

# SCIENCE

YEAR 4

SCIENCE

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KURIKULUM STANDARD SEKOLAH PENDAH  
**KSSR**  
(SEMAKAN 2017)  
KEMENTERIAN PENDIDIKAN MALAYSIA





## **RUKUN NEGARA**

**Bahawasanya Negara Kita Malaysia**  
mendukung cita-cita hendak:

Mencapai perpaduan yang lebih erat dalam kalangan  
seluruh masyarakatnya;

Memelihara satu cara hidup demokrasi;

Mencipta satu masyarakat yang adil di mana kemakmuran negara  
akan dapat dinikmati bersama secara adil dan saksama;

Menjamin satu cara yang liberal terhadap  
tradisi-tradisi kebudayaannya yang kaya dan pelbagai corak;

Membina satu masyarakat progresif yang akan menggunakan  
sains dan teknologi moden.

MAKA KAMI, rakyat Malaysia,  
berikrar akan menumpukan  
seluruh tenaga dan usaha kami untuk mencapai cita-cita tersebut  
berdasarkan prinsip-prinsip yang berikut:

**KEPERCAYAAN KEPADA TUHAN**  
**KESETIAAN KEPADA RAJA DAN NEGARA**  
**KELUHURAN PERLEMBAGAAN**  
**KEDAULATAN UNDANG-UNDANG**  
**KESOPANAN DAN KESUSILAAN**

(Sumber: Jabatan Penerangan, Kementerian Komunikasi dan Multimedia Malaysia)

Dengan ini, **SAYA BERJANJI** akan menjaga buku ini  
dengan baiknya dan bertanggungjawab atas kehilangannya,  
serta mengembalikannya kepada pihak sekolah pada  
tarikh yang ditetapkan.

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Nombor Perolehan: _____			
Tarikh Penerimaan: _____			
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STANDARD-BASED CURRICULUM FOR PRIMARY SCHOOL (REVISED 2017)  
DUAL LANGUAGE PROGRAMME

# SCIENCE

## YEAR 4

### WRITERS

Mohd Ramadhan bin Anwar  
Mohammad Fazli bin Othman  
Siti Roha binti Abd. Karim  
Ahmad Pua'ad bin Ibrahim

### TRANSLATORS

Rugayah binti Tambi  
Radziah binti Mohd Yamin  
Sharifah Rohaiza binti Syed Omar

### EDITORS

Marliana binti Shamsir  
Ana Suhana binti Zainuddin  
Mohamad Arshad bin Sulaiman

### GRAPHIC DESIGNERS

Muhamad Helmy bin Abdul Malik  
Saiful Azli bin Saaidin

### ILLUSTRATOR

Nurul Nazihah binti Mohd Som



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# INTRODUCTION

The contents of this *Science Year 4 Textbook* are written and interpreted based on the Standard Curriculum and Assessment Document (DSKP) Science Year 4 of the Standard-based Curriculum for Primary School (Revised 2017). The production of this book is aimed at fulfilling the new policy under the Malaysia Education Blueprint 2013-2025 that integrates knowledge, values, 21st Century Learning Skills (PAK-21), Higher Order Thinking Skills (HOTS) through the Science, Technology, Engineering and Mathematics (STEM) approach explicitly. This curriculum is also aimed at providing education comparable to international standards. Thus, this book is expected to contribute towards positive outcomes of pupils.

This textbook consists of 10 units that cover six themes: Inquiry in Science, Life Science, Physical Science, Material Science, Earth and Space as well as Technology and Sustainability of Life. The contents of this book are designed to stimulate and capture pupils' interest in learning both in the classroom or independently. Every unit in this textbook begins with a stimulus page, a description of the learning contents, activities, conclusion, evaluation, and enrichment activities. To facilitate teaching and learning, answer pages are provided at the end of the book. Science Info contains additional information as added values to the contents of the topics discussed.

To ensure the goals and objectives of the Science Standard-based Curriculum for Primary School (Revised 2017) are achieved, the contents of this textbook emphasise aspects of HOTS that focus on inquiry and project-based learning approaches. In addition, existing elements of learning across the curriculum are added with elements of creativity, innovation, entrepreneurship and Information and Communication Technology (ICT). In addition, values, positive attributes, and good working culture are also incorporated in this textbook.

The teaching and learning strategies in the curriculum standard prioritise thoughtful learning, acquisition and mastery skills as well as emphasising pupils' knowledge to the optimum level. The STEM approach is integrated in a contextual and authentic approach in order to inculcate a harmonious learning environment among pupils through investigative activities. Fun and enjoyable learning experiences are stimulated through weaving edutainment with the subject content.

Therefore, the panel of writers hopes that this book will trigger new ideas for teachers to enhance their teaching and learning effectiveness. It is also hoped that pupils will find this book interesting and will utilise it in their learning.

# ICON DESCRIPTIONS



## FUN ACTIVITY

Activities that help pupils to master the learning standards through innovative and creative methods either individually, in pairs or in groups.



## LET'S TEST

Investigative science activities that help pupils to master the learning standards.



## FUN SCIENCE

Interesting and challenging enrichment activities that encourage fun learning and appreciation of the contents of each unit.



## MIND REFLECTION

Brief notes on the contents at the end of each unit.



## MIND TEST

Questions aimed at assessing pupils' understanding at the end of each unit.



Higher Order Thinking Skills (HOTS) that can test pupils' thinking skills on the content learned.



Safety aspects that pupils need to be aware of while doing activities.



Additional information of learning materials that can be scanned and accessed using a smartphone.



Learning standards as in the Standard Curriculum and Assessment Document (DSKP).

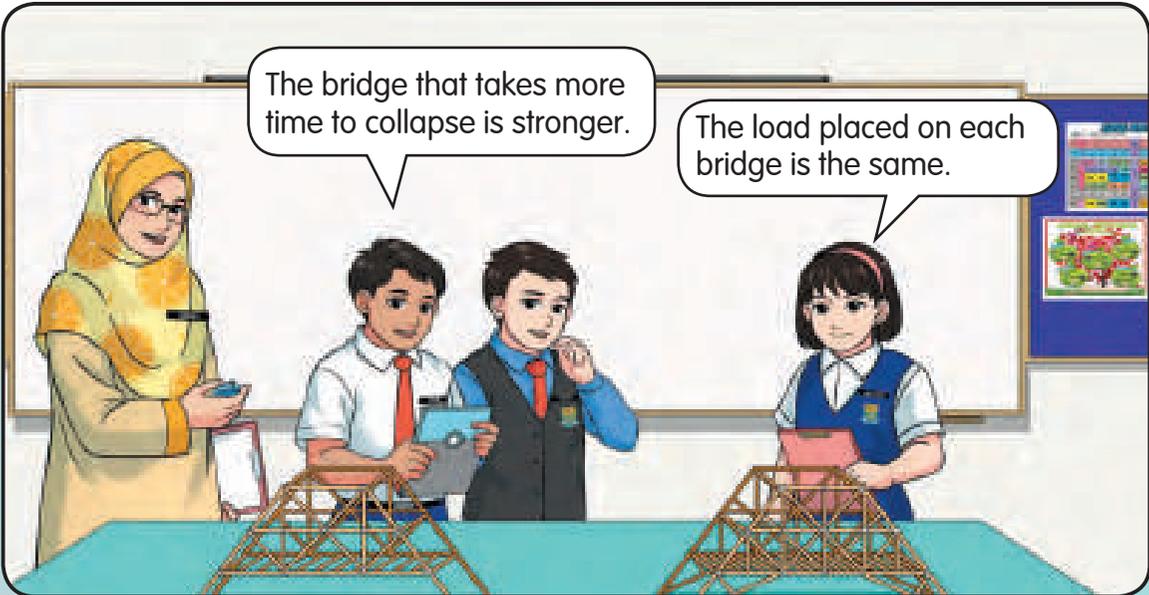


Guide and supplementary information to assist teachers during teaching and learning activities.

# UNIT 1

# SCIENTIFIC SKILLS

Two groups of Year 4 pupils participate in a model bridge construction competition. They use the scientific process skills throughout the competition.



Oh no, our model has almost collapsed! Why?

It looks like we have to improve our bridge design.

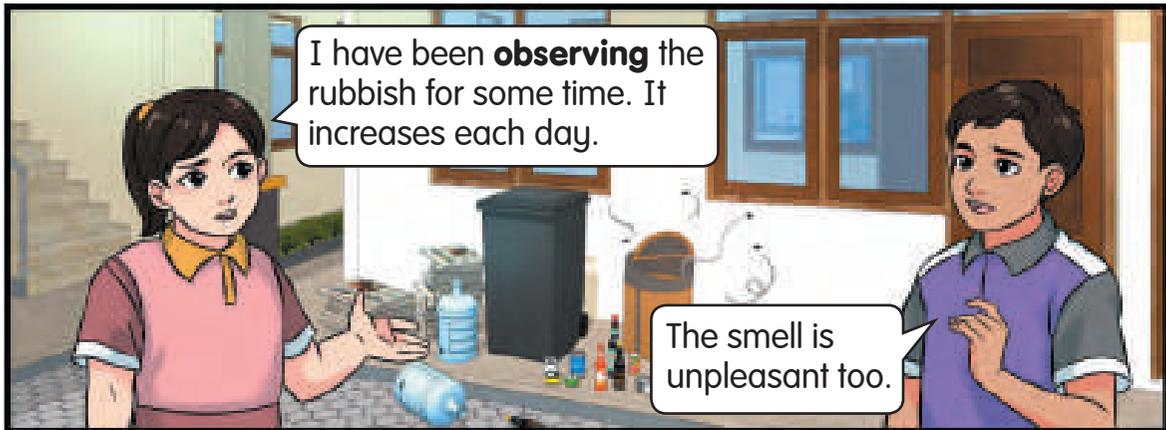
Model A

Model B

How can you help Group A to win the competition?

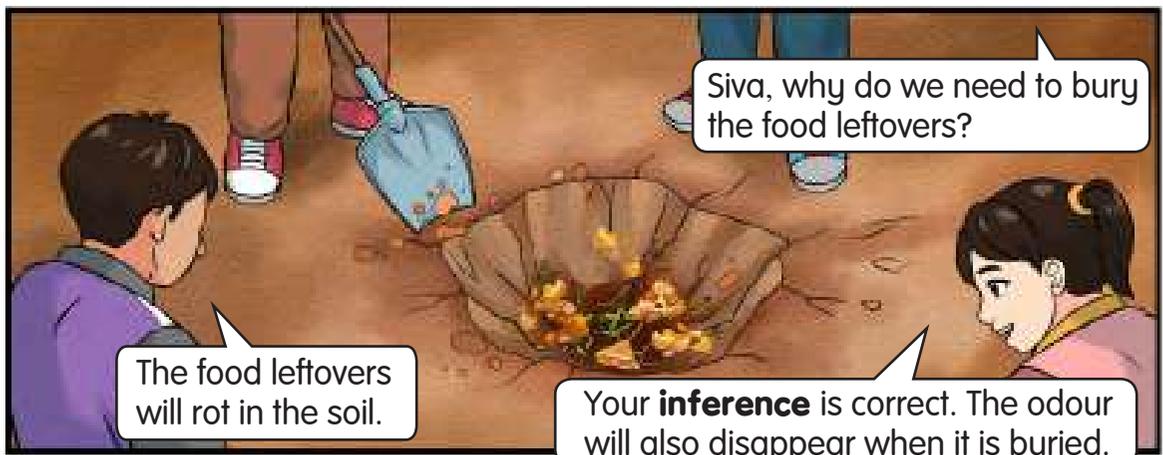
## Science Process Skills

Do you still remember the science process skills that you have learned? The science process skills help us to scientifically understand objects and our surroundings. Let us observe the situation below.



They are **discussing** ways to dispose of the rubbish.

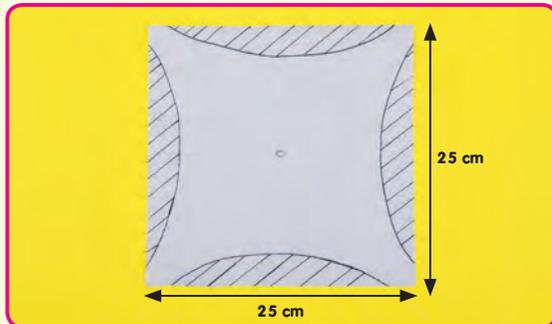




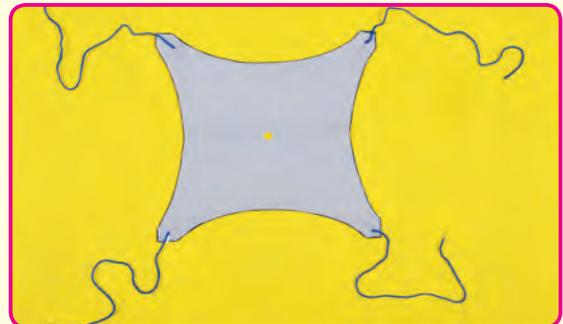
Based on the situation above, list the science process skills that they have applied.

**Apparatus and Materials**

Scissors, knife, ruler, tracing paper, thread, paper clip, stone, stopwatch, adhesive tape

**Steps**

1. Sketch two squares with a measurement of 25 cm. Cut and make a hole at the centre of the tracing paper.



2. Cut four 30 cm-length of threads. Stick each thread to each corner of the paper. Tie all the ends of the threads together into a knot.



3. Make a second parachute. Hang a paper clip that is tied to a stone at the end of the parachute.



4. Drop both parachutes from any high place at the same time. Observe the time taken for each parachute to reach the ground.

**Questions**

1. Which parachute reaches the ground faster?
2. If the parachute had holes at the sides, what would you observe?



## FUN ACTIVITY

## Classifying Objects

GROUP  
ACTIVITY

### Apparatus and Materials

Wooden ruler, popsicle stick, metal spoon, glass plate, lens, marbles, hockey stick

### Steps

1. Identify a characteristic to classify the objects.
2. Construct a classification table of different characteristics.

### Question

State the characteristics that you have identified to classify the objects.



## FUN ACTIVITY

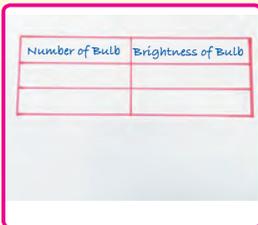
## Brightness of a Bulb

GROUP  
ACTIVITY

### Apparatus and Materials

3 bulbs with holders, 7 wires, 2 dry cells with holders, 2 switches

### Steps

1.  Build a complete circuit with one bulb. Observe its brightness.
2.  Build another complete circuit with two bulbs. Observe their brightness.
3.  Record the observations in a table.
 

Number of Bulb	Brightness of Bulb
4.  Present the observations to the class.

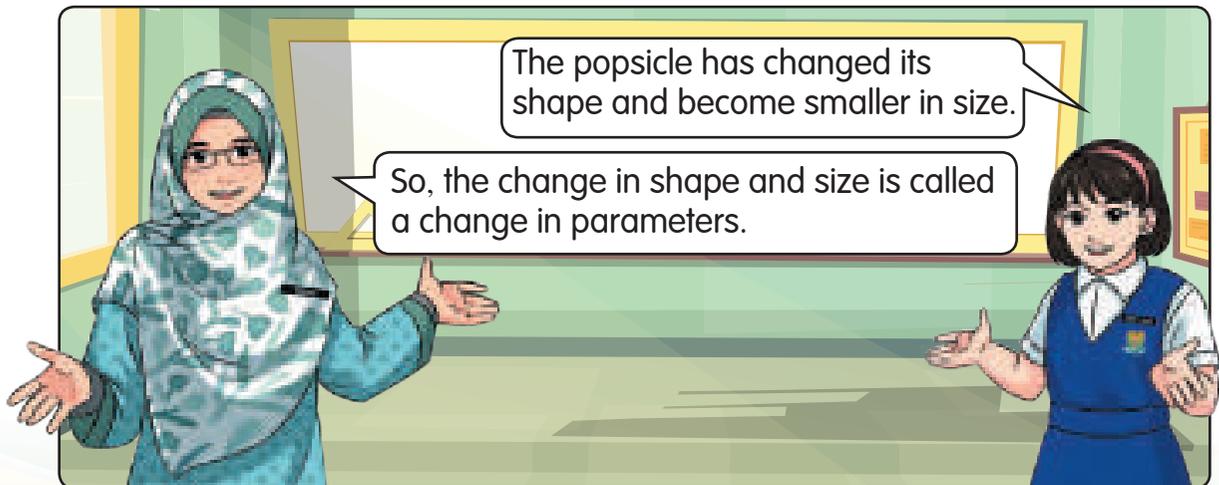
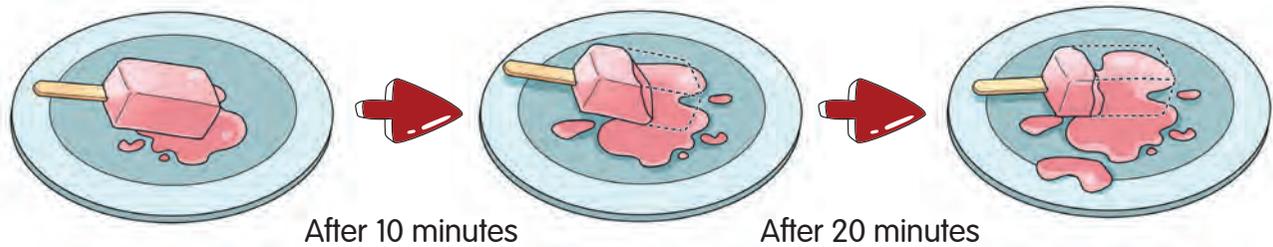
### Questions

1. Other than tables, what other presentation methods can be used?
2. Predict the brightness of the bulbs if the activity is repeated using three bulbs.

## Using Space-Time Relationship

Using space-time relationship is a skill that describes changes of situations or phenomena based on the changes in parameters over time. The examples of parameters are location, direction, shape, size, volume, and weight.

What changes can be observed when a popsicle is placed under the sunlight for 20 minutes?



What is the relationship between the shape and size of the popsicle and the time taken based on the investigation above?

As time increases, the shape of the popsicle becomes irregular and the size becomes smaller.

Therefore, the relationship between space and time in the situation above is, as time increases, the shape of the popsicle becomes irregular and it decreases in size.

**Apparatus and Materials**

1 cup of wheat flour, 150 ml of warm water, 1 teaspoon of yeast, 1 teaspoon of sugar, plastic container, blue and red marker pens

**Steps**

1. Put wheat flour, sugar, and yeast into the plastic container. Then, mix using a spoon.



2. Pour 150 ml of warm water and stir the mixture until it becomes a dough.



3. Flatten the dough inside the container. Mark the initial level of the dough using a blue marker pen. Leave the dough for 30 minutes.



4. Mark the final level of the dough using a red marker pen. Then, discuss the changes in parameter over time in this activity.

**Question**

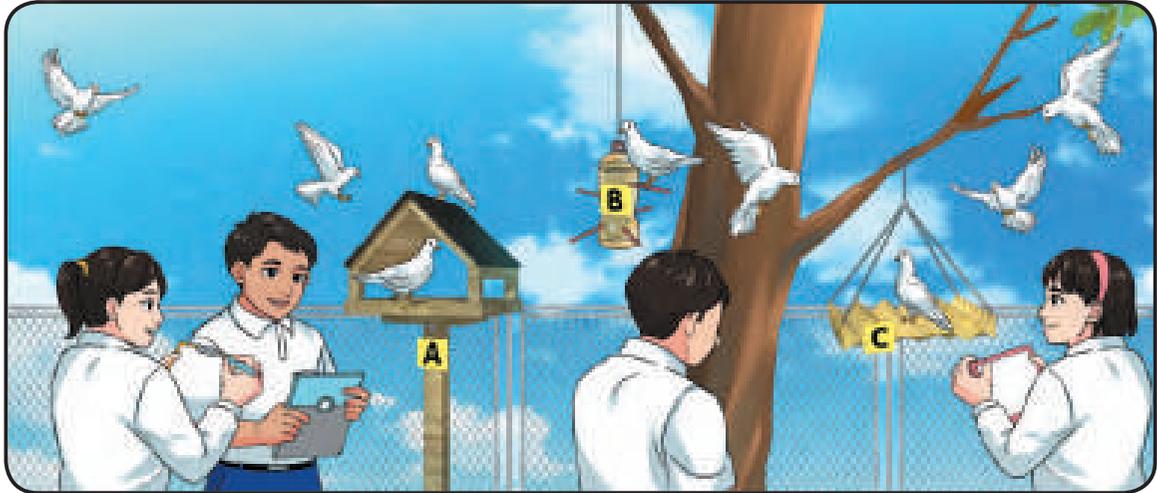
How does the parameter of the dough change over time?



Hafiz released an inflated balloon into the air from the ground floor of the school. After 10 seconds, the balloon deflated and was found on the first floor. What are the changes in the parameters over time?

## Interpreting Data

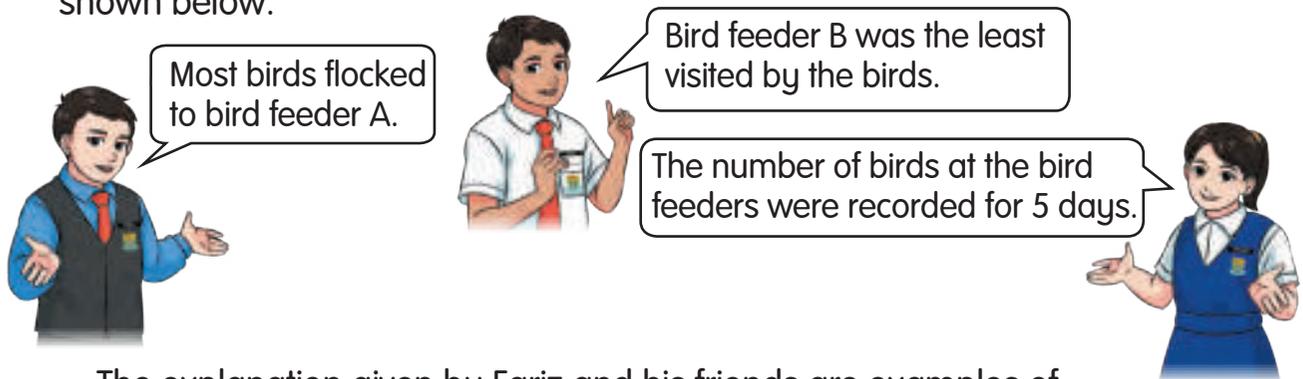
Interpreting data is a skill to give rational description about objects, events or patterns from collected data.



Fariz and his friends built three bird feeders. The number of birds that flock to the bird feeders is recorded as shown in the table below.

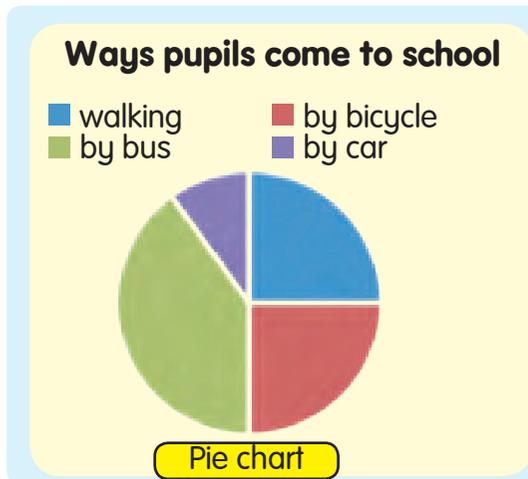
Bird feeder	Number of birds					Total number of birds
	Day 1	Day 2	Day 3	Day 4	Day 5	
A	4	8	7	9	5	33
B	2	4	5	5	4	20
C	3	6	8	7	2	26

Then, they explained about the data collected to their other friends as shown below.



The explanation given by Fariz and his friends are examples of interpretation of data.

Observe the examples of data interpretation based on the diagrams below.



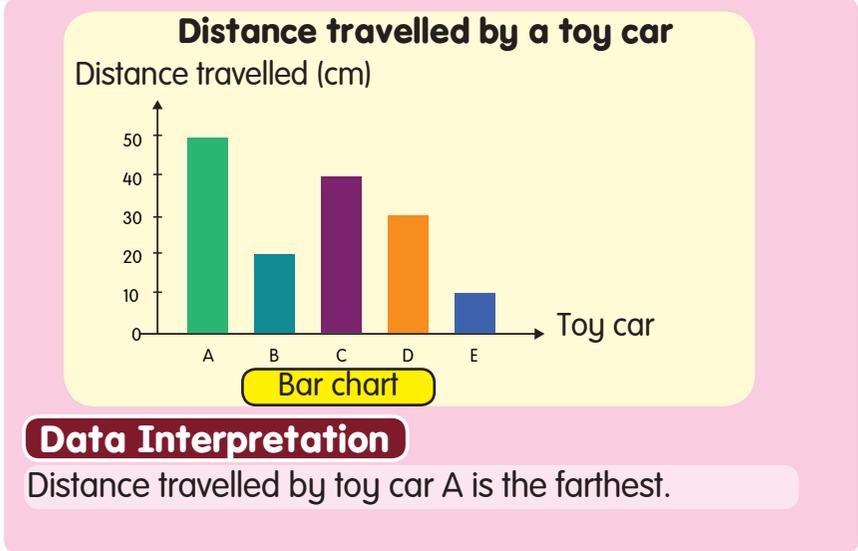
#### Data Interpretation

The number of pupils riding a bicycle to school is the same as those walking.

Which is the main mode of transportation for pupils to come to school?

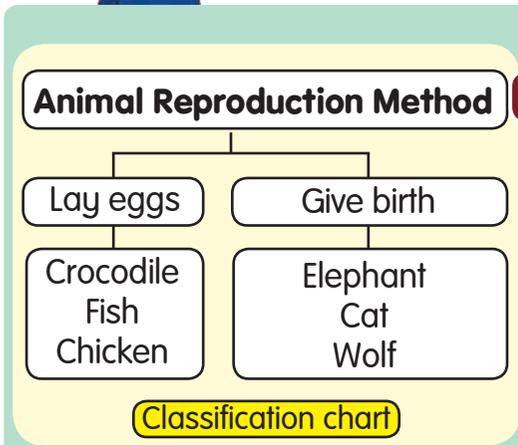


What is the difference in the distance travelled by toy cars A and E?



#### Data Interpretation

Distance travelled by toy car A is the farthest.



