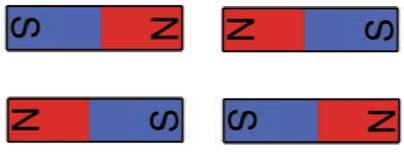


Attracting and Repelling

- Unlike poles of magnets, North - South, attract each other.
- Like poles of magnets, South - South, North - North repel each other.

Attracting each other

Repelling each other



Making a Magnet

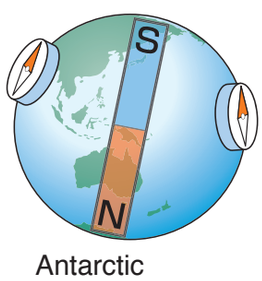
- Once an iron object is attracted to a magnet, the object becomes a magnet

Use of Magnet

- A compass always points north so that if helps us find the direction.


Compass

- The Earth is a big magnet. The earth's south pole is near the Arctic, and the earth's north pole is near the Antarctic



Summary and Exercise

Exercise 8.1 Properties of Magnet

Q1. Complete each sentence with the correct word.

(1) A magnetic object is made of _____.

(2) A magnet has north pole and _____ pole.

(3) The north pole and _____ pole of magnets attract each other.

(4) The north pole and north pole of magnets _____ each other.

Q2. Choose the letter with the correct answer.

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

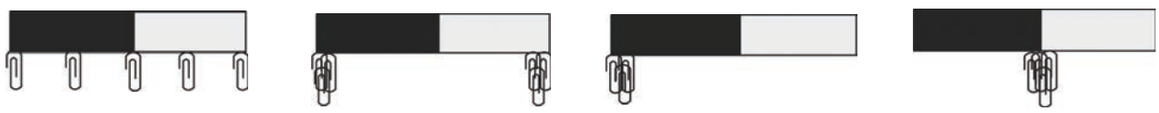
A. Some kind of magnets have only one pole.

B. All metals are magnetic objects.

C. An iron nail will become a magnet once the nail is attracted to a magnet.

D. Unlike poles of magnets push away each other.

(2) Which place at the bar magnet will attract more steel clips?



A. Same at any place B. At both ends C. On one end only D. At the centre of the magnet

Q3. Answer the following question.

Which of the following objects are attracted by a magnet?

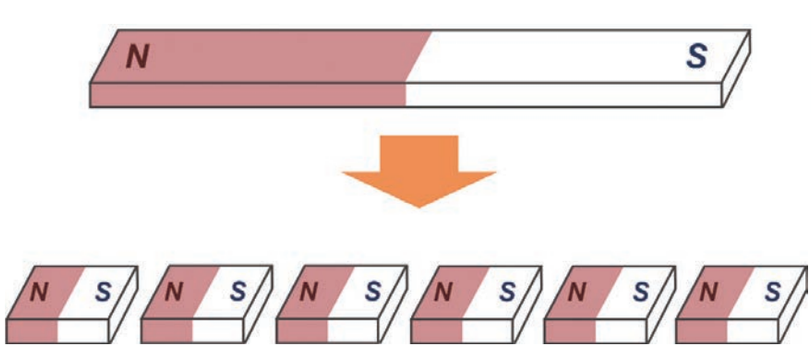
A. Plastic bottle 	B. Iron nail 	C. Text book 	D. Aluminium can 	E. Steel clip 
F. Wood ruler 	G. Rubber band 	H. Scissors 	I. Glass bin 	J. Staples 

Q4. Explain why the north pole of a compass always points to the North.

What happens when you cut a magnet?

Let's guess what happens when you cut a magnet into two pieces? Do you think the two pieces are still magnets?

When you cut a bar magnet into two pieces, the two pieces are still bar magnet. At the cutting edge, new poles are created, so that the piece has both the north and south poles. In addition, what will happen if the pieces are cut further? Interestingly, a magnet is still a magnet even if it is broken down into small pieces.



Chapter Test

8. Properties of Magnet

Q1

Complete each sentence with the correct word.

(1) A magnet attracts objects made of _____.

(2) Objects attracted by a magnet are called _____ objects.

(3) The two ends of a bar magnet are its _____.

(4) The south and north poles of magnets _____ 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

Q3

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

_____

_____

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

_____

_____

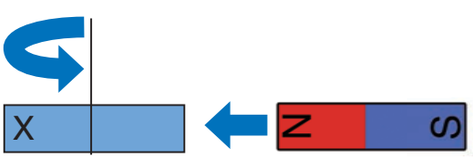
(3) How is a bar magnet similar to a horseshoe magnet?

_____

_____

Q4

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



Magnet A Magnet B

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

_____

_____

_____