#### Data Interpretation

Crocodile, fish, and chicken lay eggs, while elephant, cat, and wolf give birth.

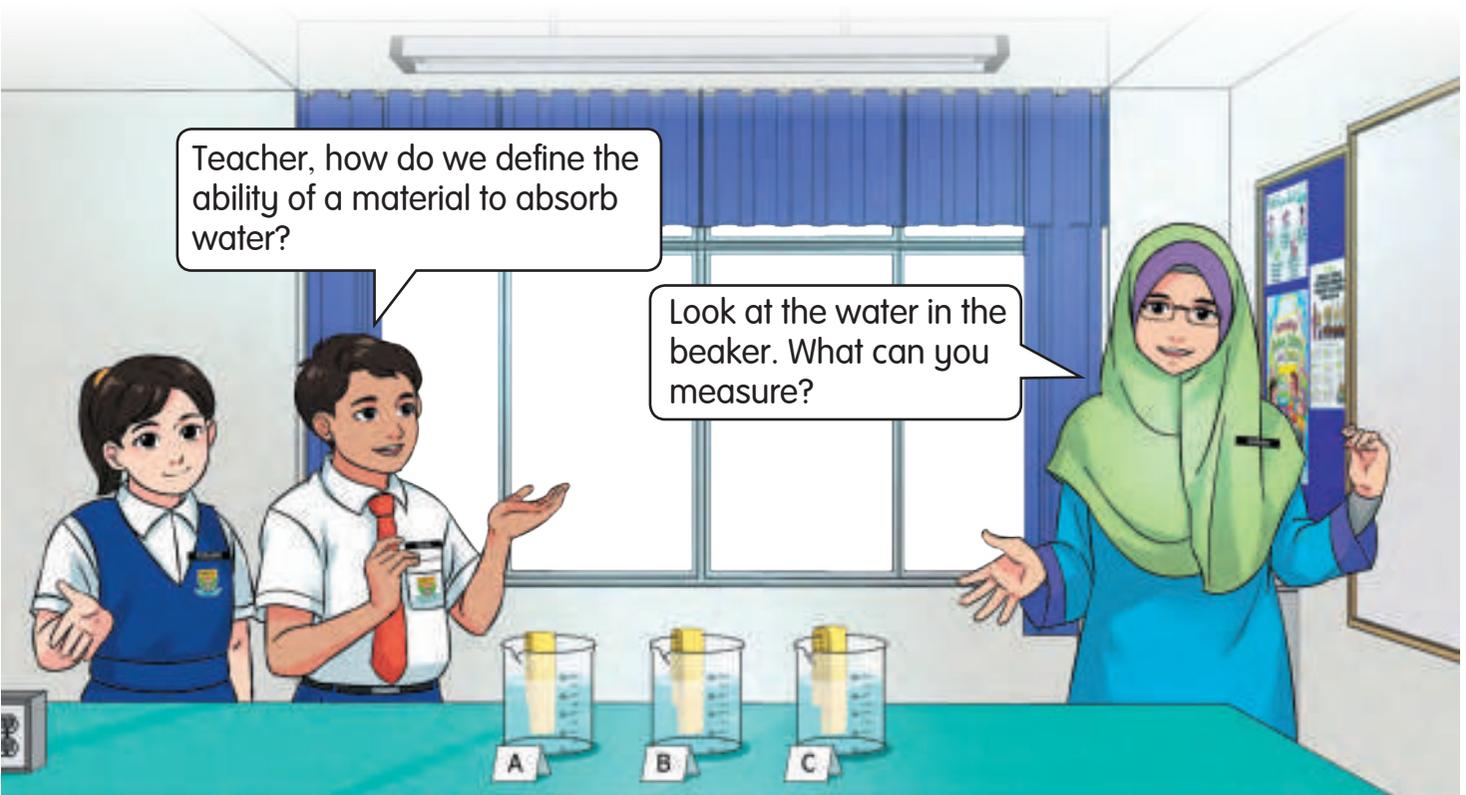
How many methods of animal reproduction are there?



## Defining Operationally

Defining operationally is a skill to define a concept by stating what can be carried out and observed.

Siva and Teruni want to test the ability of a material to absorb water. They soak three tissue papers of different thickness in 50 ml of water for one minute. Observe the situation below.

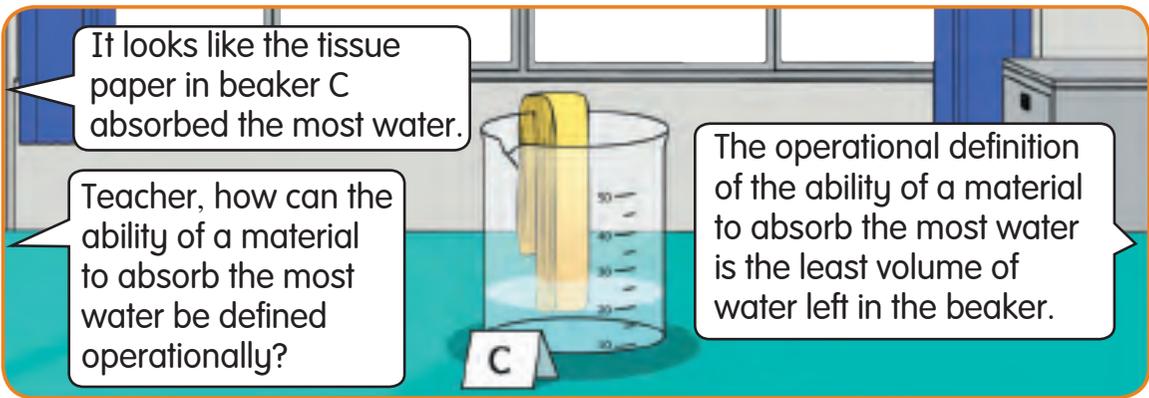


Teacher, how do we define the ability of a material to absorb water?

Look at the water in the beaker. What can you measure?

I can measure the volume of the water left in the beaker.

Therefore, the operational definition of the ability of the material to absorb water is the volume of water left in the beaker.



**LET'S TEST**

**The Growth of a Green Bean Plant**

**Objective**

To define operationally the growth of a green bean plant.



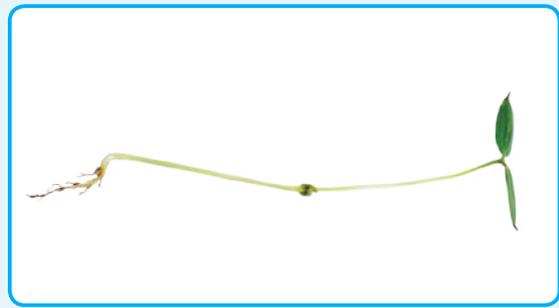
**Apparatus and Materials**

5 green bean seeds, plastic container, cotton, ruler, thread, water

**Steps**



1. Place the green bean seeds on wet cotton. Observe their growth for a week.



2. Take one of the seedlings. Record the number of leaves and height of the seedling.

**Question**

What is the operational definition of the growth of a green bean plant?



Fizah investigates the elasticity of a rubber band. She can stretch the rubber band up to 15 cm and it will snap if she pulls any further. How can Fizah operationally define the elasticity limit of the rubber band?

## Controlling Variables

Variables are factors that can change in an investigation. Let us find out the types of variables in the following situations.

Fariz and Mei Lan were given two plants of the same type. They were required to investigate the amount of water needed for the healthy growth of the plant.



Fariz placed his plant beside the window. He watered his plant with 100 ml of water, once a week.



Mei Lan placed her plant in the cupboard. She watered the plant with 100 ml of water, three times a week.

After a month, Fariz's plant is larger in size.



So, my plant grows better although it is watered once a week.

I think our investigation is unfair. My plant did not get any sunlight.

That is correct. For a fair investigation, we have to make sure that only one variable is manipulated in an experiment.

Alright, teacher. This time, we will only change the volume of water used to water the plants.

A variable that is changed in an investigation is called a **manipulated variable**.

We also have to make sure that other variables remain constant.

So, the amount of sunlight, the type of soil, and the quantity of soil for both plants are the same.

amount of sunlight

quantity of soil

type of soil

Variables that remain constant are known as **constant variables**.

**After one month**

Now, what can you observe?

It looks like my plant is larger in size.

A variable that is observed in an investigation is known as a **responding variable**.



## FUN ACTIVITY

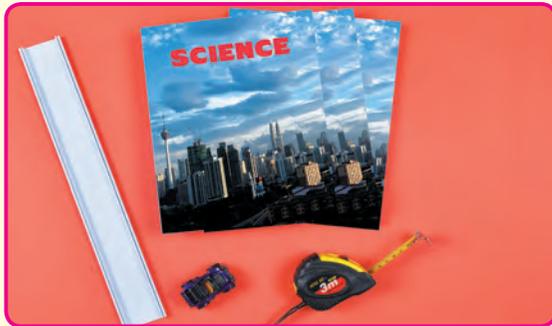
## Far and Near



### Apparatus and Materials

3 books of the same thickness, wire casing, toy car, measuring tape, marker pen

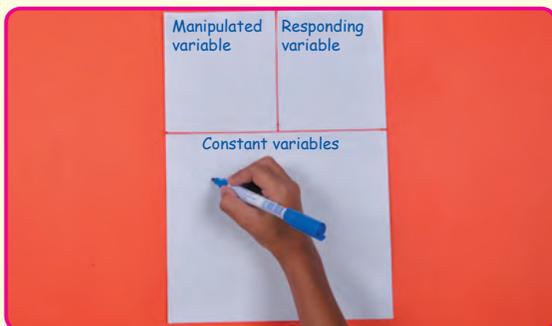
### Steps



1. Plan how to move the toy car to get to different distances using the apparatus and materials mentioned above.



2. Your partner has to list all the relevant variables.



3. Share and discuss your idea with your partner about the variables.



4. Conduct your investigation repeatedly according to the variables that were determined earlier.

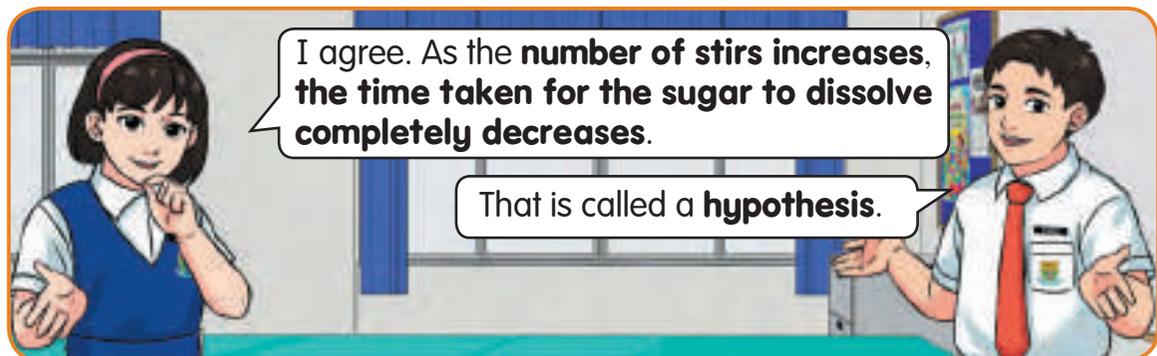
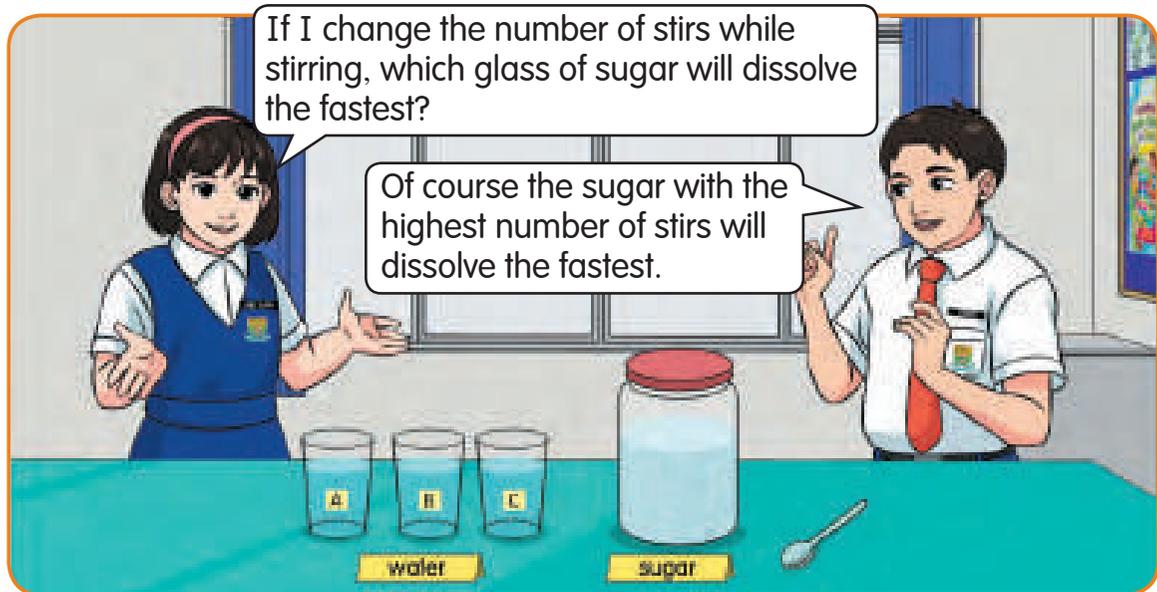
### Question

What are the manipulated variable, responding variable, and constant variables that you have identified?

## Making a Hypothesis

Making a hypothesis is a skill to make a general statement that can be tested about the relationship between the variables in an investigation. Let us follow the situation below.

Mei Lan and Fariz want to investigate whether the number of stirs can reduce the time taken for the sugar to dissolve completely.



They successfully made a hypothesis by relating the manipulated variable, which is the number of stirs, to the responding variable, which is the time taken for the sugar to dissolve completely.

Hypothesis that has been made can be tested by conducting an experiment.

1.1.11  
1.1.12

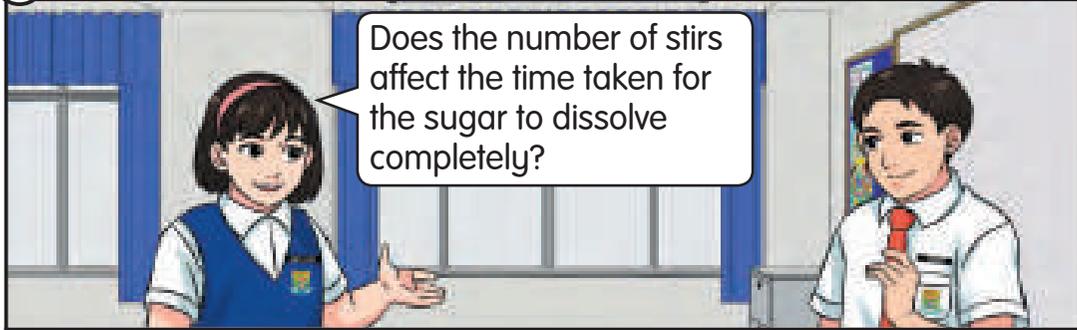


## Experimenting

Experimenting is a skill to plan and conduct an investigation to test a hypothesis by collecting and interpreting data to make conclusions from the investigation.

### Planning an experiment

#### a Identifying the problem and making a problem statement



Does the number of stirs affect the time taken for the sugar to dissolve completely?

Mei Lan and Fariz identified the problem that needed to be tested by making a problem statement.

#### b Making a hypothesis

The more the number of stirs, the lesser the time taken for the sugar to dissolve completely.



Before the investigation, they made a hypothesis.

#### c Controlling the variables

The manipulated variable is the number of stirs.

The responding variable is the time taken for the sugar to dissolve completely.

The constant variables are the quantity of the sugar, the size of the sugar, the volume and the temperature of the water.

They identified all the variables to test the hypothesis made.

d

### Listing the apparatus and materials



#### Apparatus and Materials:

- 3 beakers
- 3 spoons of sugar
- 300 ml warm water
- stopwatch
- glass rod

They listed the apparatus and materials that will be used to conduct the investigation based on the variables that have been identified.

e

### Planning the steps



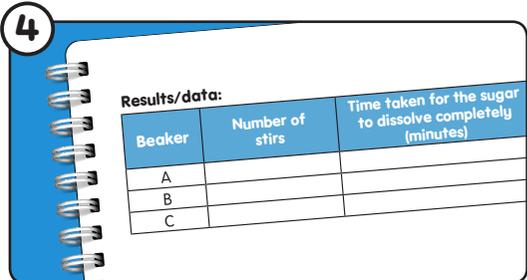
Pour 100 ml of warm water into each beaker; A, B and C.



Place one spoon of sugar into each beaker.



Stir the mixture in beaker A once per minute. Stir the mixture in beaker B, three times per minute. Stir the mixture in beaker C, six times per minute. Record the time taken for the sugar to dissolve completely in each beaker.



Record the observations in the table that has the information about the manipulated variable and the responding variable.

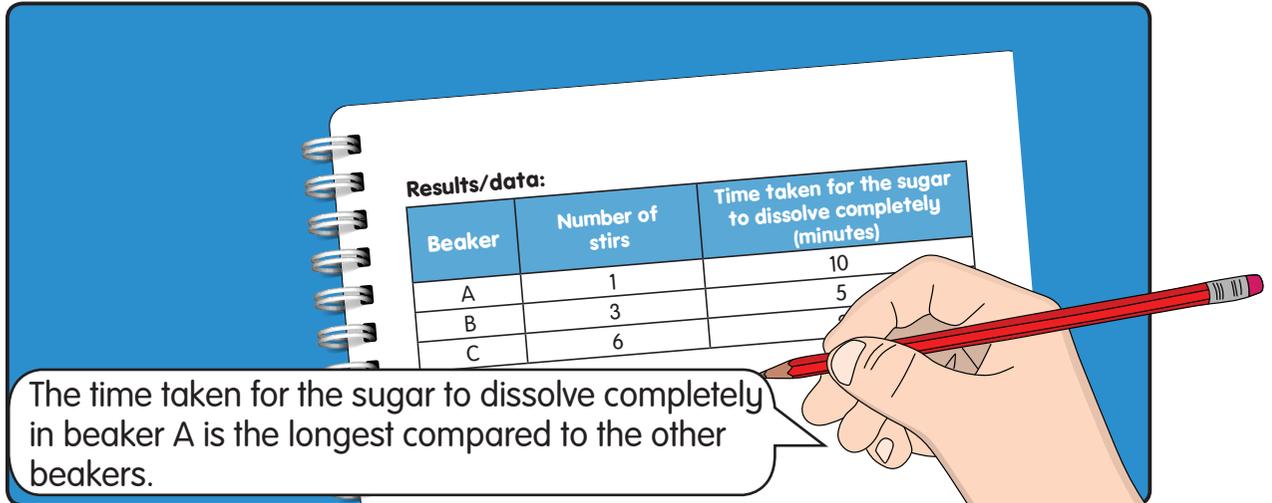
They planned the steps to test the hypothesis.

### Testing the hypothesis

They tested the hypothesis by conducting the investigation according to the steps that were planned.

### Collecting and interpreting data

After conducting the investigation, they interpreted the data collected.



The time taken for the sugar to dissolve completely in beaker A is the longest compared to the other beakers.

Results/data:		
Beaker	Number of stirs	Time taken for the sugar to dissolve completely (minutes)
A	1	10
B	3	5
C	6	2

### Making a conclusion

Based on the interpreted data, they are finally able to determine whether their hypothesis is accepted or not accepted.



The more the number of stirs, the lesser the time taken for the sugar to dissolve completely.

It looks like our hypothesis is accepted.

## Writing a report

After the investigation is completed, they write a complete experimental report as shown in the example below.

### Experimental Report

1. **Aim:** To investigate the relationship between the number of stirs and the time taken for the sugar to dissolve completely.
2. **Problem statement:** Does the number of stirs affect the time taken for the sugar to dissolve completely?
3. **Hypothesis:** As the number of stirs increases, the lesser the time taken for the sugar to dissolve completely.
4. **Determining the variables:**
  - (i) Manipulated variable: Number of stirs.
  - (ii) Responding variable: Time taken for sugar to dissolve completely.
  - (iii) Constant variables: Quantity of sugar, size of sugar, volume of water, temperature of water.
5. **Apparatus and materials:** 3 beakers, 3 spoons of sugar, 300 ml warm water, stopwatch, glass rod
6. **Steps:**
  - (i) 100 ml of warm water was poured into each beaker; A, B and C.
  - (ii) One spoon of sugar was added into each beaker.
  - (iii) Beaker A was stirred once per minute. Beaker B was stirred three times per minute. Beaker C was stirred six times per minute. The time taken for the sugar to dissolve completely in each beaker was recorded.
  - (iv) The observation was recorded in a table that has the information about the manipulated variable and the responding variable.

#### 7. Results/Data:

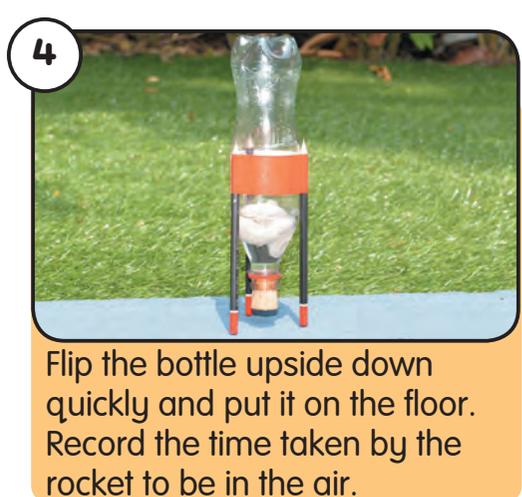
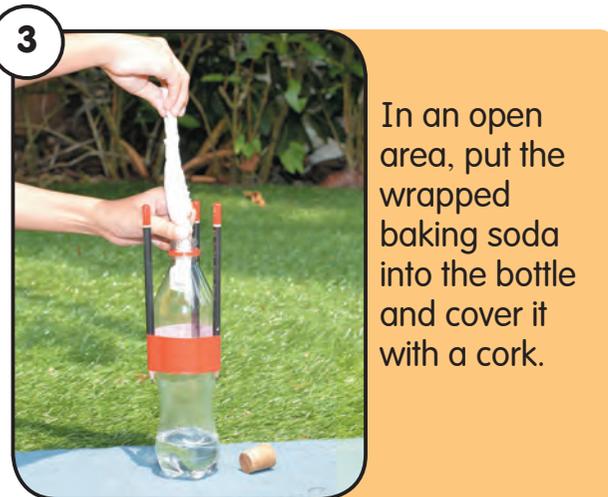
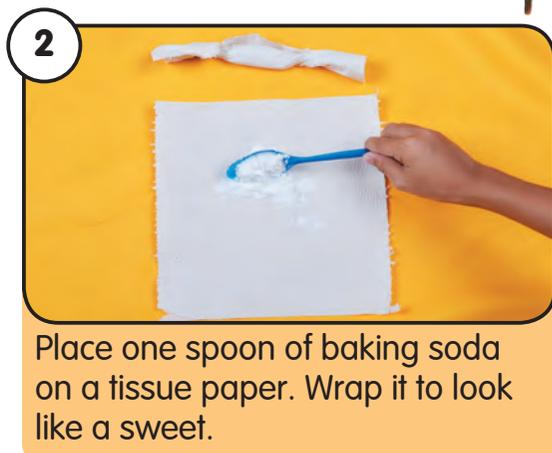
Beaker	Number of stirs	Time taken for sugar to dissolve completely (minutes)
A	1	10

8. **Interpreting the data:** The sugar which was stirred the most was the fastest to dissolve completely.
9. **Conclusion:** As the number of stirs increases, the lesser the time taken for the sugar to dissolve completely. The hypothesis is accepted.

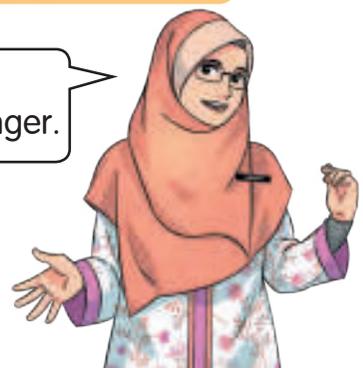
Now, let us read the story.



Let us read the following steps.



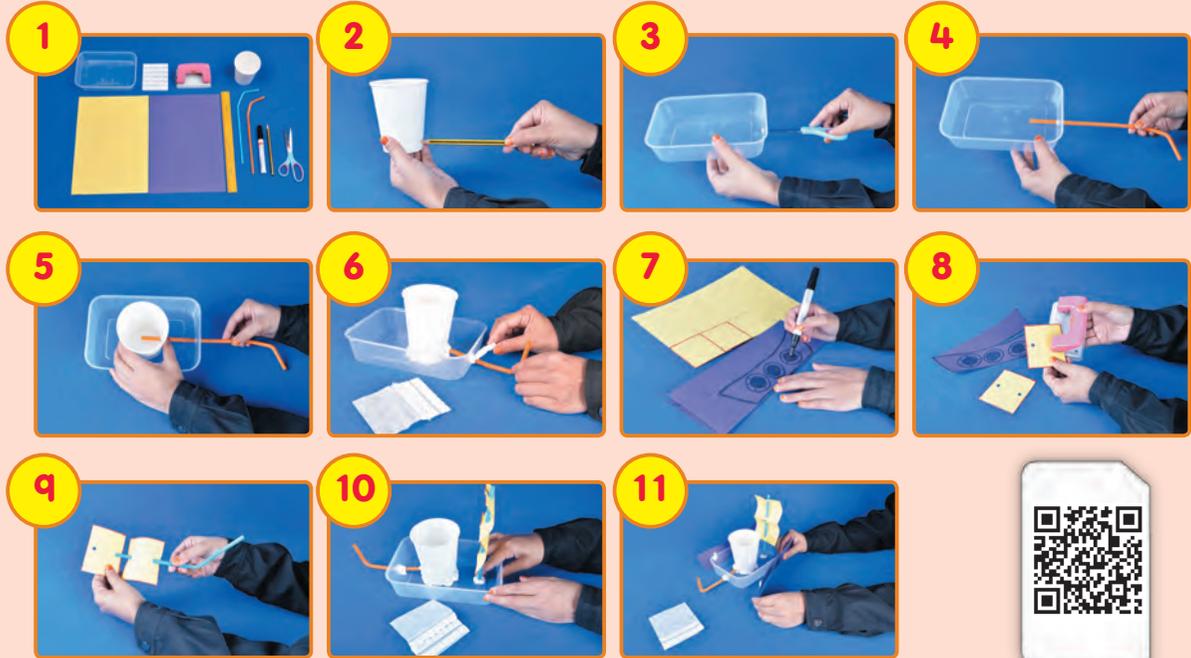
Try planning and conducting an experiment to determine the variables that will enable the rocket to be in the air longer.





Steps

Use a plastic container, paper cup, straws, coloured papers, and adhesive clay to make a boat based on your creativity.



Pour water into the paper cup and place the boat on water.

What can you observe if different volumes of water is used?



MIND REFLECTION

Science Process Skills

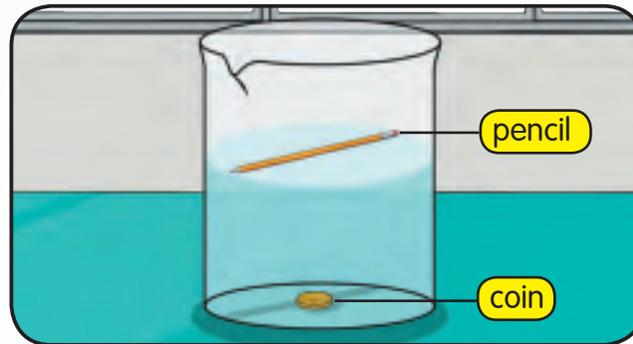
- Observing
- Classifying
- Measuring and using numbers
- Making inferences
- Predicting
- Communicating
- Using space–time relationship
- Interpreting data
- Defining operationally
- Controlling variables
- Making hypothesis
- Experimenting



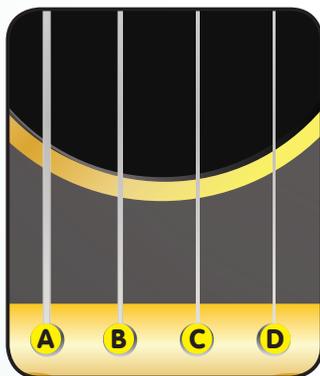
## MIND TEST

Answer all questions in the Science exercise book.

1. Mei Lan placed two objects into a beaker filled with water as shown below.



- (a) Based on the picture, state one observation.
  - (b) Give an inference based on your answer in (a).
  - (c) What can you predict if Mei Lan placed three pencils that are tied together using a rubber band?
2. The diagram below shows a part of the strings on a musical instrument.



The tone that is created when the strings are plucked is recorded in the table below:

String	Tone
A	Low
B	Moderate
C	High
D	Very high

Based on the information stated above,

- (a) determine the manipulated, responding, and constant variables.
- (b) what is a suitable hypothesis for the investigation above?

# UNIT 2

# HUMANS

Various situations take place at the park in the afternoon. What activities can you observe in this picture that are related to life processes?

Wow, such fresh air!

Ouch! That hurts!

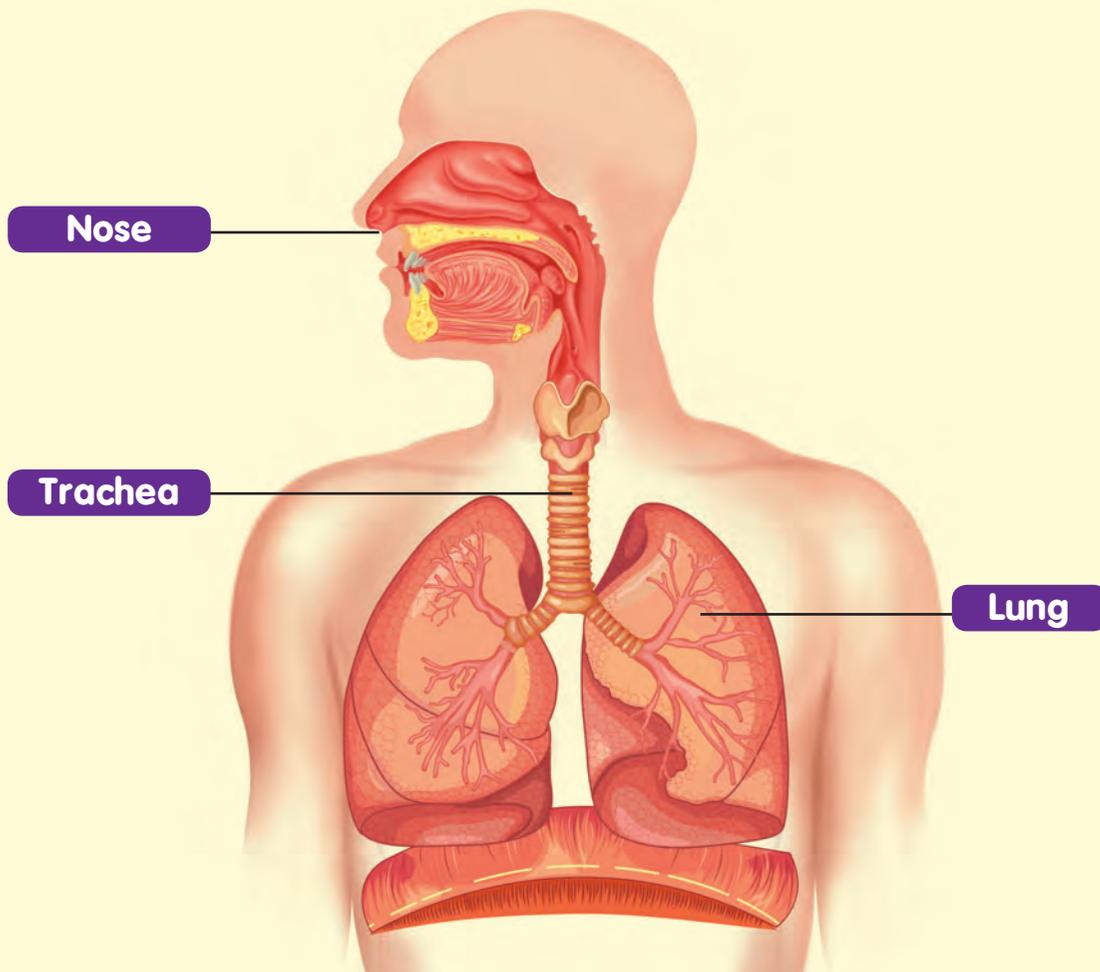
Oh, my stomach is acting up!

I am so tired! My whole body is sweating!

Hmm, so fragrant!

## Organs Involved in Human Breathing

Humans breathe to survive. During inhalation, air is taken into the lungs. During exhalation, air is expelled from the lungs. The lungs are the organs involved in human breathing. Observe the figure below showing the organs that are involved during breathing.



Try to identify the organs that are involved in the breathing process.

### SCIENCE-INFO

The size of the left lung is smaller compared to the right because the heart is located on the left side.





## FUN ACTIVITY

## Labelling the Human Breathing Organs

### Apparatus and Materials

Red modelling clay, purple modelling clay, brown modelling clay, rolling pin, ruler, pencil, white paper, manila card, marker pen, scissors



### Steps



1. Draw the shape of the lungs on a piece of white paper. Then, cut it out.



2. Knead the red modelling clay and then flatten it using the rolling pin.



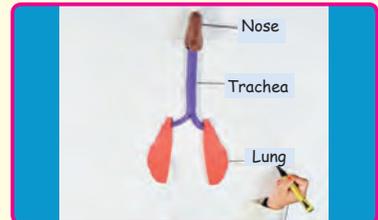
3. Trace the cut-out of the lungs on the flattened red modelling clay. Use the ruler to cut through the modelling clay according to the shape.



4. Repeat step 2 using the brown modelling clay to form the nose.



5. Shape the purple modelling clay into the letter 'Y' to form the trachea.



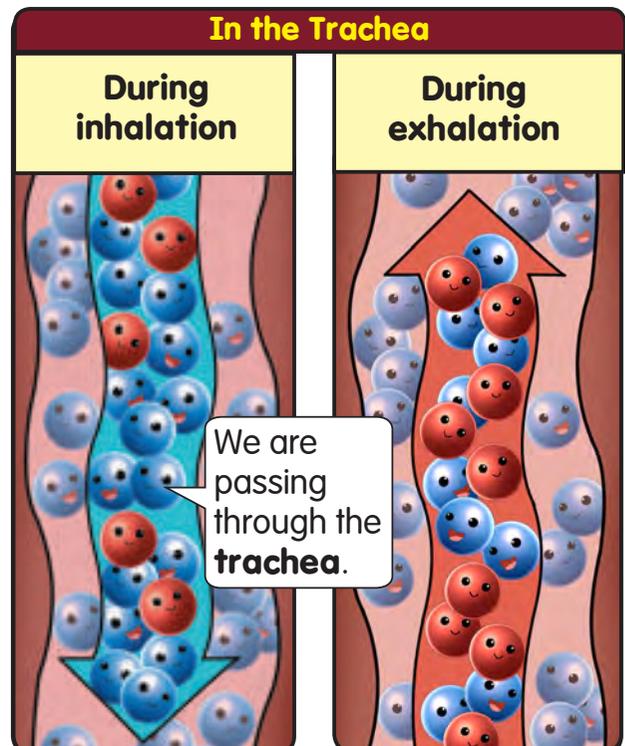
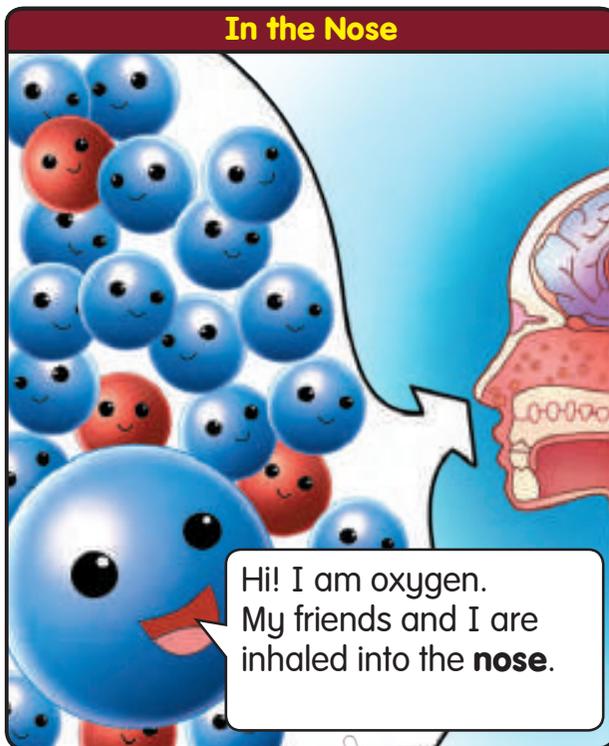
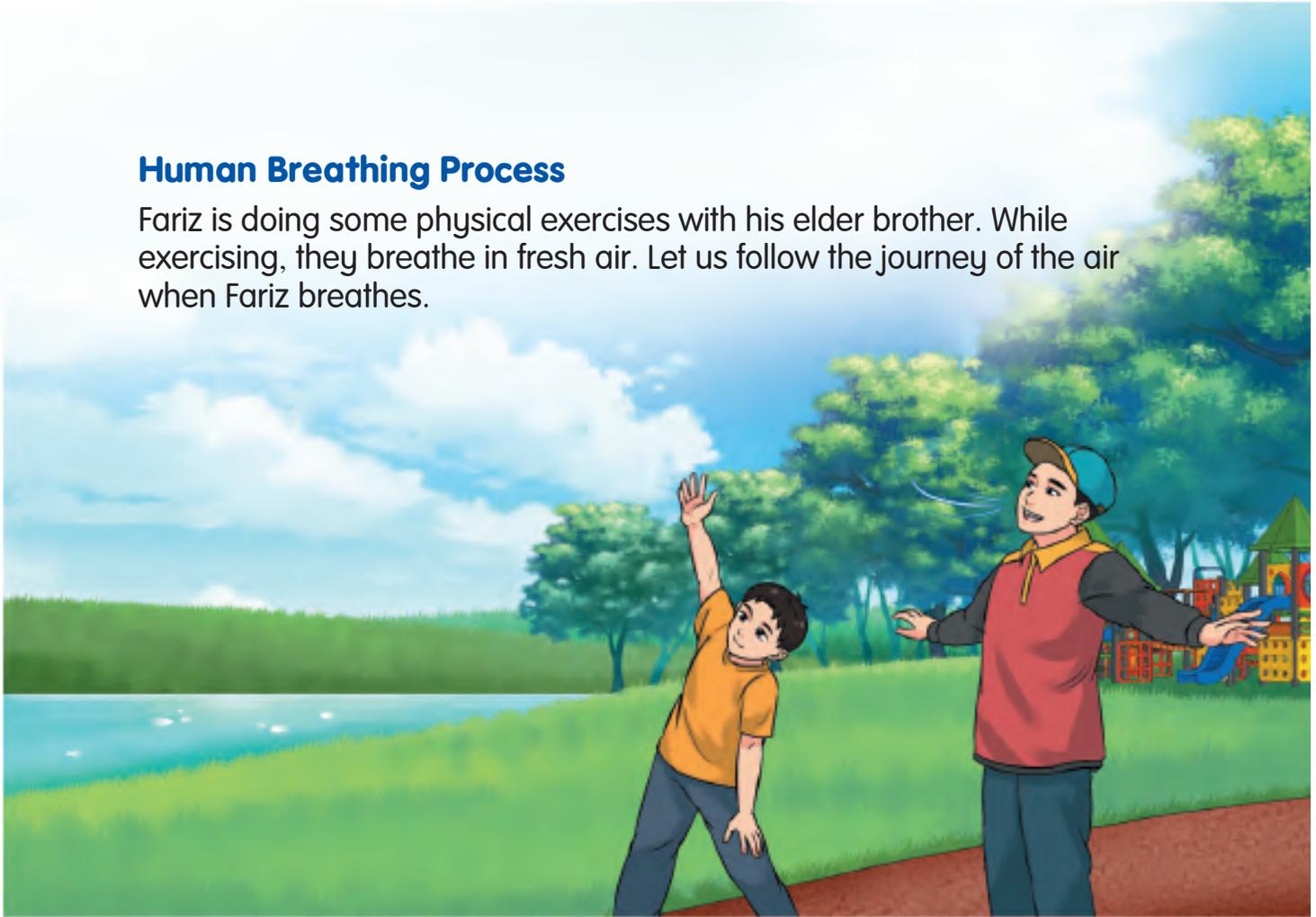
6. Place the clay models of the lungs, nose, and trachea onto a manila card. Label accordingly using a marker pen.

### Question

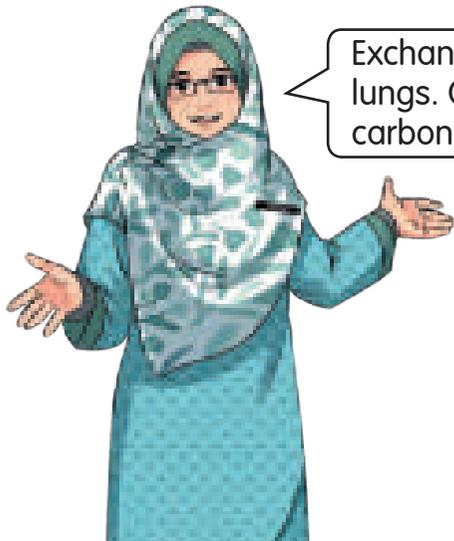
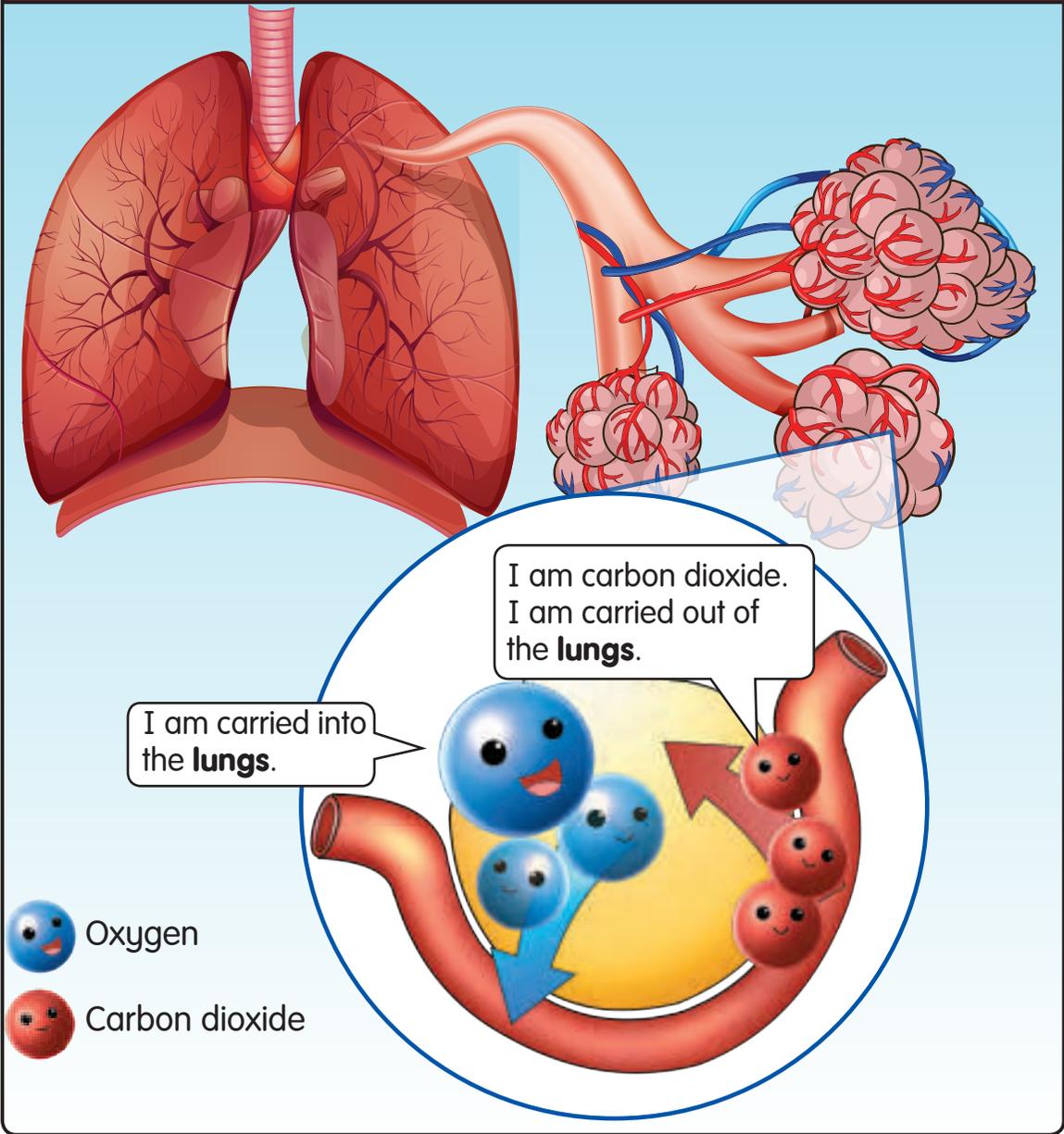
Based on the activity above, what organs are involved when humans breathe?

## Human Breathing Process

Fariz is doing some physical exercises with his elder brother. While exercising, they breathe in fresh air. Let us follow the journey of the air when Fariz breathes.



## In the Lungs

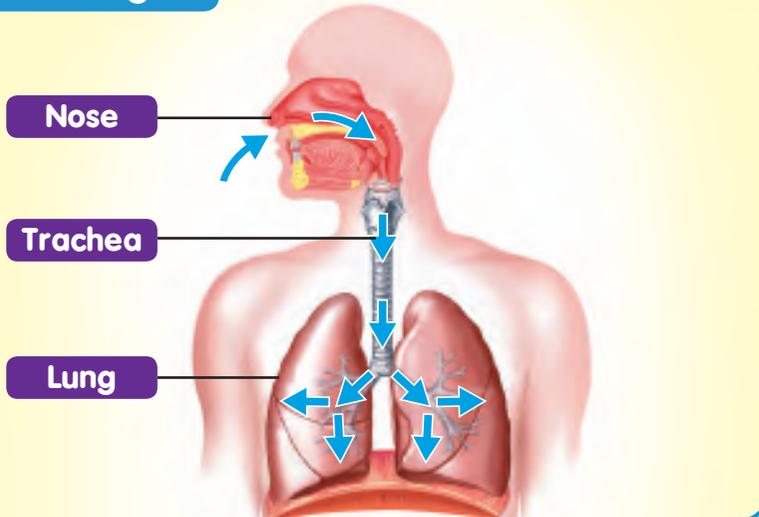


Exchange of gases take place in the lungs. Oxygen enters the lungs while carbon dioxide leaves the lungs.



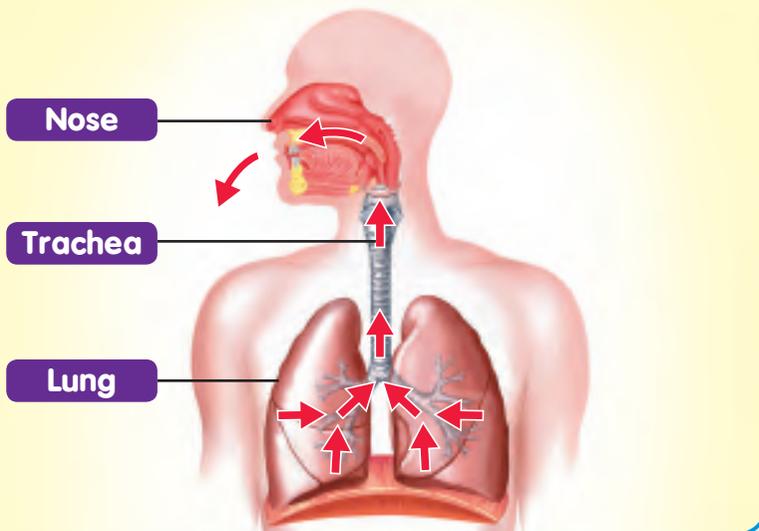
Breathing is a process of inhaling and exhaling. Observe the passage of air below.

### Inhaling



**Nose** ➔ **Trachea** ➔ **Lungs**

### Exhaling



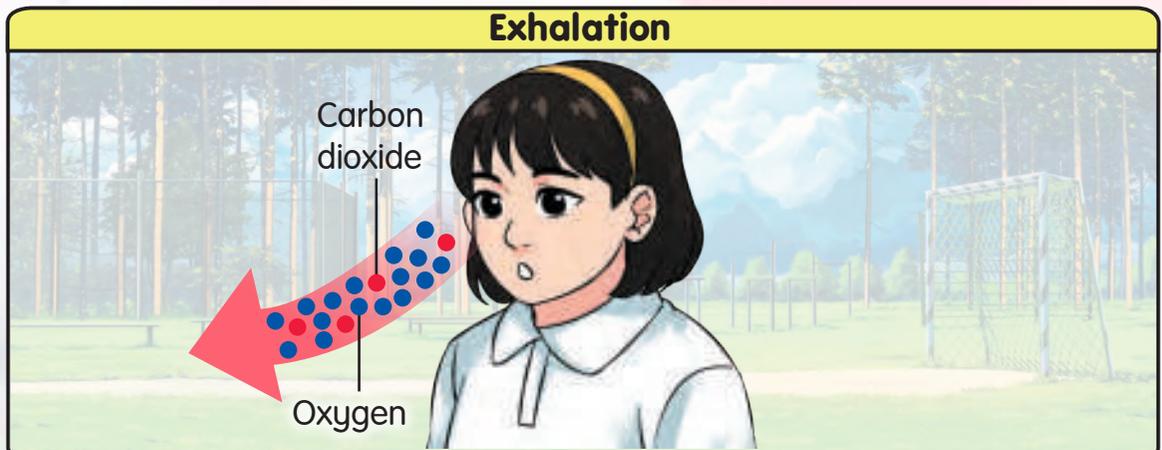
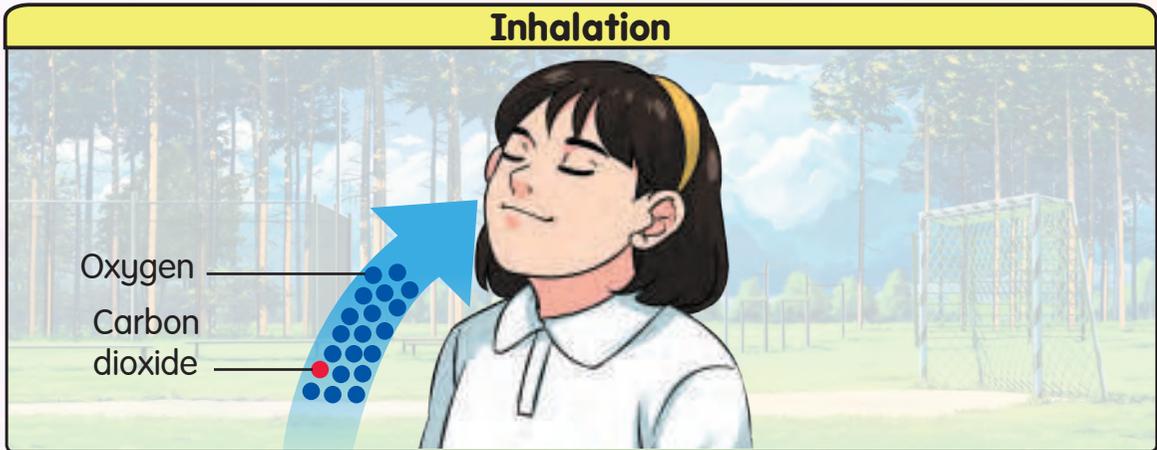
**Lungs** ➔ **Trachea** ➔ **Nose**



Based on the journey of the air, try to creatively retell the breathing process in terms of the air passage and the exchange of gases in the lungs.

## Content of Oxygen and Carbon Dioxide During Breathing

Do you know that when we breathe, there is a difference in the content of oxygen and carbon dioxide during inhalation and exhalation? Observe the pictures below.



Inhaled air contains **more oxygen** compared to exhaled air.  
Exhaled air contains **more carbon dioxide** compared to inhaled air.



State the difference in the content of oxygen and carbon dioxide during inhalation and exhalation.



### SCIENCE-INFO

The surrounding air contains **oxygen, carbon dioxide, nitrogen, other gases, and water vapour.**



## FUN ACTIVITY

## Human Breathing Process



### Apparatus and Materials

Flip chart paper, marker pens, pictures of the human breathing organs

### Steps

1.



Discuss the human breathing process in terms of **air passage** and **exchange of gases** during inhalation and exhalation.

2.



Prepare the discussion in the form of a flow chart.

3.



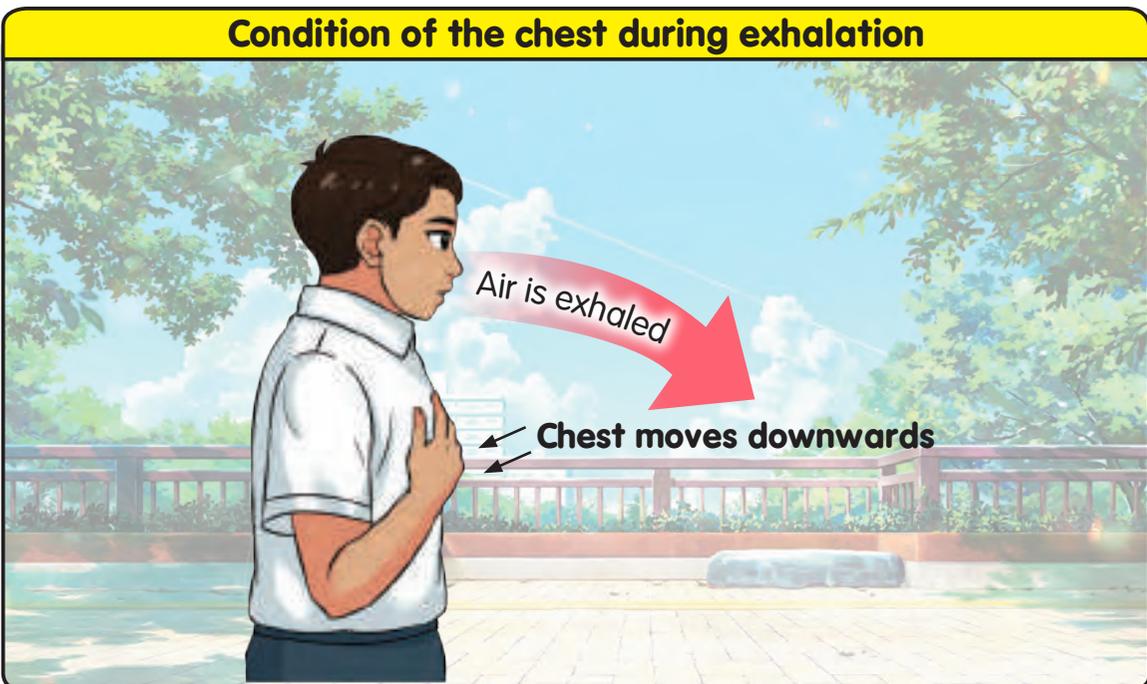
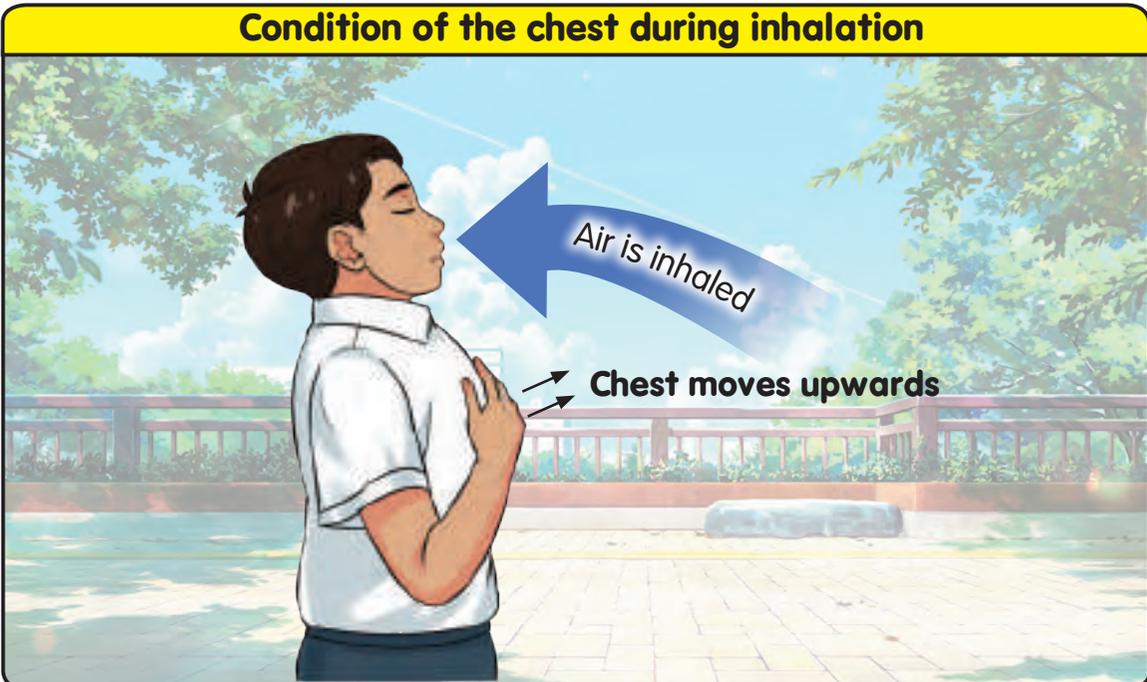
Present the group work in front of the class.

### Questions

1. State the air passage during inhalation and exhalation.
2. What is the difference in the air content during inhalation and exhalation?

## Chest Movement During Breathing

Try placing your hand on your chest while you inhale and exhale. What changes do you observe to your chest? Look at the pictures below.





## LET'S TEST

## Chest Movement While Breathing

### Aim

To investigate the chest movement during inhalation and exhalation.

PAIR WORK  
ACTIVITY

### Apparatus and Materials

Book, mat

### Steps



1. Choose a partner of the same gender as you. On the mat, one partner lies flat on his/her back.
2. Place a book on his/her chest. Then, ask him/her to inhale and exhale.
3. Observe the movement of the book and chest. Record your observations in the following table.

Activity	Movement of book (up/down)	Movement of chest (upwards/downwards)
Inhale		
Exhale		

### Questions

1. What causes the book to change its movement during inhalation and exhalation in this activity?
2. State your conclusion regarding chest movement during inhalation and exhalation.

## Rate of Breathing

The rate of breathing is the number of upward and downward chest movements in one minute. The rate of breathing depends on the type of activity that is carried out. Observe the situation below.

Moderate Rate of Breathing

High Rate of Breathing

Low Rate of Breathing

Why is the rate of breathing different in each activity shown above?

Give other examples of activities for each type of rate of breathing.



## LET'S TEST

## Rate of Human Breathing



### Aim

To investigate the relationship between types of activities and the rate of breathing.

### Apparatus and Materials

Stopwatch, radio

### Steps

1. Play some music and start walking slowly for one minute.
2. After one minute, stop the music and stop walking.
3. Place one hand on your chest and start the stopwatch. Count the number of chest movements in one minute.
4. Record your observations in the following table.

Type of activity	Number of upward and downward movements of the chest	Rate of breathing (low/moderate/high)
Slow walk		
Running on the spot		
Jumping jacks		

5. Repeat steps 1 to 4 with running on the spot and jumping jacks.

### Questions

1. Is there a difference in the rate of breathing for each type of activity that was carried out?
2. What can you summarise regarding the relationship between the type of activity and rate of breathing?



Besides the type of activity, explain other factors than can affect the rate of breathing.

## Situations That Affect Breathing

Air in a clean environment ensures that humans breathe better. Observe the situations below.

**Situation 1**



**Situation 2**



**Situation 3**



**Situation 4**



What is the effect of each situation on human breathing?



Suggest ways on how humans can keep their lungs healthy.

### SCIENCE-INFO

Haze is dry air containing various gases, dust, and floating particles in the atmosphere which causes low visibility and it is unhealthy for humans.



## FUN ACTIVITY

## Maintaining Healthy Lungs



### Apparatus and Materials

Paper, stationery, situation cards, envelopes

### Steps



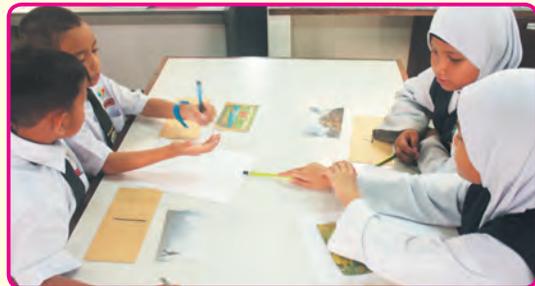
1. Form a group of four members. Each member receives a numbered envelope; 1, 2, 3 or 4. Each envelope contains a different situation card.



2. Pupils with the same numbered envelopes form a new group of experts.



3. Each expert group is given 10 minutes to discuss the situation cards in terms of the good and bad effects as well as suggestions on how to keep the lungs healthy.



4. After the discussion, the experts return to their original groups and share the information with their group members.

### Question

Why is it important for humans to take care of their breathing organs?

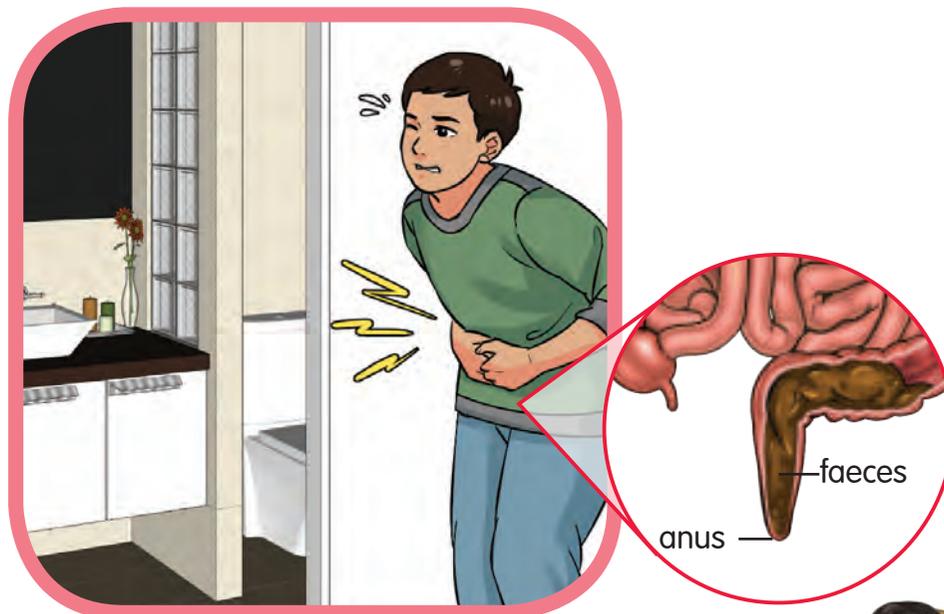
## Excretion and Defecation

The human body produces different waste products such as urine, sweat, faeces, carbon dioxide, and water vapour. These waste products must be removed from the body to avoid diseases.

The removal of waste products from the body is called **excretion**. Some examples are shown below.



Meanwhile, **defecation** is the removal of faeces through the anus.

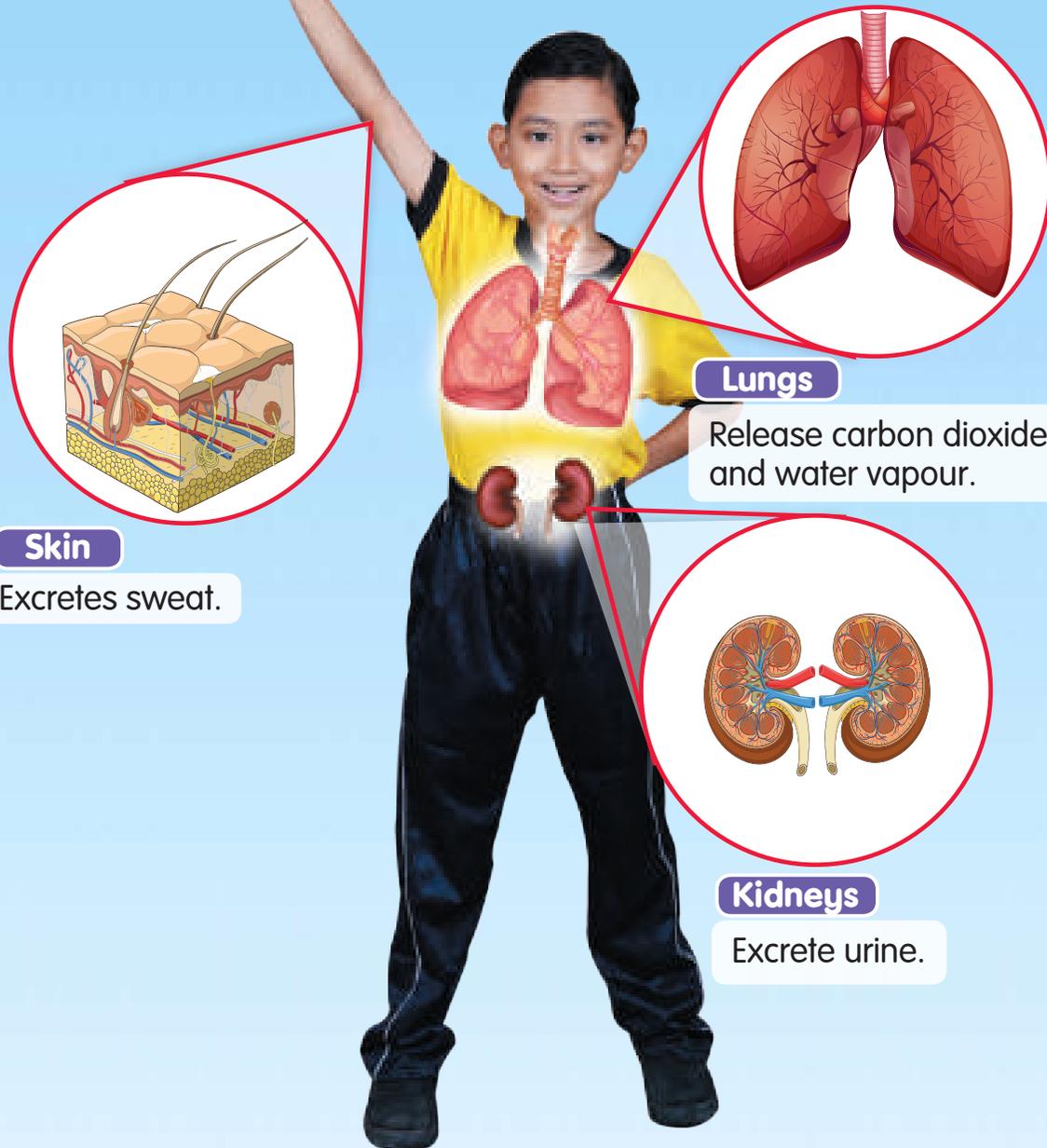


What do excretion and defecation mean?



## Organs and Their Products of Excretion

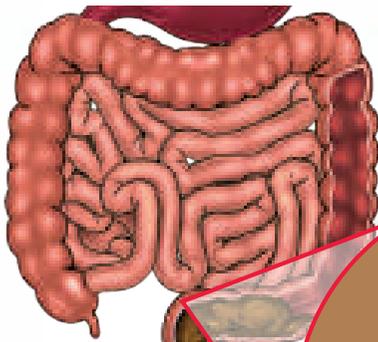
Excretion takes place in excretory organs. Let us find out about the excretory organs and their products.



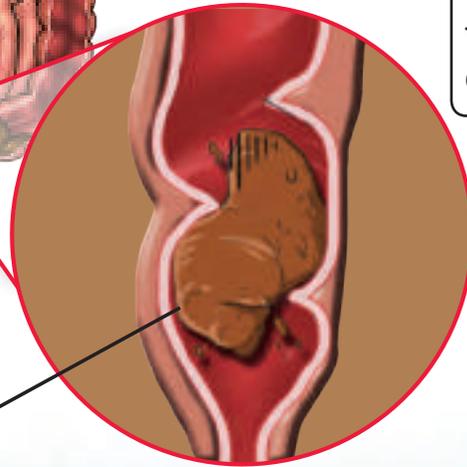
Based on the information above, try to identify the excretory organs and their products.



Teacher, what about defecation?

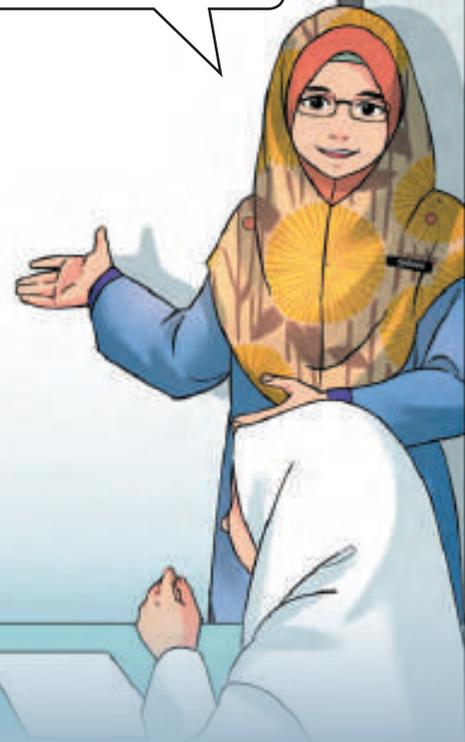


anus



faeces

Undigested food during the digestion process becomes **faeces**. The removal of faeces through the **anus** is called **defecation**.



Compare and contrast the excretion and defecation processes.



## FUN ACTIVITY

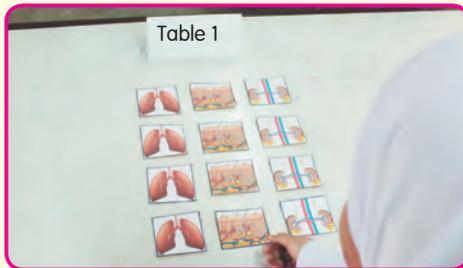
## Getting to Know Excretion and Defecation

### Apparatus and Materials

A4 paper, marker pen, pictures of organs, answer cards



### Steps



1. A representative from each group chooses three pictures of organs from Table 1.



2. Members in each group discuss and identify the product(s) of each selected organ.



3. Another group representative goes to Table 2 and chooses the corresponding answer card as discussed earlier.



4. The group members match the organs with the products of excretion using suitable graphic organisers according to their creativity. Present it in front of the class.

### Question

What can you tell about excretion and defecation?

## Importance of Excretion and Defecation

What will happen if the excretion and defecation processes are disrupted? Have a look at the situations below.

### Situation 1



Why must urine be excreted?

### Situation 2



Why must faeces be excreted?

Why is it important to get rid of the products of excretion and faeces?



**Apparatus and Materials**

A4 paper, coloured pencils, marker pens

**Steps**

1.



Gather information from various sources on good habits which ensure that excretion and defecation processes are not disrupted.

2.



Discuss the information gathered within the group and then present it creatively in the form of MS PowerPoint slides.

3.



Present the outcome of the group in front of the class.

**Questions**

1. What are the habits that can be practised to ensure that our kidneys, skin, and lungs function well?
2. How do we ensure the defecation process goes smoothly?
3. Discuss the health problems associated with the disruption of defecation.

## Response to Stimuli

Humans respond to changes in their surrounding environment. The surrounding environment can change. The changes are known as **stimuli**. Meanwhile, the action taken towards the stimulus is called **response**. The sensory organs of humans receive stimuli such as light, smell, sound, taste, and touch.

Have a look at the situation below.



Based on the situation above, the **smell of food** is an example of a **stimulus**, while the action of **smelling** with the nose is an example of a **response**.



Observe the different situations below.



**Moving the hand away spontaneously as it touches a thorn.**

<b>Stimulus</b>	a thorn
<b>Response</b>	moving the hand away spontaneously

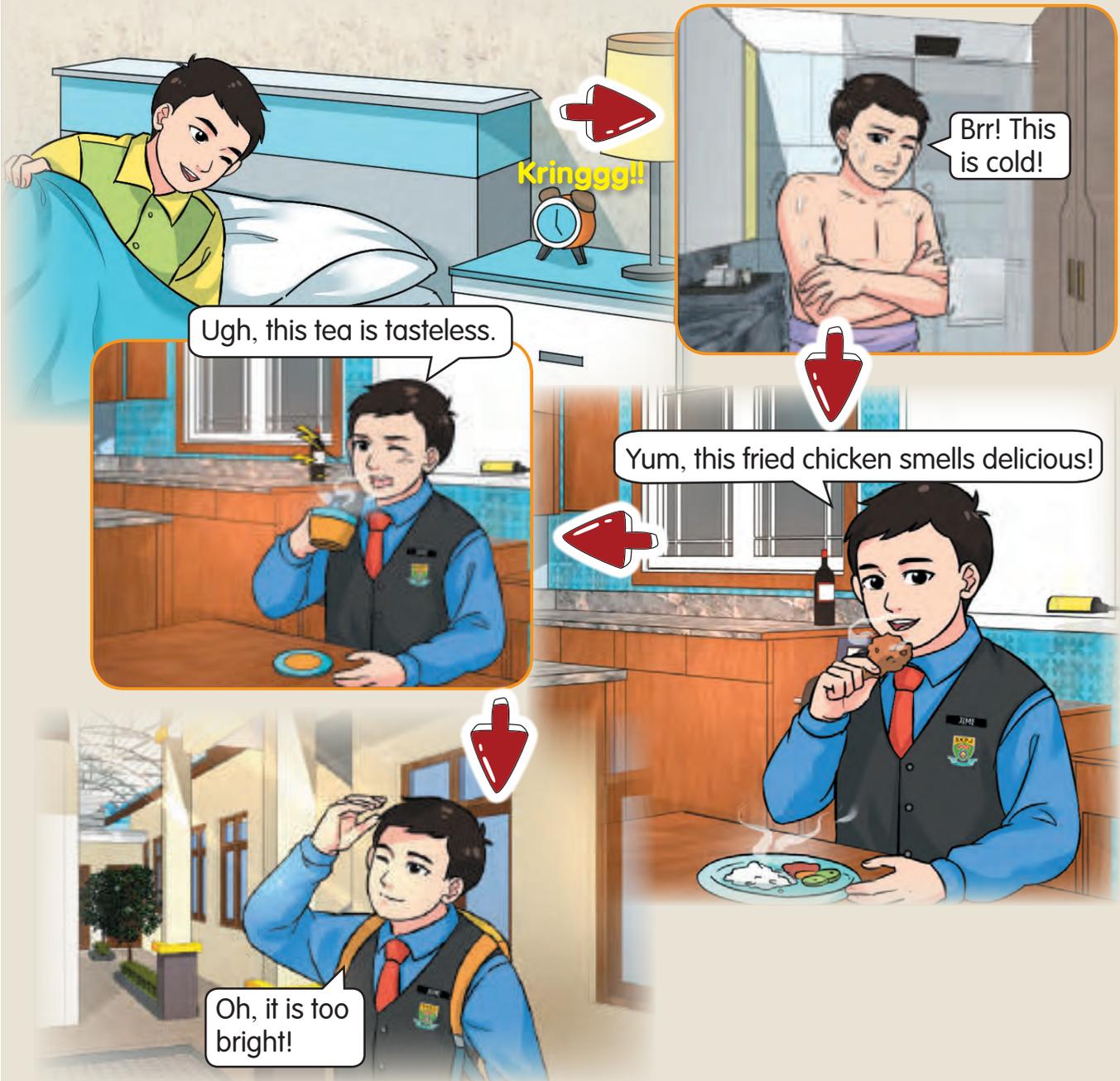


**Startled by the sound of thunder.**

<b>Stimulus</b>	the sound of thunder
<b>Response</b>	startled

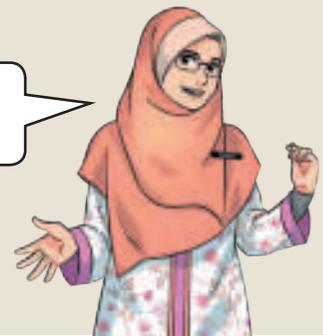
## Sensory Organs

Let us take look at a day in Jimi's life. Observe every action taken by Jimi.



State the sensory organ that is involved in each action as shown above.

What can you say about Jimi's responses in all the situations above?





## LET'S TEST

## Response to Stimuli



**Aim** To investigate human responses to stimuli.

**Apparatus and Materials** Torch, whistle, coffee with no sugar, shrimp paste, small towel, ice cubes

### Steps

1. Each group will be conducting investigations at five stations. The activity at each station is as follows.

Station	Activity
A	Wrap some ice cubes using a small towel and place it on the neck.
B	Taste the coffee with no sugar.
C	Shine light towards the eyes.
D	Smell shrimp paste.
E	Blow a whistle loudly into someone's ear.

2. Identify the stimuli and responses in this activity. Then, record them in the table as shown below.

Stimulus	Response

3. Explain the results of your group's investigation in front of the class.

### Question

State other examples of stimuli and responses in your daily life.

2.3.2  
2.3.5

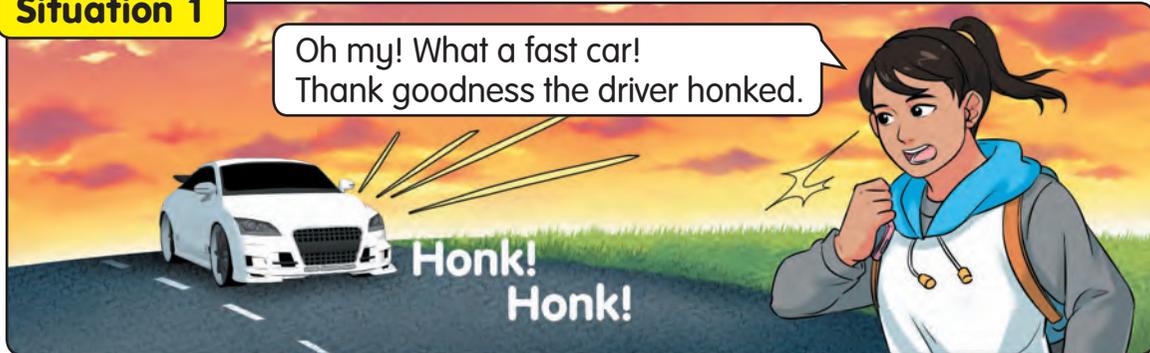
TEACHER'S  
NOTES

Activities at stations C and E should be carried out 1 metre away as a safety precaution.

## Importance of Response

Humans respond when the sensory organs receive stimuli. Take a closer look at the situations below.

### Situation 1



What will happen if she does not respond to the sound of the horn?

### Situation 2



What will happen if he is unable to smell the smoke?

### Situation 3



What will happen if all the drivers are unable to respond to the siren from the ambulance?

Why do humans need to respond to stimuli?



## Habits that Disrupt Human Response

Alcohol consumption, glue sniffing, and drug abuse have serious consequences on human lives. These habits can disrupt human response to stimuli.



Alcoholic drinks can cause intoxication. When this happens, the person is not able to respond quickly to stimuli because the sensory organs are disrupted.

Glue is a chemical substance that can cause hallucination and addiction to those who sniff it. The chemical compounds in glue can disrupt the function of sensory organs as well as the brain. This causes slow response to stimuli.



Drugs can be used as medicine. However, abuse of drugs such as cough syrups or ecstasy pills can cause hallucinations, blackouts, and addiction. As a result, drug addict's responses to stimuli will be disrupted because the sensory organs are not functioning well.

2.3.4



How do the habits above disrupt human response to stimuli?



## FUN ACTIVITY

## Love Your Sensory Organs



### Apparatus and Materials

A4 paper, stationery

### Steps

1.



In groups, obtain information from different sources on habits that can disrupt human response to stimuli.

2.



Discuss with your group members on how to relate the habits to the damages they can cause to the sensory organs.

3.



Present the result of the discussion in the form of a creative poster.

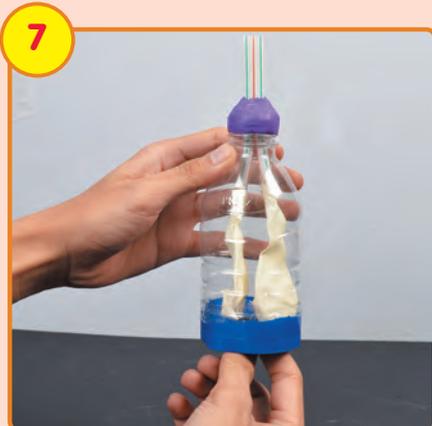
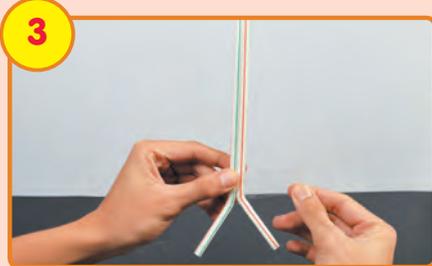
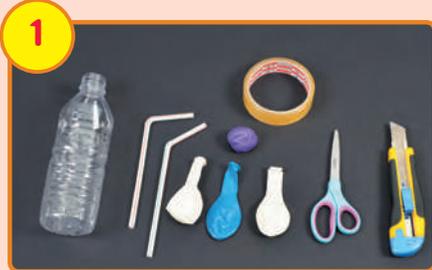
### Question

Name several habits that must be avoided to prevent damages to the sensory organs. Explain.



Steps

Using your own creativity, construct a model of human lungs using materials such as plastic bottles, straws, balloons, adhesive tape, scissors, knife, and modelling clay.





## MIND REFLECTION

1. The organs that are involved in the breathing process are the nose, trachea, and lungs.
2. The air passage during inhalation: Nose → Trachea → Lungs
3. The air passage during exhalation: Lungs → Trachea → Nose
4. Gas exchange takes place in the lungs.
5. The inhaled air contains more oxygen compared to the exhaled air.
6. The exhaled air contains more carbon dioxide compared to the inhaled air.
7. The chest moves upwards during inhalation.
8. The chest moves downwards during exhalation.
9. The more intense the activity, the higher the rate of breathing.
10. Excretion is the process of removing waste products from the body.
11. Defecation is the process of removing faeces through the anus.
12. The excretory organs and their products are as follows:

Organ	Product
Kidneys	urine
Skin	sweat
Lungs	carbon dioxide and water vapour

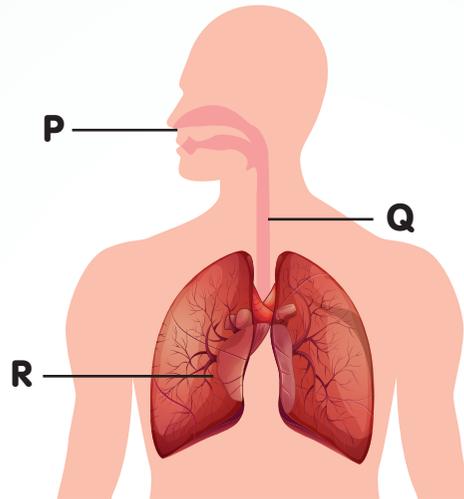
13. Stimuli are changes in the condition of the surrounding environment.
14. Response is the action taken towards a stimulus.
15. Human sensory organs receive stimuli such as light, smell, sound, taste, and touch.
16. The importance of human response to stimuli are:
  - (a) to avoid injury.
  - (b) to save oneself.
  - (c) to obtain information and to communicate.
17. Alcohol consumption, glue sniffing, and drug abuse can cause intoxication, hallucination, and addiction which disrupt the process of human response to stimuli.



## MIND TEST

Answer all questions in the Science exercise book.

1. The figure below shows the organs in a human body that are involved during the breathing process.



(a) Name organ **P** : , **Q** : , **R** : .

- (b) Arrange the organs above according to the correct passage of air during exhalation.



- (c) What will happen to a person who is always exposed to polluted air?

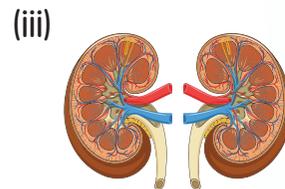
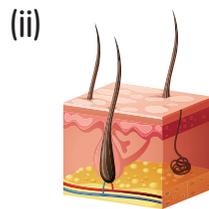
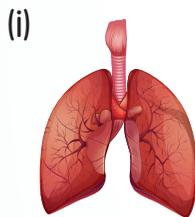
(d) Tick (✓) the correct statement.

-  Inhaled air contains more carbon dioxide compared to exhaled air.
-  Exhaled air contains less oxygen compared to inhaled air.

2. The bar chart below shows the result of an investigation on the effect of the types of activity on human breathing rate.



- (a) Based on the bar chart above, state one observation.  
 (b) State one inference based on your observation above.  
 (c) What conclusion can be drawn from this investigation?
3. (a) What are the meanings of excretion and defecation?  
 (b) State the product(s) of each excretory organ below:



- (c) Why are excretion and defecation important?
4. The figure below shows a human's response to a stimulus.



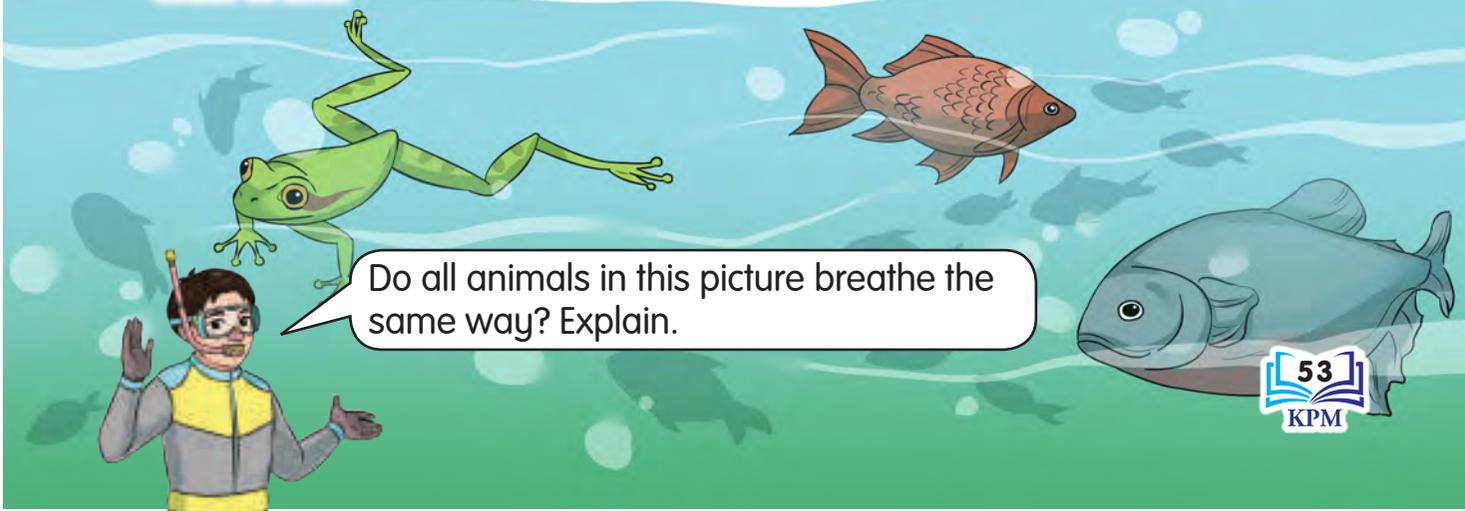
- (a) State the sensory organ involved in the response above.  
 (b) State the stimulus and response involved.  
 (c) What is the importance of response to the stimulus above?
5. State one habit that can disrupt the process of human response to stimuli. Explain.

# UNIT 3

# ANIMALS



All around us, there are animals that live on land, that live in water, and those that can live both on land and in water. Animals need to breathe in order to live.



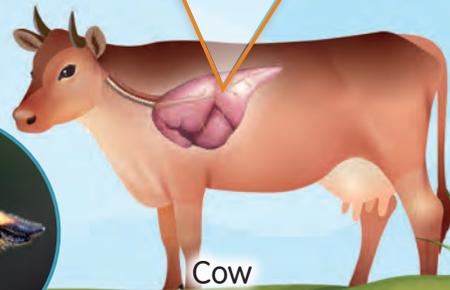
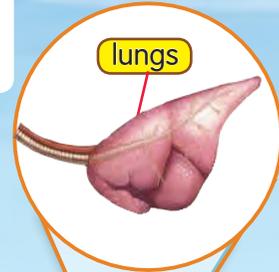
Do all animals in this picture breathe the same way? Explain.

# Breathing Organs of Animals

Observe the picture below.

## Lungs

Normally, animals that live on land breathe using their lungs. For example, cows.



Cow

## Spiracles

Animals such as insects breathe through spiracles. For example, grasshoppers.



Grasshopper



Leech



Chicken



Dragonfly

## Gills

Normally, animals that live in water use their gills to breathe. For example, fish.



Crab



Fish

## Moist skin

Animals such as worms breathe through their moist skin.



Worm

Can you identify the breathing organs of chickens, leeches, crabs, and dragonflies?



## FUN ACTIVITY

## Recognising the Breathing Organ of Fish

### Apparatus and Materials

Fish, specimen tray, gloves, forceps, hand lens, A4 paper, marker pen

GROUP  
ACTIVITY

### Steps



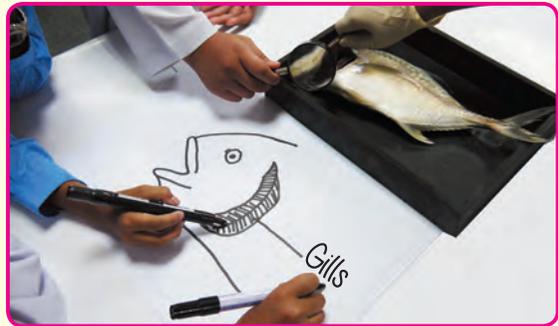
1. Place a fresh fish on the specimen tray.



2. Lift the part of the fish covering the gills using the forceps.



3. Observe the gills using the hand lens.



4. Sketch the gills on the A4 paper. Then, label accordingly.

### Question

What are other animals that breathe using gills?

## Classification of Animals Based on Their Breathing Organs

Observe the pictures below.



Crab



Caterpillar



Tadpole



Worm



Freshwater leech



Cat



Butterfly

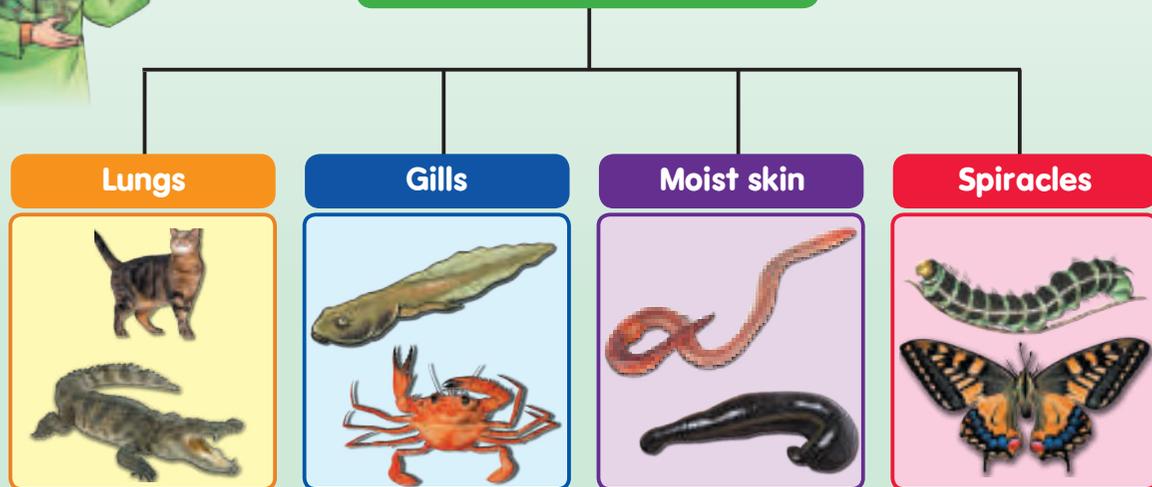


Crocodile



Animals can be classified according to their breathing organs, which are **lungs**, **gills**, **moist skin**, and **spiracles**.

### Breathing organs of animals



Classify the animals below according to their breathing organs.



Goat



Prawn



Land leech



Ant

## Living on Land and in Water

One evening, a frog and a fish were having a conversation in a pond.

Wow, you are very lucky, Mr Frog! You can live on land and in water!

When on land, I use my lungs to breathe but when I am in the water, I breathe using my moist skin.

Lungs

Moist skin

Oh, no wonder! I can only live in the water because I only have one breathing organ, my gills.

gills

**SCIENCE-INFO**

Other than frogs, caecilia and newts also have more than one breathing organ. They can breathe through their lungs and moist skin. Caecilia lives in tropical regions while salamanders are not found in our country. They are only found in regions with cold and temperate climates.

caecilia      salamander or newt

Based on the conversation between the fish and the frog, what can you conclude about the breathing organs in some animals?

## Vertebrates and Invertebrates

Do you know that there are animals which have backbones and there are those that do not have backbones?

Hi, I am an earthworm.

Hi, I am a snake.

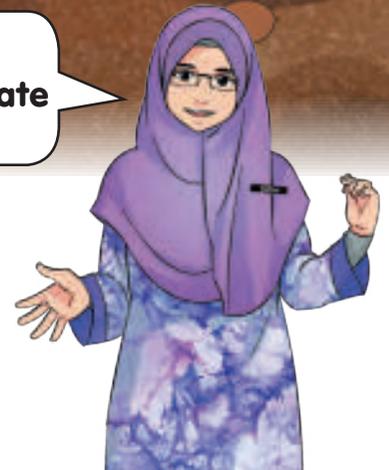
What is the difference between the two animals above? Observe the structures below.

backbone

no backbone

A snake is an example of **vertebrate** because it has a backbone. An earthworm is an example of an **invertebrate** because it has no backbone.

What do vertebrate and invertebrate mean?





## Specific Characteristics of Vertebrates

Besides breathing organs, we can also classify animals based on specific characteristics such as methods of reproduction, their body coverings, and habitats. Based on these specific characteristics, vertebrates can be classified as **mammals**, **reptiles**, **amphibians**, **birds**, and **fish**.

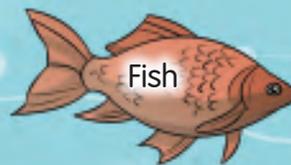
### Mammals

- Breathing organ: lungs
- Method of reproduction: give birth
- Body covering: fine hair
- Habitat: on land
- Examples: deer, cat



### Amphibians

- Breathing organs: lungs and moist skin
- Method of reproduction: lay eggs
- Body covering: moist skin
- Habitats: on land and in water
- Examples: frog, caecilia



### Fish

- Breathing organ: gills
- Method of reproduction: lay eggs
- Body covering: scales
- Habitat: in water
- Example: fish

### SCIENCE-INFO

Whales are mammals that live in the sea. They are mammals because they give birth to their offsprings and breathe with their lungs.





Why do dolphins often swim to the surface of the water although their habitat is in the water?

### SCIENCE-INFO

Bats are mammals that can fly but they are not classified as birds.



### Birds

- Breathing organ: lungs
- Method of reproduction: lay eggs
- Body covering: feathers
- Habitat: on land
- Examples: chicken, stork



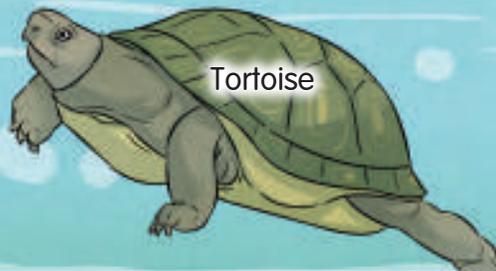
Chicken



Stork

### Reptiles

- Breathing organ: lungs
- Method of reproduction: lay eggs
- Body covering: scales or hard shell
- Habitat: mostly on land
- Examples: tortoise, crocodile



Tortoise



### SCIENCE-INFO

The platypus is a unique mammal that lays eggs but it suckles its offspring. Platypuses spend most of their time in water compared to on land.





## FUN ACTIVITY

## Classifying Vertebrates

### Apparatus and Materials

Animal picture cards on strings, manila card, marker pen



### Steps

1.



Using your creativity, construct a classification table of vertebrates. Then, choose a group representative and put the animal picture card on his/her back without him/her looking.

2.



The pupil with the picture card should ask the group members about specific characteristics of the vertebrate on the picture cards such as methods of reproduction, breathing organs, body coverings, and habitats.

3.



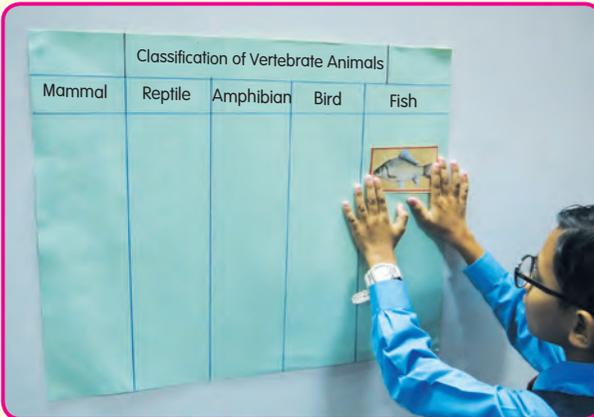
The group members can only answer “yes” or “no”.

4.



After the question and answer session, the pupil guesses what picture of vertebrate is put on his/her back.

5.



If the answer is correct, the pupil places the picture card on the classification table of vertebrates.

6.



If the answer is incorrect, the pupil is allowed to ask additional questions on other characteristics of the vertebrates with the help of the teacher.

### Question

What are other examples of vertebrates that can be classified based on the specific characteristics of mammals, reptiles, amphibians, birds, and fish?



Steps

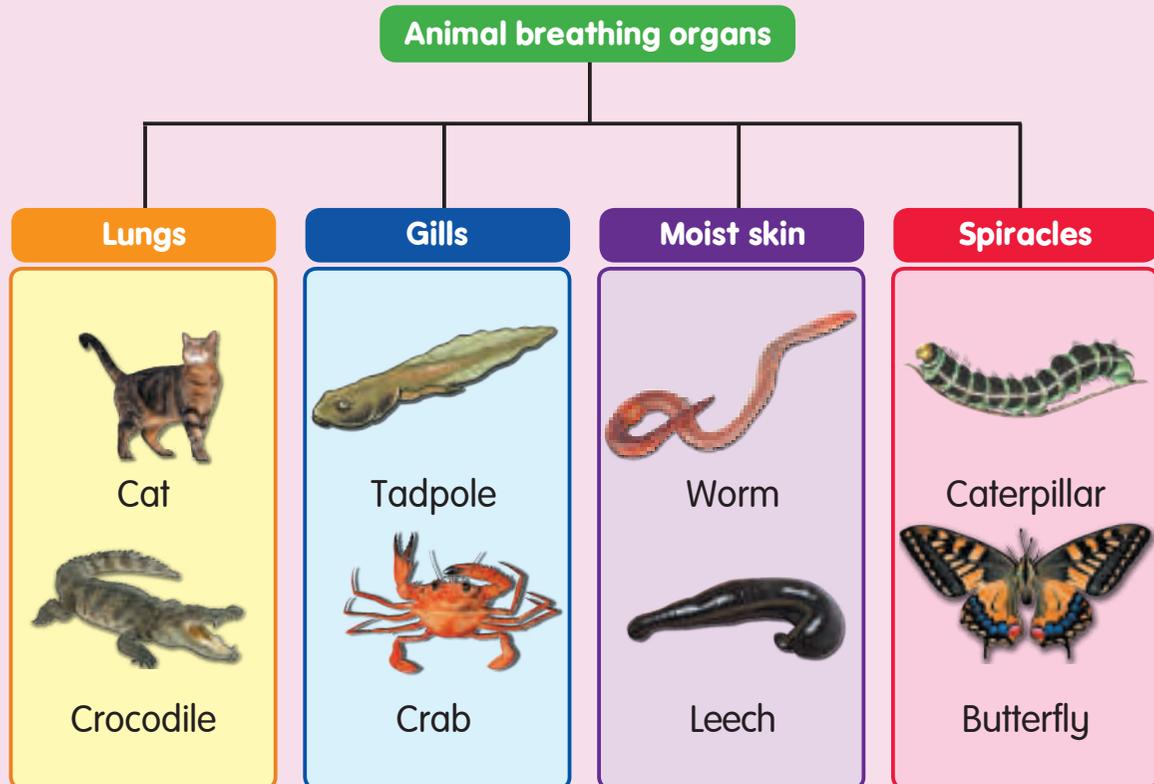
Make an x-ray card of the skeleton of a vertebrate based on your creativity. Use a black cardboard, cotton buds, string, glue, scissors, and other used materials.





## MIND REFLECTION

1. Animals breathe using organs such as lungs, gills, moist skin, and spiracles.
2. The classification of animals based on their breathing organs is as follows:

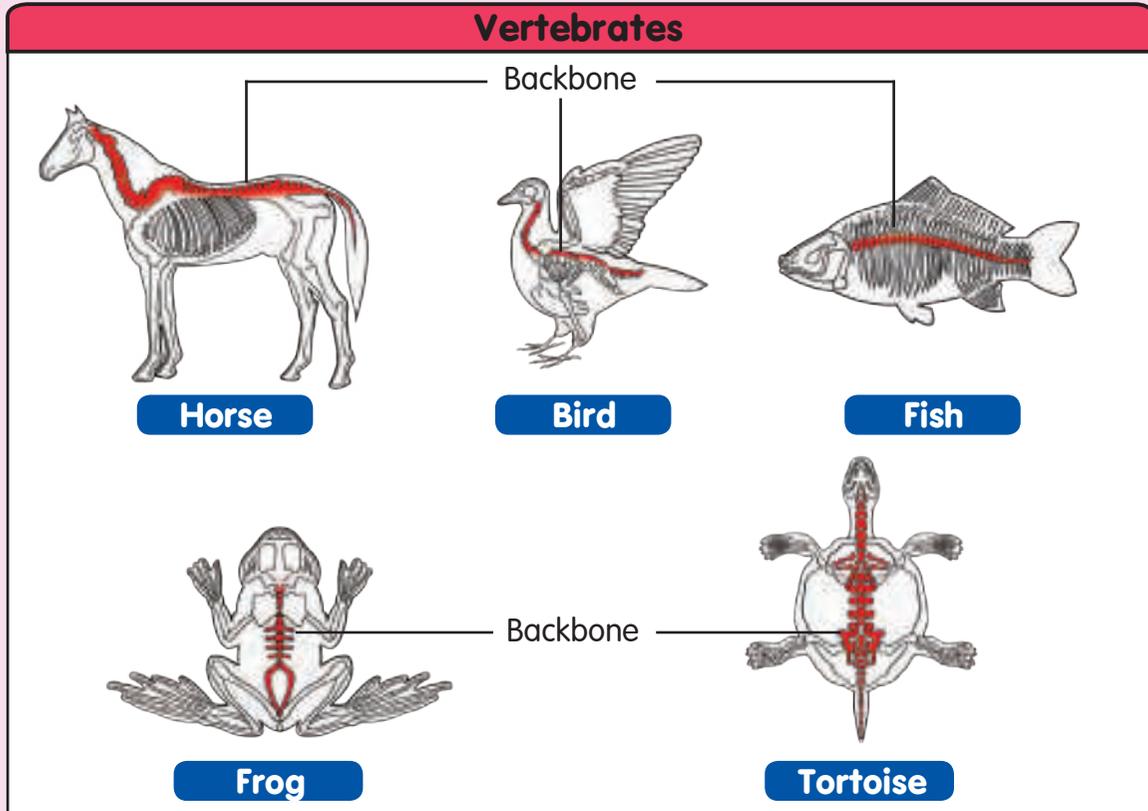


3. There are animals that have more than one breathing organ such as frogs. Usually, these animals can live in two different habitats. Frogs breathe using their lungs when on land. They breathe using their moist skin when they are in water.



A zoologist has discovered a new species of animal in a forest. However, he did not classify the animal as a mammal, bird, fish, reptile or amphibian. Why?

4. Vertebrates are animals with backbones such as horses and fish.



5. Invertebrates are animals with no backbones such as cockroaches and worms.
6. Vertebrates can be classified as mammals, reptiles, amphibians, birds, and fish.
7. Specific characteristics of vertebrates are as follows:

Class of animal	Breathing organ	Method of reproduction	Body covering	Habitat
Mammal	Lungs	Gives birth	Fine hair	On land
Reptile	Lungs	Lays eggs	Scales or hard shell	Mostly on land
Amphibian	Lungs and moist skin	Lays eggs	Moist skin	On land and in water
Bird	Lungs	Lays eggs	Feathers	On land
Fish	Gills	Lays eggs	Scales	In water



## MIND TEST

Answer all questions in the Science exercise book.

1. Which animal and its breathing organ is correctly matched?

	Animal	Breathing organ
A	Tadpole	Lungs
B	Cow	Spiracles
C	Turtle	Gills
D	Worm	Moist skin

2. Construct a classification table for the following animals based on their breathing organs.

(a)	(b)	(c)	(d)
			
Tadpole	Snail	Deer	Prawn
(e)	(f)	(g)	(h)
			
Butterfly	Lizard	Cockroach	Leech

3. The information below describes animal X.

When I was young, I lived in the water and breathe using my gills. As an adult, I am able to live in water and on land because I have two breathing organs.

Which of the following could be animal X?

A Fish    B Turtle    C Crocodile    D Toad

4. What is meant by vertebrates and invertebrates?

5. Construct a suitable mind map for the following vertebrates and invertebrates.

					
Tortoise	Centipede	Starfish	Caecilia	Tiger	Grasshopper

6. Construct a classification table for the following vertebrates. State their specific characteristics.

(a)



Bear

(b)



Goose

(c)



Crocodile

(d)



Toad

(e)



Fish

7. Which of the following animals below can live both on land and in water? State your reason.



Frog



Lizard

8. The figure below shows an animal that lives in water.



Why is it not classified as a fish?

# UNIT 4

# PLANTS

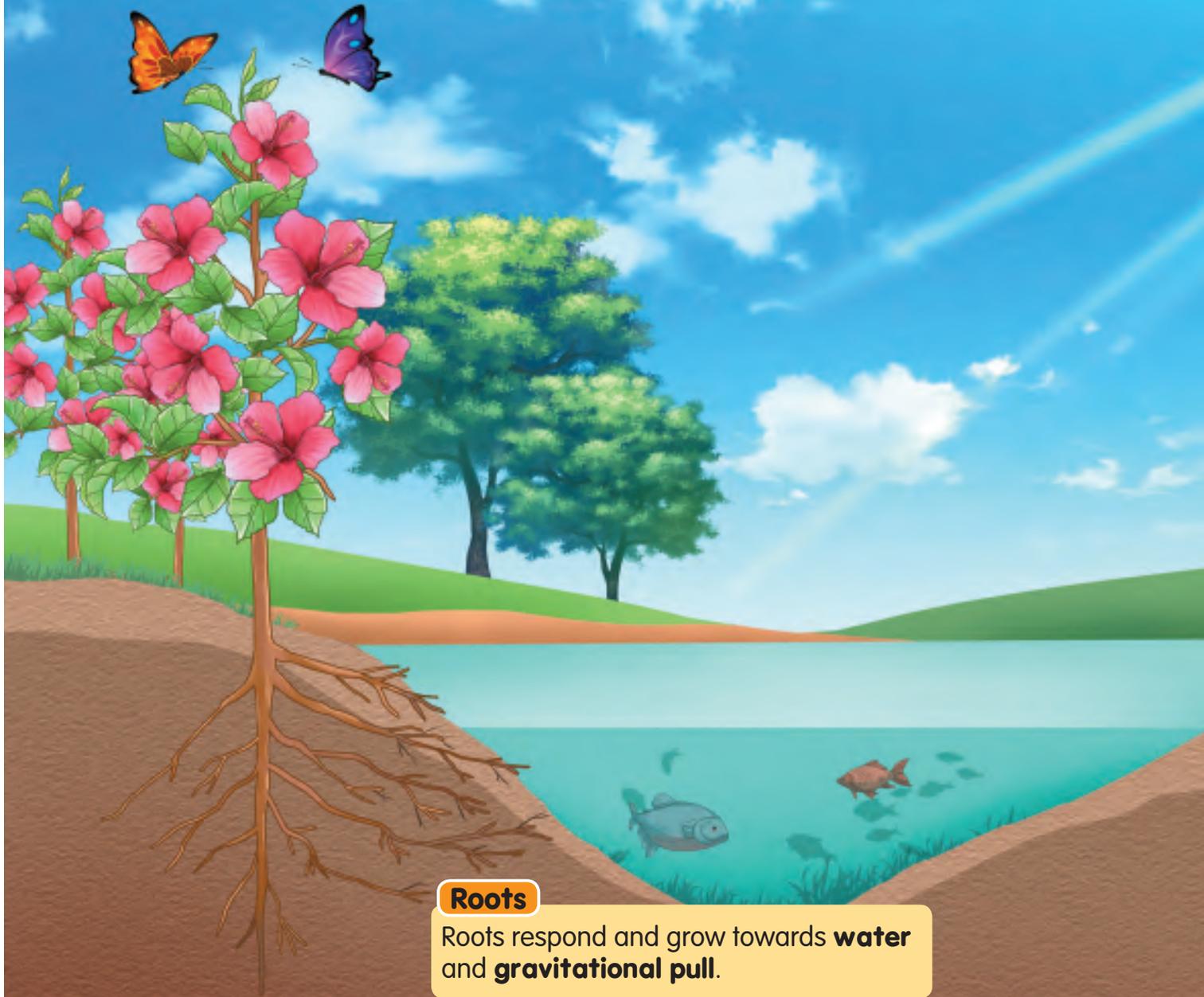
Teruni helps her grandfather at the vegetable farm.  
What can you observe?

Wow, there are so many pumpkins!

Why is this part of the plant coiled around this pole?

## Plant Responses to Stimuli

Like humans and animals, plants also respond to stimuli, such as water, gravity, light, and touch. Let us look at the picture below.



### Roots

Roots respond and grow towards **water** and **gravitational pull**.



### Shoots

Shoots respond and grow towards **light**.

### Leaves

Leaves of **some** plants respond to **touch**.



### SCIENCE INFO

Some plants, such as *Mimosa pudica* and Venus flytrap will droop and fold their leaves inward when touched.



**Mimosa pudica**



**Venus flytrap**

Based on the picture above, what can you say about plant responses towards stimuli?



## Activity 1

**Aim** To investigate whether roots respond to water.

**Hypothesis** Roots respond to water.

### Apparatus and Materials

3 newly germinated green bean seedlings, cotton, straw, double-sided tape, water, marker pen, petri dish

### Steps



1. Place the green bean seedlings on a double-sided tape in the middle of the petri dish.



2. Put cotton on the left and right sides of the petri dish. Then, mark their positions as A and B using the marker pen.



3. Add a few drops of water on cotton A using a straw until it is damp.
4. Observe the growth of roots of the green bean seedlings every day for a week.
5. Record your observations in the form of sketches.

### Questions

1. In which direction do the roots of the green bean seedlings grow?
2. Is your hypothesis accepted?
3. What is your conclusion based on this activity?

## Activity 2

**Aim** To investigate whether roots respond to gravity.

**Hypothesis** Roots respond to gravity.

### Apparatus and Materials

8 newly germinated green bean seedlings, cotton, straw, water, tile, petri dish, double-sided tape, modelling clay, plastic food wrapper, skewer

### Steps



1. Line the petri dish with cotton. Then, arrange the seedlings on a double-sided tape in different positions.



2. Add a few drops of water on the cotton using a straw until it is completely moist.



3. Wrap the petri dish with the plastic food wrapper. Then, make a few holes on its surface using a skewer.



4. Hold the petri dish upright on the tile using the modelling clay.

5. Observe the growth of the roots of the green bean seedlings every day for a week.

6. Record your observations in the form of sketches.

### Questions

1. In which direction do the roots of the green bean seedlings grow?
2. Is your hypothesis accepted?
3. What is your conclusion based on this activity?

### Activity 3

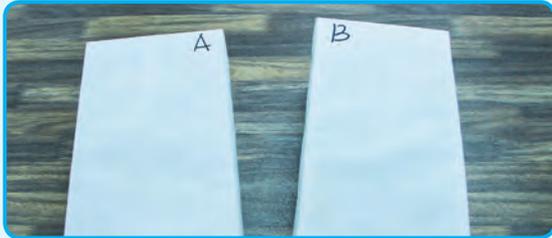
**Aim** To investigate whether shoots respond to light.

**Hypothesis** Shoots respond to light.

#### Apparatus and Materials

2 beakers filled with damp soil that are planted with chilli plants,  
2 shoe boxes, knife

#### Steps



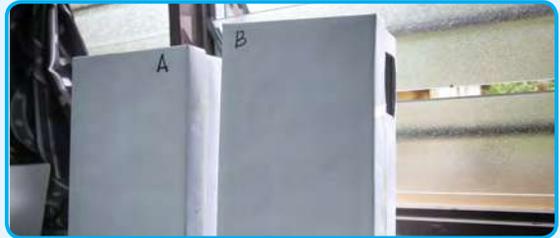
1. Label both shoe boxes, A and B.



2. Make one hole on the left side of box A and the right side of box B using a knife.



3. Place the beaker with the chilli plant in each box. Then, close the boxes.



4. Place both boxes in the sunlight.
5. Observe the growth of the shoots of the chilli plants after a week.
6. Record your observations in the form of sketches.

#### Questions

1. What are the conditions of the chilli plants in boxes A and B after a week?
2. In which directions do the chilli shoots in boxes A and B grow?
3. Is your hypothesis accepted?
4. What is your conclusion based on this activity?

## Activity 4

**Aim** To investigate parts of a plant that can respond to touch.

**Hypothesis** Leaves of *Mimosa pudica* respond to touch.

**Apparatus and Materials** *Mimosa pudica*

### Steps



1. Touch the leaves of *Mimosa pudica* with your fingers. Observe.
2. Record your observation in the form of sketches.



3. Repeat steps 1 and 2 by touching the flower and stem of *Mimosa pudica*.

### Questions

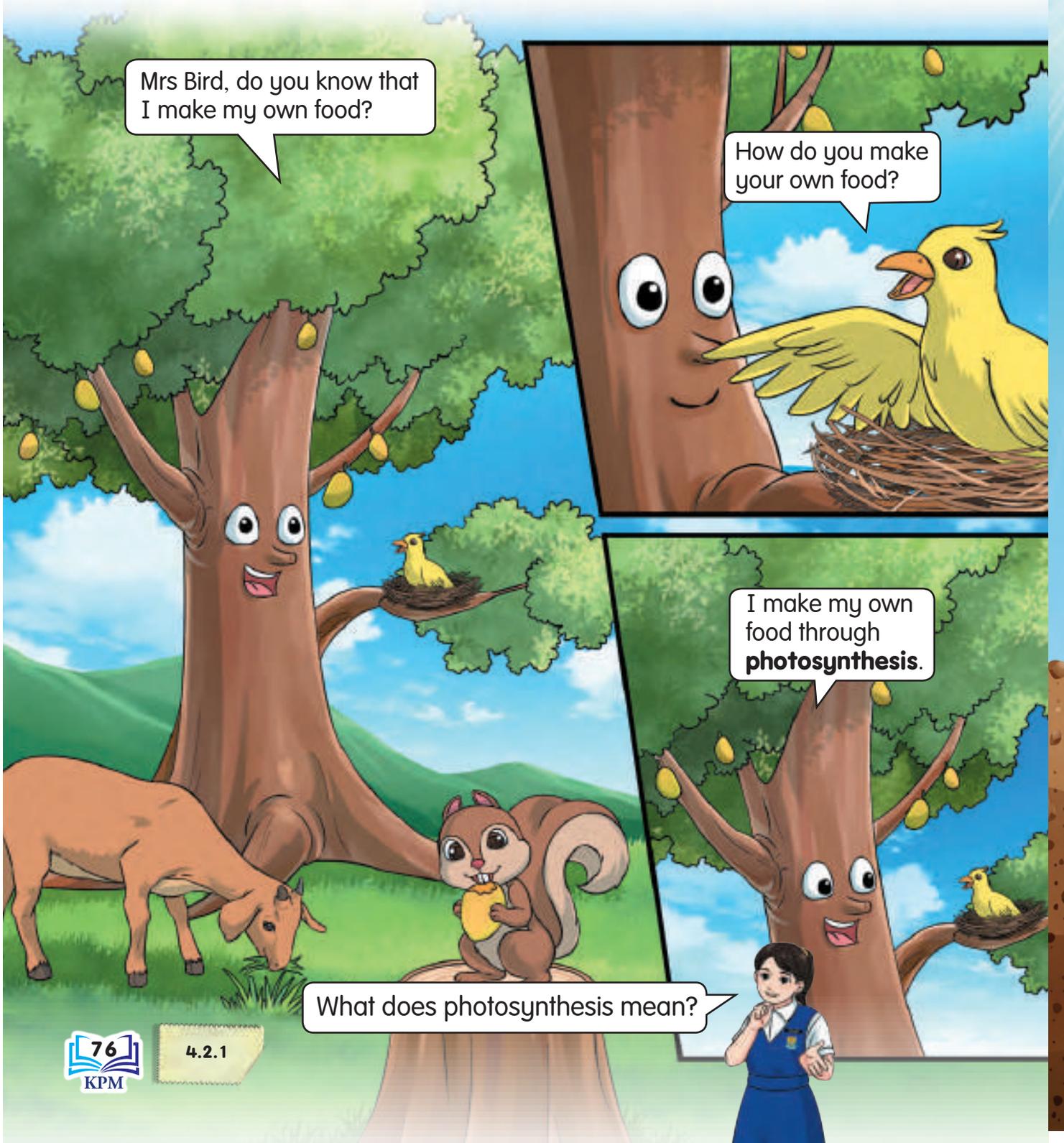
1. Based on this activity, what can you observe about the leaves, flower, and stem of *Mimosa pudica* when touched?
2. Is your hypothesis accepted?
3. What is your conclusion based on this activity?
4. Give examples of other plants that respond to touch. How do these plants respond?



Based on the investigation above, what can you conclude about the relationship between each part of the plant and its stimuli?

## Photosynthesis

Plants, humans, and animals need food to survive and grow. Humans and animals can move to find food but plants are not able to move. How do plants make their own food? Let us follow the conversation between the tree and the bird.



Mrs Bird, do you know that I make my own food?

How do you make your own food?

I make my own food through **photosynthesis**.

What does photosynthesis mean?

## The Needs of Photosynthesis

Plants need **sunlight**, **chlorophyll**, **carbon dioxide**, and **water** for photosynthesis.

### Sunlight

Main source of energy.

### Carbon dioxide

Gas in the air which enters the leaves.

### Water

Absorbed through the roots.

### Chlorophyll

Green coloured substance in plants.

### SCIENCE INFO

Non-green plants can also carry out photosynthesis if they have chlorophyll.

What do plants need for photosynthesis?

4.2.2

## Products of Photosynthesis

During photosynthesis, chlorophyll absorbs sunlight and converts water and carbon dioxide into **glucose** and **oxygen**. The glucose produced is then combined to form starch which is stored in parts of plants such as leaves, stems, roots, seeds, flowers, and fruits.

**Glucose stored in the form of starch**

Substance produced as food.

**Oxygen**

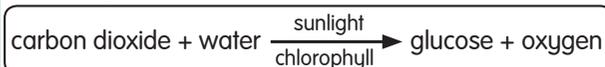
Gas released into the air through the leaves.



Based on the information above, what are the products of photosynthesis?

### SCIENCE-INFO

Photosynthesis involves:





## FUN ACTIVITY

## The Story of Photosynthesis



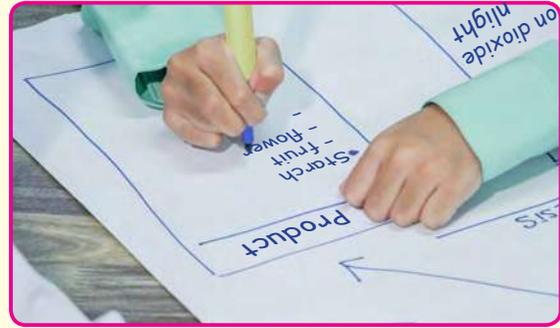
### Apparatus and Materials

Flip chart paper, A4 paper, marker pens of different colours

### Steps



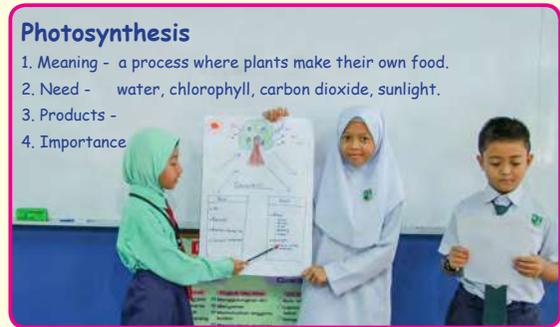
1. Form a group of three. Take turns to write the idea of photosynthesis on A4 paper in the clockwise direction.



2. The next member may add or correct what is written by his/her previous friend.



3. Discuss the written ideas in the group. Then, make a mind map on the flip chart paper based on the group's creativity.



4. Present the group work in front of the class.

### Question

What can you explain about photosynthesis?

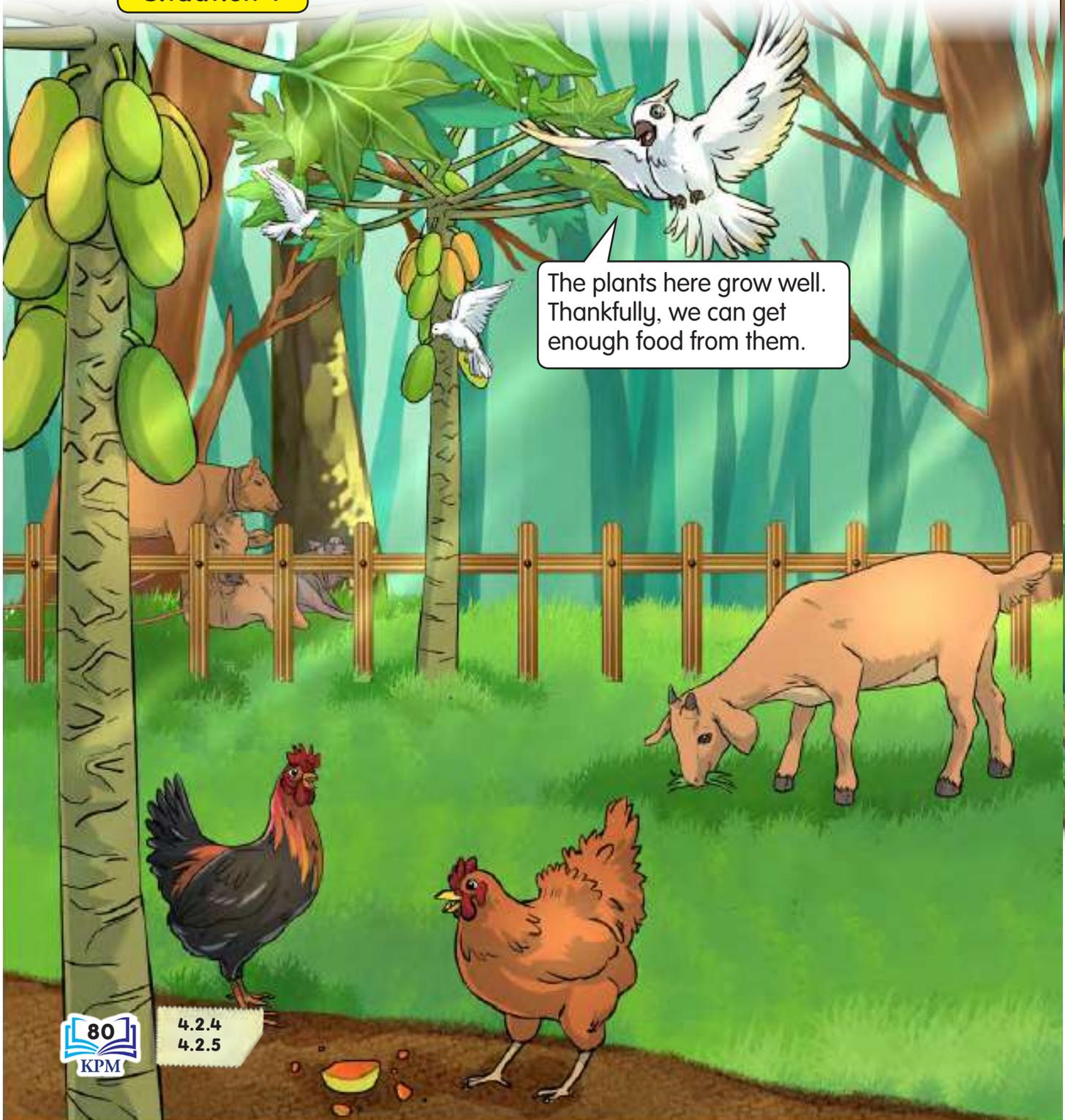


How do responses in plants assist the process of photosynthesis? Explain.

## Importance of Photosynthesis to Living Things

Plants constantly carry out photosynthesis to enable them to produce their own food. The products of photosynthesis also provide benefits to other animals and the surrounding environment. Observe the situations.

### Situation 1



The plants here grow well. Thankfully, we can get enough food from them.

## Situation 2

We can supply oxygen for humans and animals to breathe.

We also absorb carbon dioxide for photosynthesis. This helps to maintain the balance of gas composition in the air.



Why is photosynthesis important to living things?

Photosynthesis is important to living things because it enables plants to provide food, to produce oxygen for breathing, and also to maintain the balance of gas composition in the air.



## FUN ACTIVITY

## Photosynthesis Game



### Apparatus and Materials

A4 paper, scissors, envelope, stationery

### Steps



1. Gather information on the importance of photosynthesis and plant responses through various sources.



2. Fold an A4 paper into six parts and cut it using a pair of scissors to make question cards. Each group has to produce 12 question cards.



3. Write down questions related to the importance of photosynthesis and plant responses on each card.



4. Put the question cards into an envelope and give it to another group.

5.



Each group needs to answer the questions from the envelope received from another group. The group that answers quickly and correctly wins the game.

### Question

What are the importance of photosynthesis and responses in plants?



Steps

Produce an Emoticon Garden based on your creativity using used plastic containers, scissors, knife, marker pens, plastic ribbons, garden soil, A4 papers, vegetable seeds, and water sprayers.

1



2



3

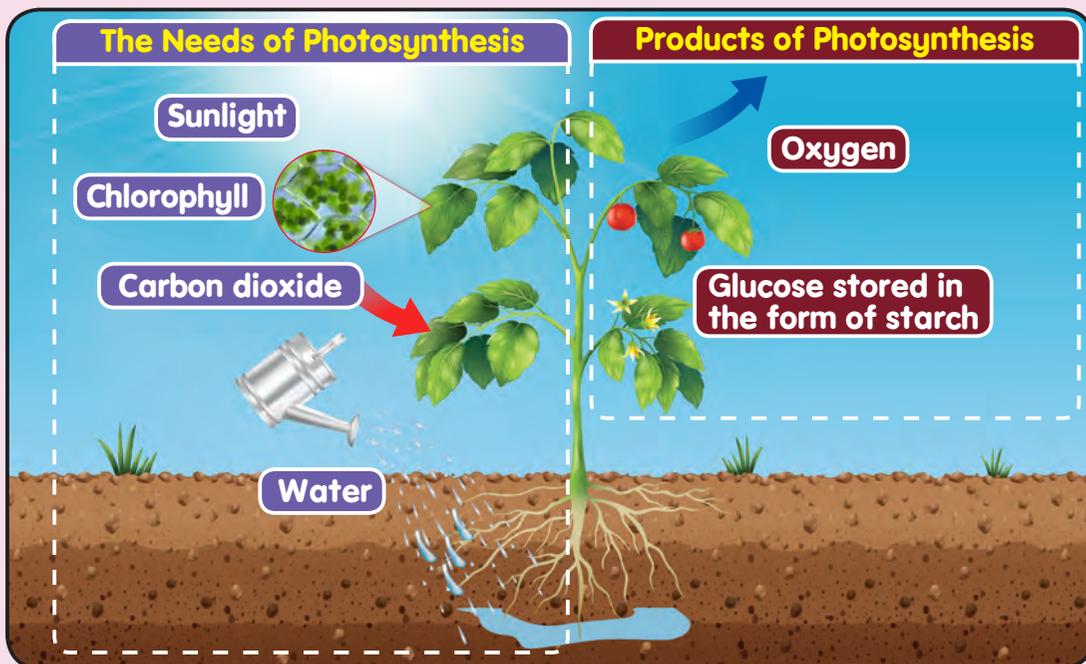


4



## MIND REFLECTION

1. Plants respond to stimuli such as water, gravity, sunlight, and touch.
2. Parts of plants that respond to stimuli are as below:
  - (a) roots respond to water
  - (b) roots respond to gravity
  - (c) shoots respond to light
  - (d) leaves of some plants respond to touch
3. Photosynthesis is a process where plants produce their own food.
4. The needs and products of photosynthesis are as below:



5. Importance of photosynthesis to living things are:
  - (a) to supply food.
  - (b) to supply oxygen.
  - (c) to maintain balance of gas composition of air.
6. Responses in plants help them to obtain their needs for photosynthesis.

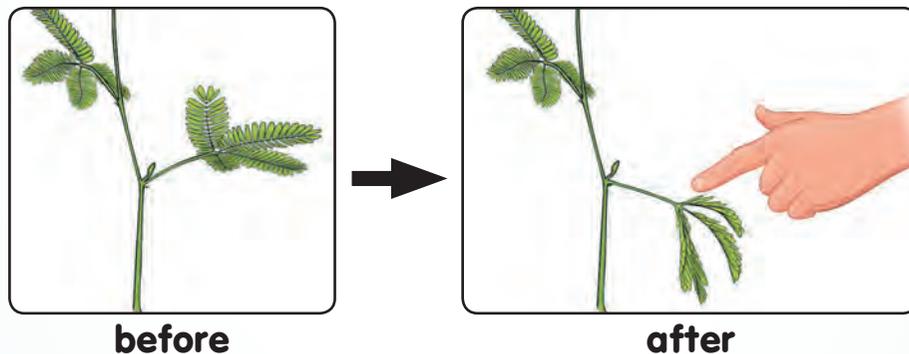
## MIND TEST

Answer all questions in the Science exercise book.

- (a) Plants respond to .  
(b) Parts of plants that can respond to stimuli are ,  and .  
(c) Plants respond to stimuli such as , , , and .
- Identify the types of stimuli that cause the following responses in the plants below.

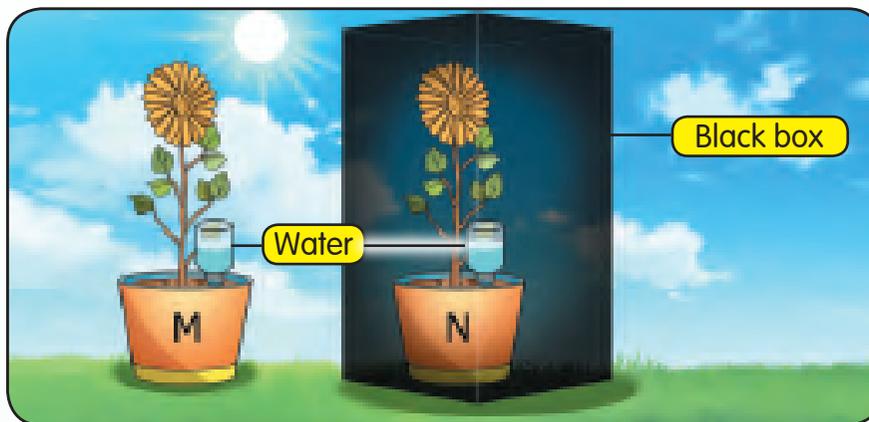


- The figure below shows the response of a plant towards a stimulus.



- State the type of stimulus that causes the response by the plant above.
- Which part of the plant responds to the stimulus?
- Give another example of a plant and its part that responds to the same type of stimulus.

4. Tick (✓) the correct meaning of photosynthesis.
- (a) A process where plants make their own food. 
- (b) A process where plants respond to water. 
5. Underline the correct answers.
- (a) (Water/Starch) is a need for plants to carry out photosynthesis.
- (b) (Chlorophyll/Light) is the green coloured substance found in leaves.
- (c) (Oxygen/Carbon dioxide) is the product of photosynthesis.
6. Tick (✓) the correct answers.
- (a) Photosynthesis supplies food to living things. 
- (b) Oxygen and glucose are products of photosynthesis. 
- (c) Starch is stored in the seed only. 
7. The figure below shows an investigation on the process of photosynthesis. Plants M and N are supplied with the same amount of water and placed under the sunlight.



- (a) What are the needs for photosynthesis in this investigation?
- (b) Predict the condition of plants M and N after three days.  
Give your reasons.
- (c) In another investigation, plant M was not supplied with water.  
Predict the condition of plant M after five days. Give your inference.

# UNIT 5

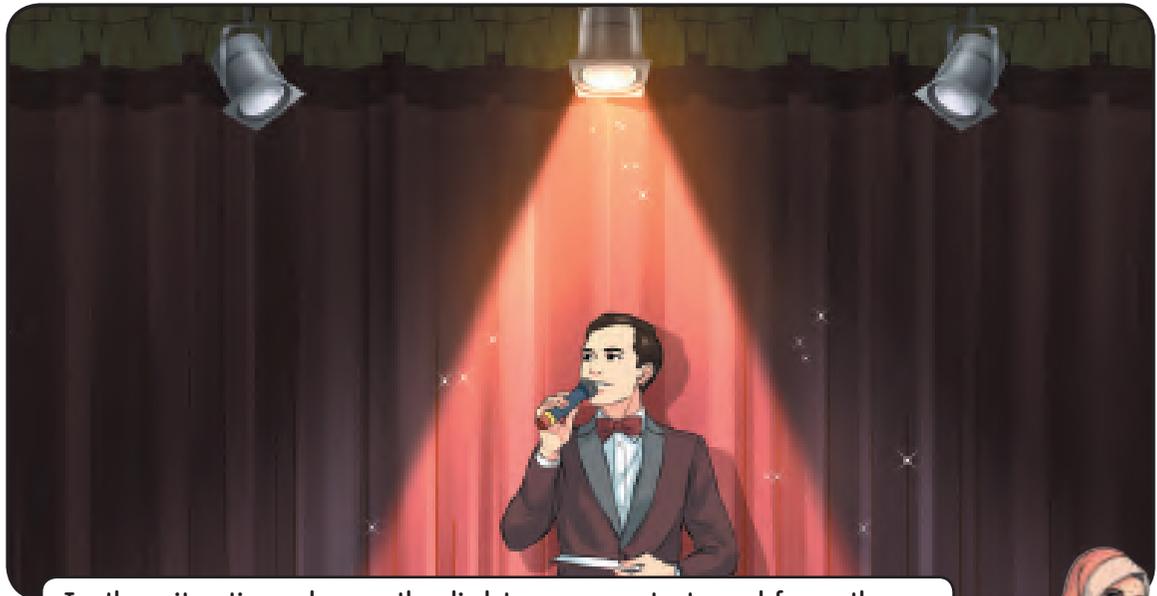
# PROPERTIES OF LIGHT



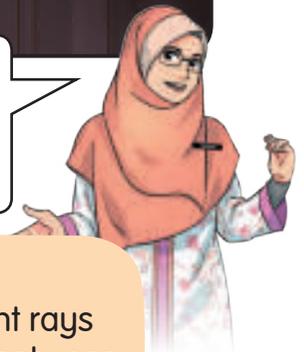
What can you observe on the water surface?

## Light Travels

Do you know that light travels? Observe the situation below.



In the situation above, the light appears to travel from the source of light. It moves in a straight line. There are many situations that show that light travels in a straight line around us. Take a look at the examples below.



Light from a car headlights.



Sunlight rays shine between the tree trunks in a forest.

Light from a helicopter.



All the examples above show that light travels in a straight line. Let us carry out an investigation to prove this.



## LET'S TEST

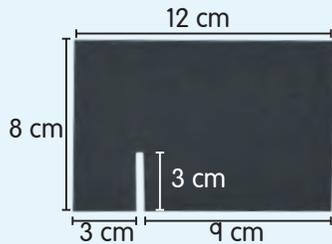
# Light Travels in a Straight Line



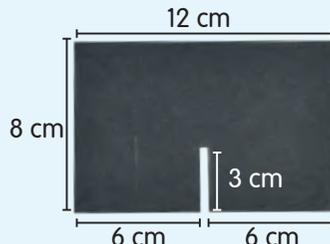
**Aim** To show that light travels in a straight line.

### Apparatus and Materials

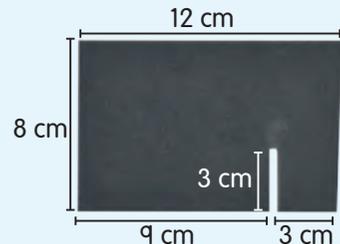
A torch, 3 cardboards with a slit, black cardboard (screen), wooden block



(i) Cardboard with slit

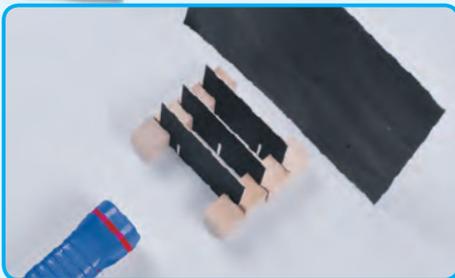


(ii) Cardboard with slit

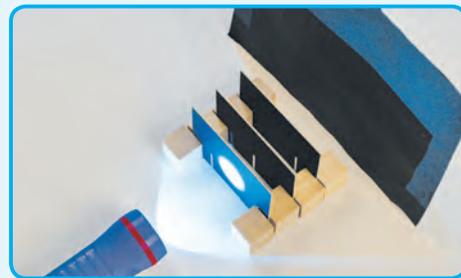


(iii) Cardboard with slit

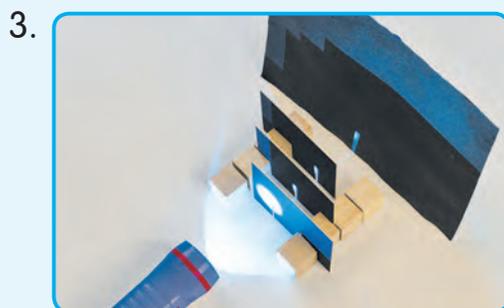
### Steps



1. Arrange the cardboards with slits and the screen as shown in the picture.



2. Switch on the torch and observe the screen.



3.

Adjust the arrangement of the cardboards with slits until a light is formed on the screen.

### Questions

1. How does the arrangement of the slits on the cardboards enable the formation of light on the screen?
2. Based on the arrangement of the slits in this activity, what can you say about how light travels?

## Shadow Clarity of Objects

Shadows are formed when a moving light is obstructed by an object. The clarity of the shadows formed may vary according to the type of object that obstructs it. The types of objects can be **transparent**, **translucent** or **opaque**. Let us investigate.



### LET'S TEST

### Compare and Contrast the Shadow



**Aim** To investigate the clarity of shadow.

**Apparatus and Materials** Torch, clear plastic, coloured plastic, manila card, adhesive tape, scissors, popsicle sticks, white paper

#### Steps



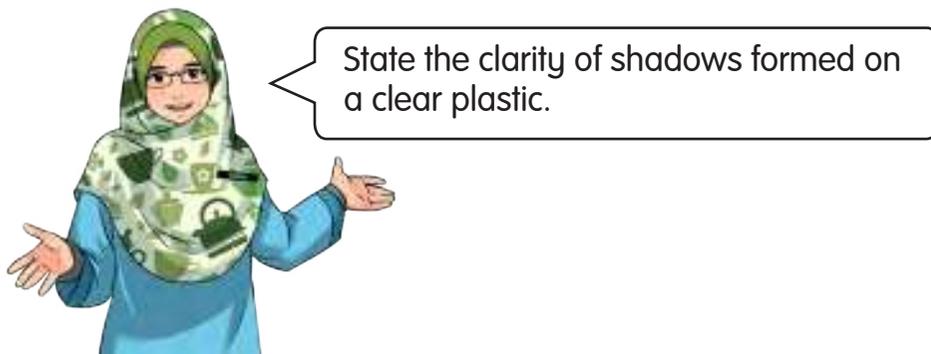
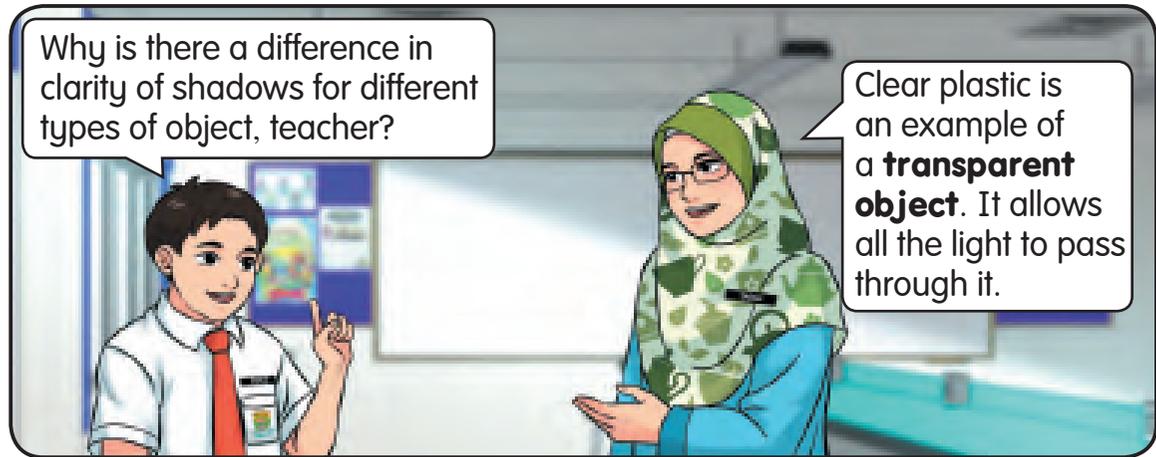
1. Draw a butterfly shape on the clear plastic, coloured plastic, and manila card. Then, tape a popsicle stick to each piece.
2. Direct the torch towards a butterfly-shaped manila card. Observe the shadow formed.
3. Repeat step 2 using coloured plastic and clear plastic of the butterfly shape.
4. Observe and record the clarity of the shadows formed in a table as shown below.

Object	Clarity of shadow (clear / less clear / none)
manila card	

#### Question

Which object formed a clear shadow? Give your inference.

Based on the activity that you have carried out, let us read the following conversations.



## Factors Affecting the Size of Shadows



### Experiment on the Size of a Shadow

**Aim:** To determine the factor which affects the size of a shadow.

**Problem statement:** What is the factor that affects the size of a shadow?

**Hypothesis:** The further the distance of an object from the light source, the smaller the size of the shadow.

#### Determining the variables:

- (i) Manipulated variable: Distance of light source from the object.
- (ii) Responding variable: Size of shadow.
- (iii) Constant variable: Distance of object from the screen.

**Apparatus and materials:** Torch, ruler, cylindrical object, adhesive tape, flip chart paper

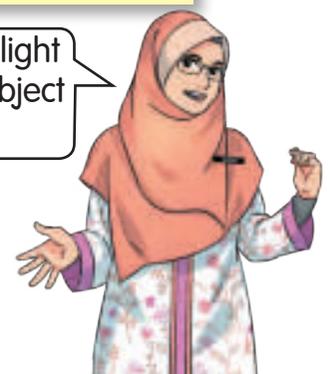
#### Steps:

1. Stick a flip chart paper on the wall.
2. Place the cylindrical object on the table.
3. Direct the torch to the cylindrical object.
4. Sketch the shape of the shadow produced on the flip chart paper.
5. Repeat steps 3 and 4 by changing the distance between the torch and the object.
6. Record the results of the experiment in the table as shown below.

Distance of object from torch (cm)	Size of shadow
5	
10	

**Conclusion:** The \_\_\_\_\_ the distance between the light source and the object, the \_\_\_\_\_ the size of the shadow. Hypothesis is accepted/not accepted.

The size of the shadow becomes larger if the distance between the light source and the object is shorter. What if the distance between the object and the screen changes? Plan and carry out an experiment.

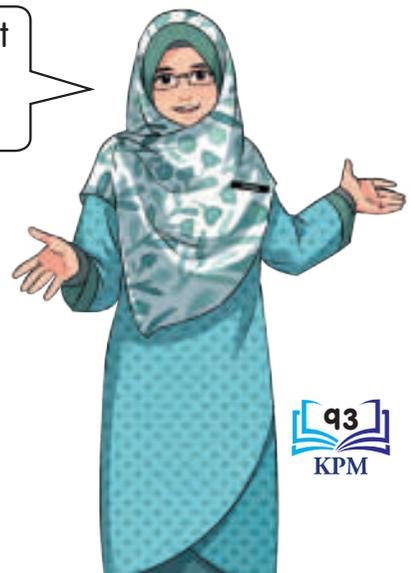


## Factors Affecting the Shape of Shadows



The orientation of the object and the position of the light source affect the shape of the shadow. Plan and carry out an experiment to test this hypothesis.

Based on the experiments that you have carried out, what is your conclusion about the factors affecting the size and shape of a shadow?



## Reflection of Light

When we look in the mirror, we can see our image. This is due to the **reflection of light**. Look at the picture below.



Image formed on the water surface.



Image formed on the floor tiles.



Image formed on a metal surface.



Why is there a shiny part in the torch?





## LET'S TEST

## Reflection of Light



**Aim** To investigate the reflection of light

**Apparatus and Materials** 2 face mirrors, 1 metal spoon, 1 tin lid, watch, string

### Steps

1.



Hang a face mirror outside the classroom with a string.

2.



Hold the metal spoon towards the sunlight. Adjust it so that light is formed on the face mirror. Observe what happens.

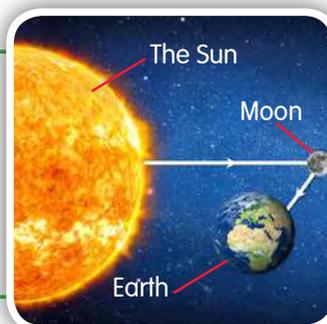
3. Repeat step 2 by replacing the metal spoon with the watch, tin lid, and face mirror.

### Questions

1. Based on the observations during this activity, what is the property of light being tested?
2. If a piece of paper is used to replace the metal spoon, what will you observe? Give your reason.

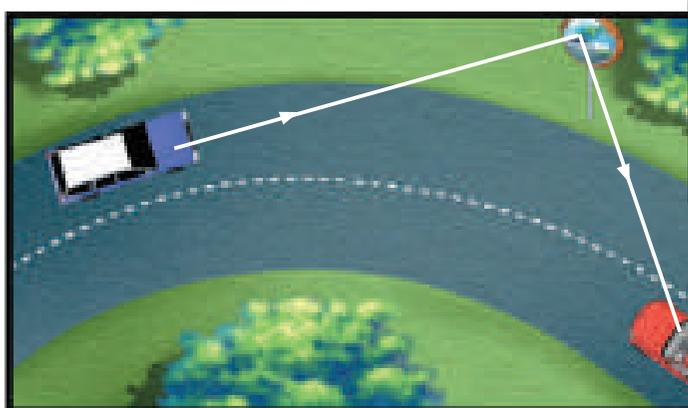
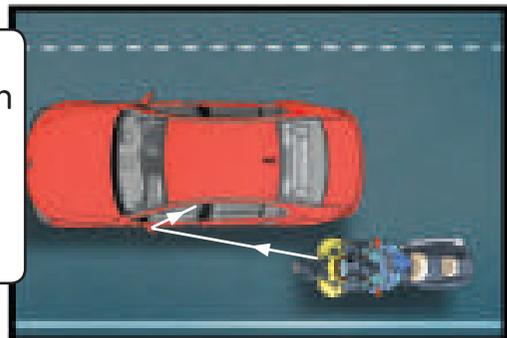
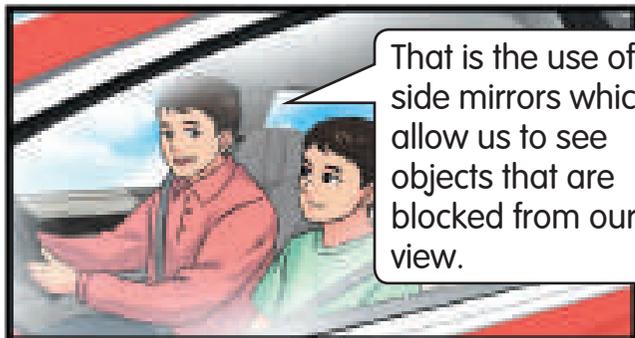
### SCIENCE-INFO

The moon is not a source of light. The moon looks bright at night because it reflects the sunlight towards Earth.



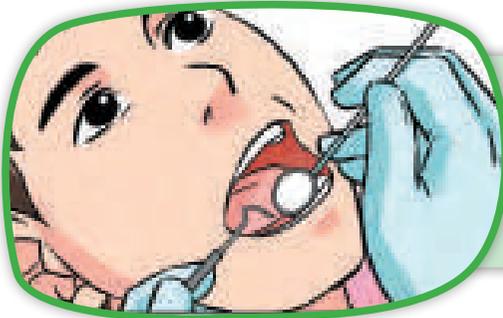
## Applications of Reflection of Light

Let us read the story below.



That is a convex mirror. The mirror allows the driver to see another vehicle blocked from the driver's view to avoid an accident.

In our daily lives, many situations involve the reflection of light as shown in the examples below.



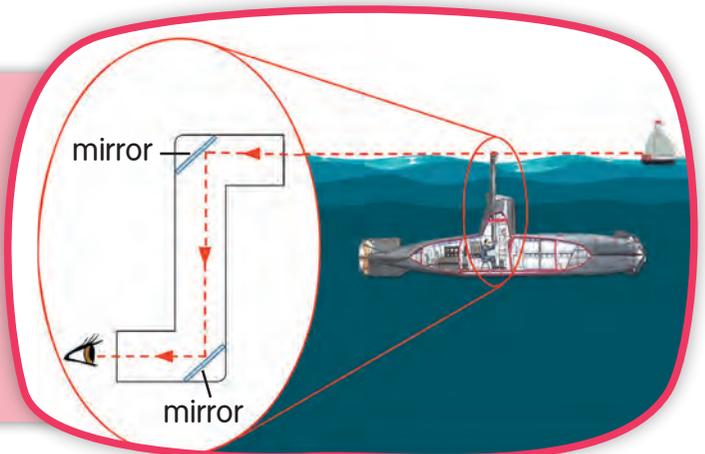
A dental mirror helps the dentist to see the patient's dental condition.

Customers at a shoe store can see the image of the shoes worn using the mirror.



A customer at a salon can see the image of the back of her head through the mirror.

Navy personnel in a submarine can see the object at the surface of the sea using a periscope. Two mirrors in the periscope reflect the obstructed light from an object to the eyes of the observer.



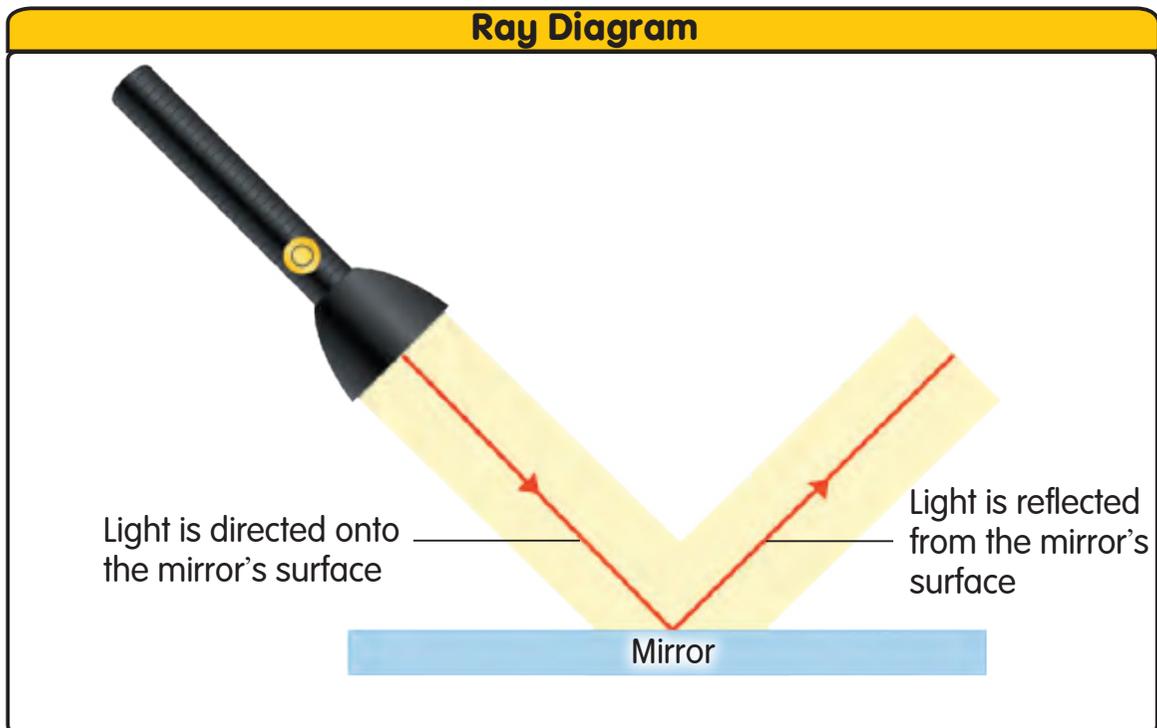
Give an example of a situation in your daily life where light is reflected. Explain its use.

## Ray Diagram

Observe the picture below.



When the light is directed onto a flat, smooth surface like a mirror, the light is reflected. This situation can be drawn in the form of a ray diagram as shown below.





## FUN ACTIVITY

## Drawing a Ray Diagram

GROUP  
ACTIVITY

### Apparatus and Materials

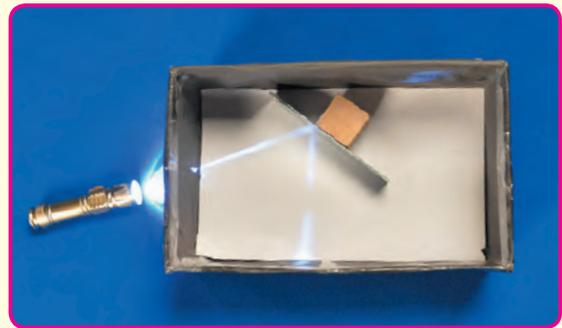
Mirror, black box with a slit, white paper, torch, wooden block, ruler



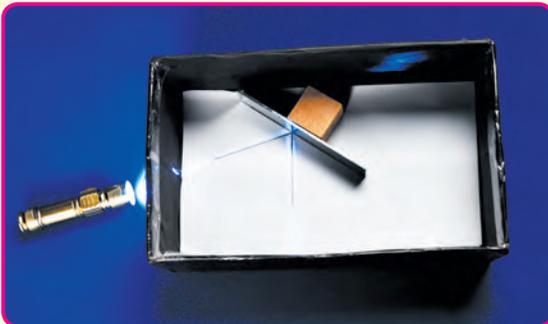
### Steps



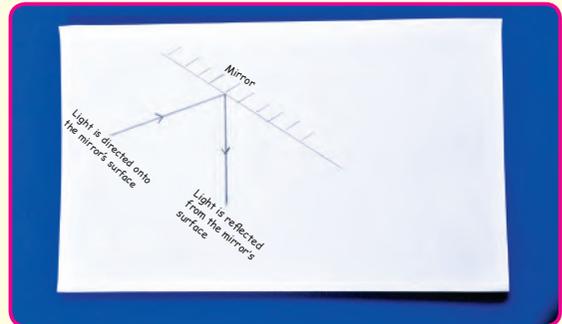
1. Place the white paper on the bottom of the box and arrange the mirror as shown in the picture.



2. Direct the torchlight through the slit on the box towards the mirror.



3. Observe the light reflected from the mirror. Then, draw the light ray on the white paper using a ruler.



4. Remove the white paper and label your drawing.

### Question

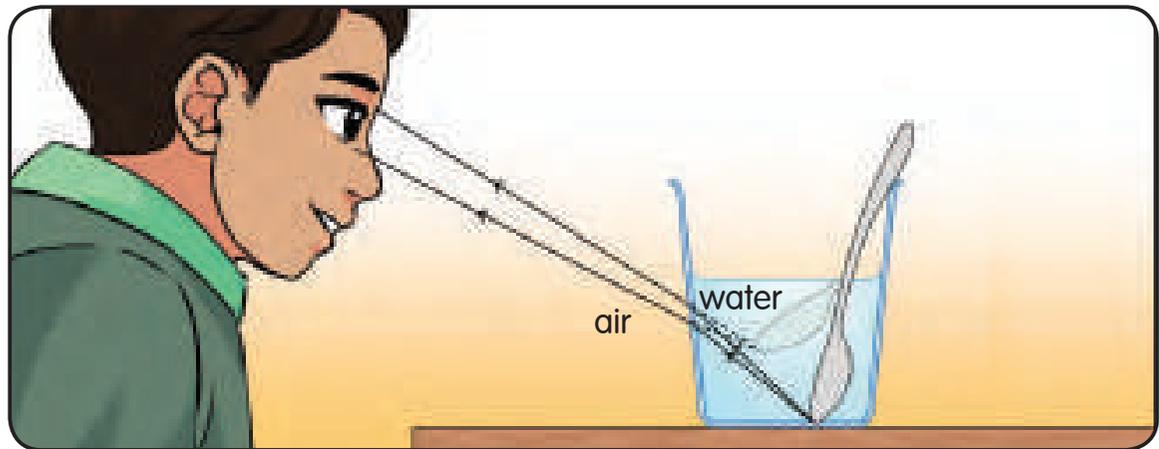
Why is a ruler used to draw a ray diagram?

## Refraction of Light

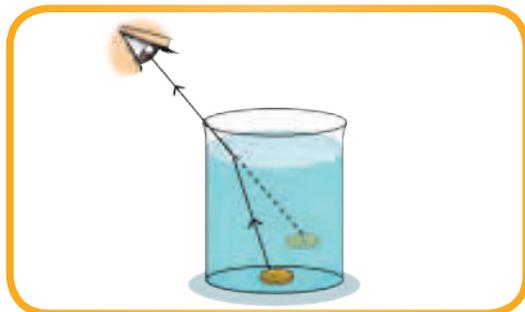
One afternoon, Siva was at Pak Abu's stall. Suddenly... .



The light from the spoon in the water is refracted when the light travels from water to air. This causes the spoon to appear bent.



When light travels through two different mediums, the direction of light will change. This is called **refraction of light**.



What is the property of light that causes the spoon to appear bent?





## LET'S TEST

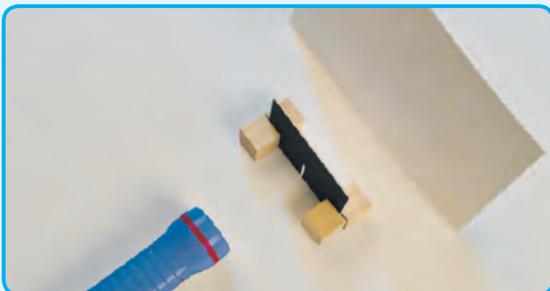
## Refraction of Light



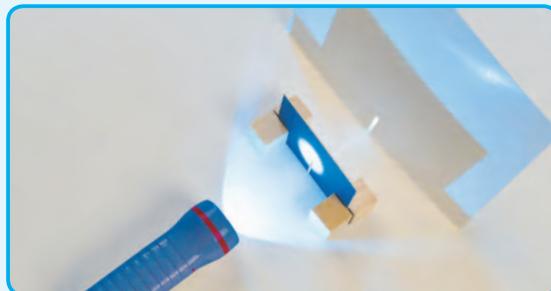
**Aim** To investigate the refraction of light.

**Apparatus and Materials** Torch, bottle filled with water, marker pen, ruler, white paper, cardboard with a slit, wooden block

### Steps



1. Arrange the apparatus and materials as shown in the picture.



2. Switch on the torch.



3. Observe and draw the direction of the light ray on the white paper formed by the slit.



4. Place the bottle filled with water as shown in the picture.

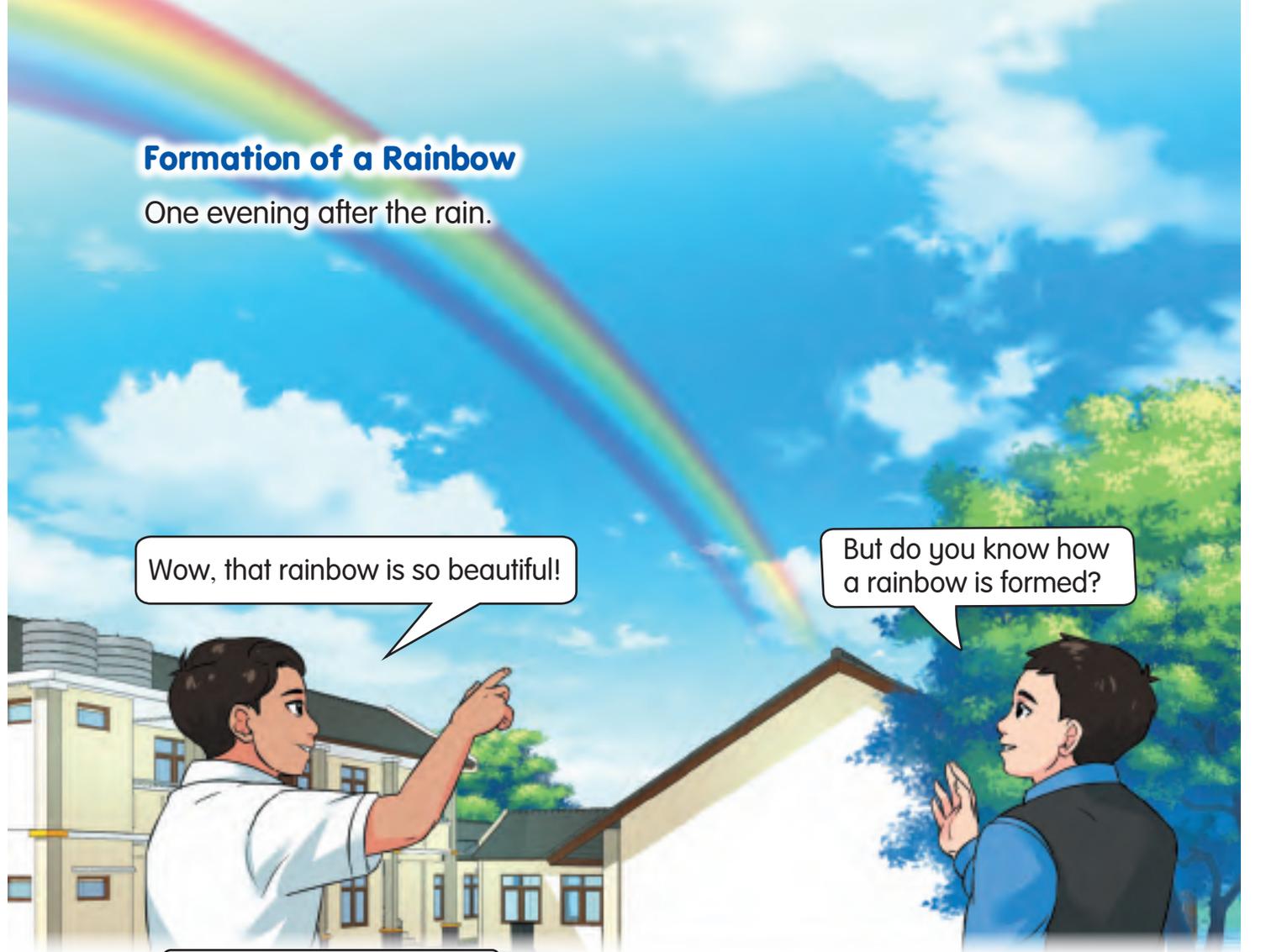
5. Observe the direction of the light ray on the white paper after passing through the bottle filled with water.

### Questions

1. What happens to the direction of the light ray after passing through the bottle filled with water?
2. What is the property of light tested in this activity?
3. Give an example of a situation in your daily life that can be related to the property of light above.

## Formation of a Rainbow

One evening after the rain.



Wow, that rainbow is so beautiful!

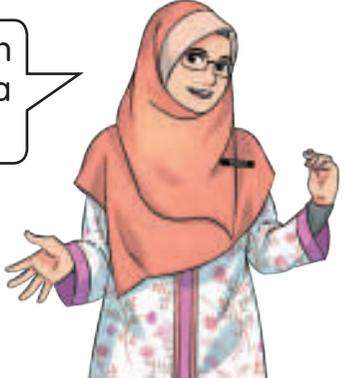
But do you know how a rainbow is formed?



Usually when the Sun shines during or after the rain, a rainbow is formed.



Oh, I see.



Do you know that when the Sun shines on the rain droplets, the light will be refracted? This will form a rainbow. Carry out an investigation.



## LET'S TEST

## Formation of a Rainbow



**Aim** To investigate the formation of a rainbow.

**Apparatus and Materials** Mirror, flip chart paper, adhesive tape, basin, water

### Steps



1. Tape a flip chart paper onto a wall outside the classroom.



2. Place a basin filled with water under the sunlight.



3. Put a mirror into the basin of water as shown in the picture.



4. Adjust the bottom part of the mirror which is under the water surface towards the Sun until a rainbow is formed on the flip chart paper.

### Questions

1. What is the function of the mirror and the water?
2. How is the light from the Sun able to form a rainbow?

## Importance of Properties of Light in Daily Life

If light does not travel in a straight line, cannot be reflected and refracted, what will happen? Take a look at the situations below.



**Situation 1**

If light does not travel in a straight line, is the light from the torch able to directly shine on the object you are looking for?

If light cannot be reflected, can we see our face in the mirror?



**Situation 2**



**Situation 3**

If light cannot be refracted, can the hand lens magnify the image of the object?

Why are the properties of light important in our daily life?





## FUN ACTIVITY

## Application of the Properties of Light

### Apparatus and Materials

Face mirror, binoculars, periscope, hand lens, flip chart paper, marker pen

GROUP  
ACTIVITY

### Steps



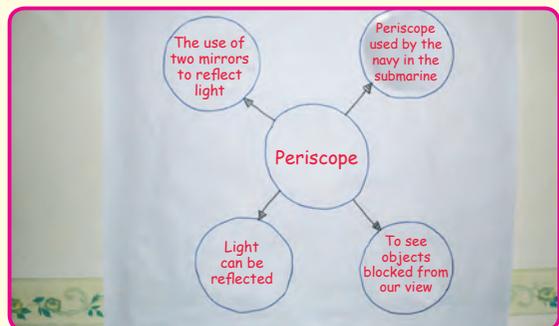
1. Form four groups. The leader of each group selects any device, such as a periscope, a pair of binocular, a hand lens or a mirror.



2. Each group discusses how the properties of light are applied by the device based on its use.



3. Present the discussion in the form of a mind map based on the creativity of the group members.



4. Display the group work in class. Pupils can view the work of other groups.

### Question

Give an example of another device that applies the properties of light to solve problems in daily life. Explain.



Steps

Make a kaleidoscope according to your creativity using cylindrical object, aluminium foil, beads, manila cards, black paper, glue, adhesive tape, scissors, and clear plastic.





## MIND REFLECTION

1. Properties of light are; a) light travels in a straight line, b) can be reflected, c) can be refracted.
2. A transparent object is an object which allows all light to pass through it. Hence, no shadow is formed.
3. A translucent object is an object which allows some light to pass through it. Hence, the shadow formed is less clear.
4. An opaque object is an object which does not allow any light to pass through it. Hence, a clear shadow is formed.
5. Factors affecting the size of a shadow are:
  - Distance between the object and the light source
  - Distance between the object and the screen
6. Factors affecting the shape of a shadow are:
  - Orientation of the object
  - Position of the light source
7. Applications of reflection in daily life are as follows:



The face mirror reflects light from our face to our eyes.



Dental mirror reflects light from the teeth and enables the dentist to examine the condition of the teeth easily.

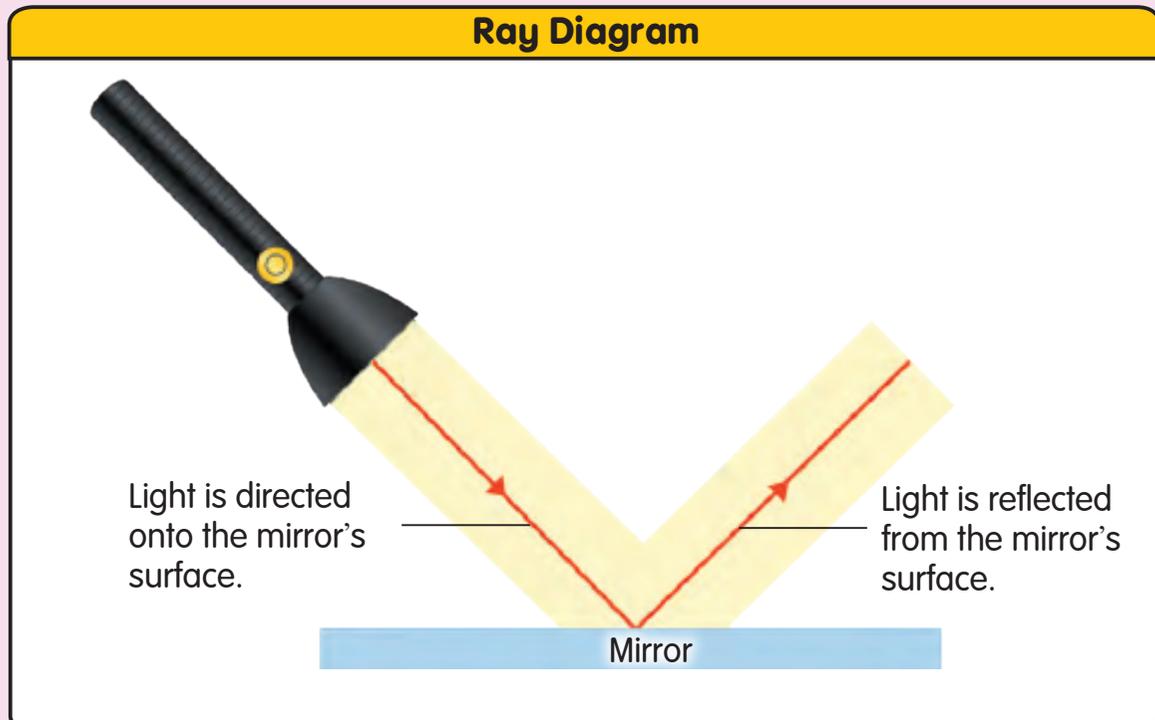


Convex mirror reflects light from blocked object to our eyes.

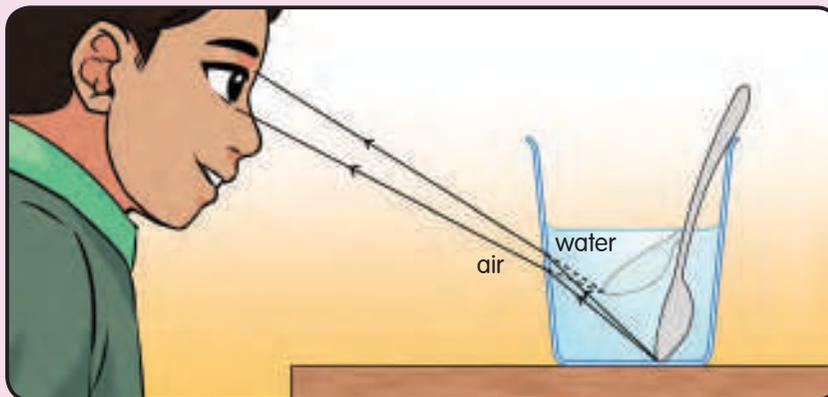


Two mirrors in the periscope reflect obstructed light from an object to our eyes.

8. The reflection of light can be drawn in the form of a ray diagram as shown below.



9. When light travels through two different mediums, the direction of light will change. This is called refraction of light.

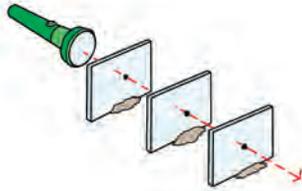


10. When the Sun shines on rain droplets, light is refracted and a rainbow is formed.

# MIND TEST

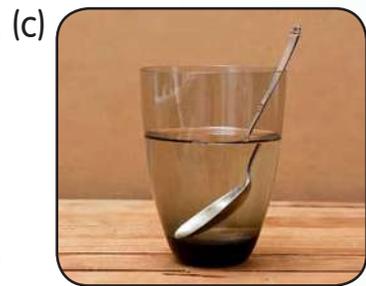
Answer all questions in the Science exercise book.

- The three properties of light are light travels \_\_\_\_\_, can be \_\_\_\_\_, and can be \_\_\_\_\_.
- The diagram below shows an investigation about the property of light.



What is the conclusion about the property of light investigated above?

- Tick (✓) the picture which shows that light travels in a straight line.



- (a) Match.

### Object

Opaque

Transparent

Translucent

### Clarity of shadow

None

Less clear

Clear

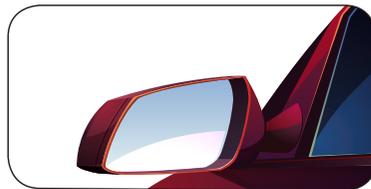
- Compare the clarity of shadows formed between a translucent object and an opaque object.

5. What are the factors affecting the shape of shadows?
6. State the factors affecting the size of shadows.
7. In an investigation, a group of Year 4 pupils carried out an experiment to measure the size of a shadow by changing the distance between the light source and the object.

The table below shows the results of the investigation.

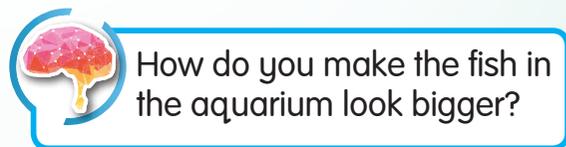
<b>Distance between the light source and object (cm)</b>	10	15	20
<b>Size of shadow</b>	Large	Medium	Small

- (a) Based on the investigation above, how can you increase the size of the shadow?
  - (b) What can you conclude from this investigation?
  - (c) State the variables involved:
    - (i) Manipulated variable
    - (ii) Constant variable
    - (iii) Responding variable
8. The diagram below shows one part of a car.



State the property of light applied to the part of the car and describe its function.

9. Complete the picture below in the form of a ray diagram.



10. How is a rainbow formed?

# UNIT 6

# SOUND

What are the sounds that you can observe in the situation below?



## Vibrations and Sound

Fariz and his friends performed in a school band. Observe the situation below.

### Blowing

When the flute is blown, the air inside the flute **vibrates**.

### Knocking

When the xylophone is knocked, the bars **vibrate**.

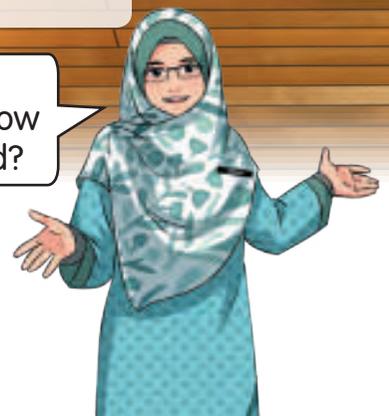
### Clapping

When cymbal pieces are clapped together, they **vibrate**.

### Plucking or Bowing

When the strings of the guitar are plucked or bowed, they **vibrate**.

Based on the situation above, how is sound produced?





## FUN ACTIVITY

## Producing Sound



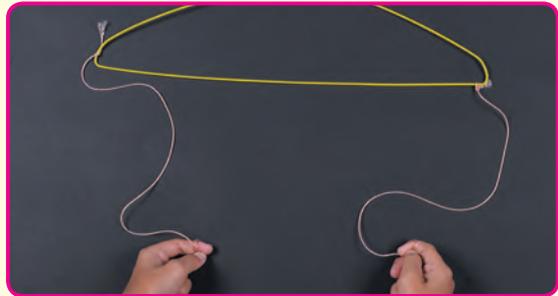
### Apparatus and Materials

Metal hanger, thread, pencil

### Steps



1. Tie the thread to the hanger.



2. Entwine the ends of the thread around your index fingers.



3. Place the index fingers close to the ears.



4. Ask your friend to tap the metal hanger with a pencil. Observe what happens.

5. Repeat steps 1 to 4 by exchanging your role with your friend.

### Questions

1. Based on the activity above, how do you produce sound?
2. What happens to the thread when the hanger is tapped?
3. What causes the production of sound?

TEACHER'S  
NOTES

Make sure that the hanger does not touch the body when it is tapped.

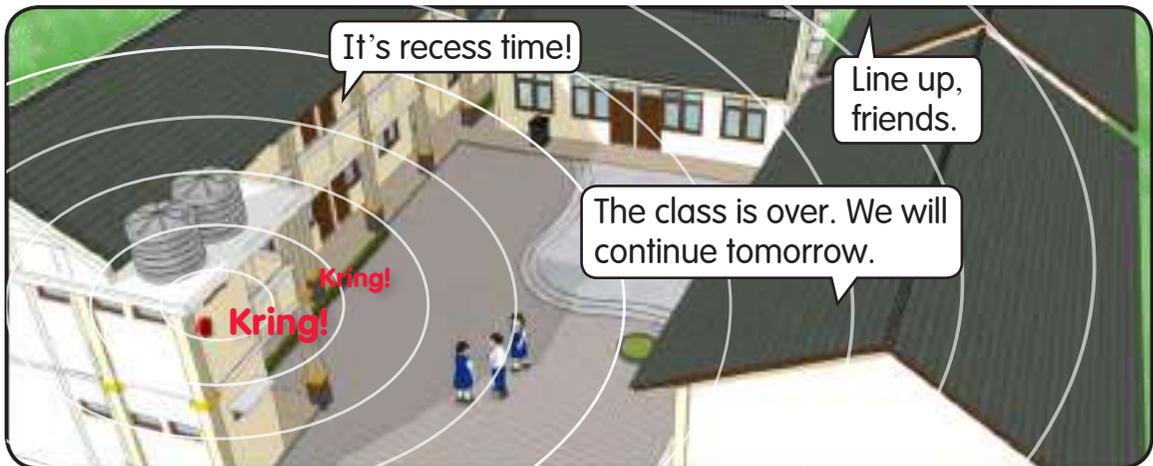
## Sound Travels

Fariz, Teruni, and Mei Lan can hear the sound of the bell ringing from an ice cream seller even though they are at different positions. Why?



Although they are at different positions, they can hear the bell ringing from an ice cream seller as **sound travels in all directions**.

Observe the situation below.



Why can the pupils on the upper floor hear the school bell?

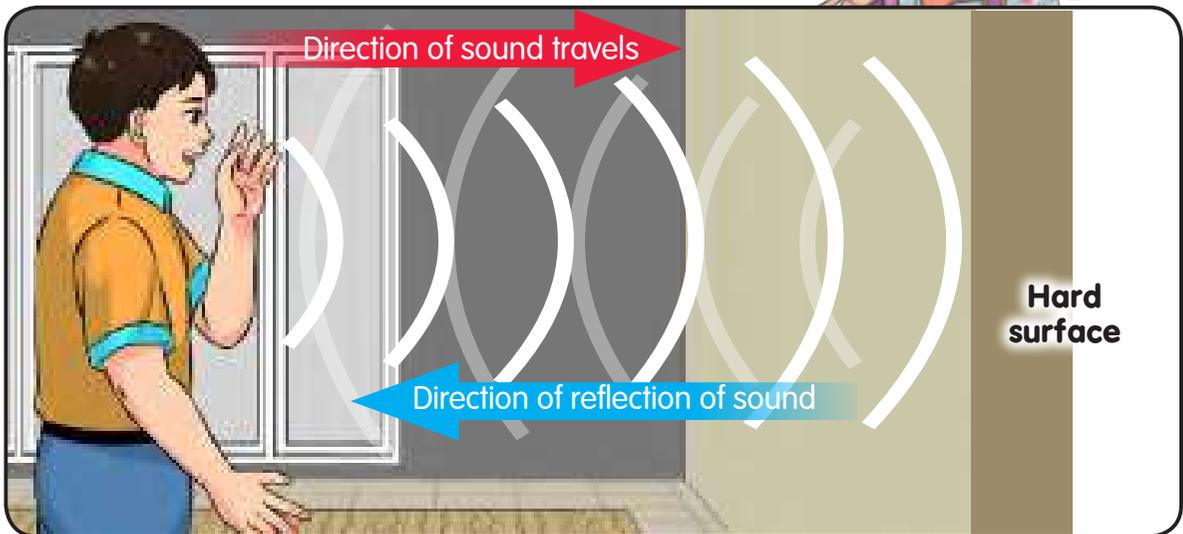


## Sound Can Be Reflected

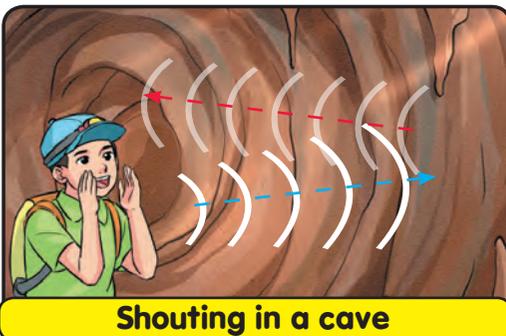
Fariz and his family have just moved into a new home. As he speaks in the empty room, he hears his voice again.



When a sound hits a hard surface, it is reflected.



Look at other examples of reflection of sound that occur around us.



## Phenomena of Reflection of Sound

Reflection of sound happens all around us. It is used by humans and animals in various ways. What are the phenomena of reflection of sound that are happening around us?

### Echo

An echo is a sound produced when a sound is reflected on a hard surface.

### SCIENCE INFO

In the medical field, ultrasonic machines are used to detect organs in the body of a patient or fetus in the womb.



### Ultrasound

Ultrasound is a sound that humans cannot hear but can be heard by animals such as bats, dolphins, and whales to navigate and detect the location of their prey.

### Sonar

Sonar is a technology that reflects ultrasonic sound to detect objects in water.

Based on the information above, give another example of reflection of sound that you have experienced. Explain.

## Useful and Harmful Sounds

Sound has many effects in our lives. What are the useful and harmful sounds to us? Observe the situations below.

**Situation 1**

Sound allows us to **communicate**.

Musical sound can be **entertaining**.

**Situation 2**

The siren of the ambulance indicates an **emergency alert**.

**Situation 3**

The ringing of the phone **provides notification** on incoming calls.

**Situation 4**

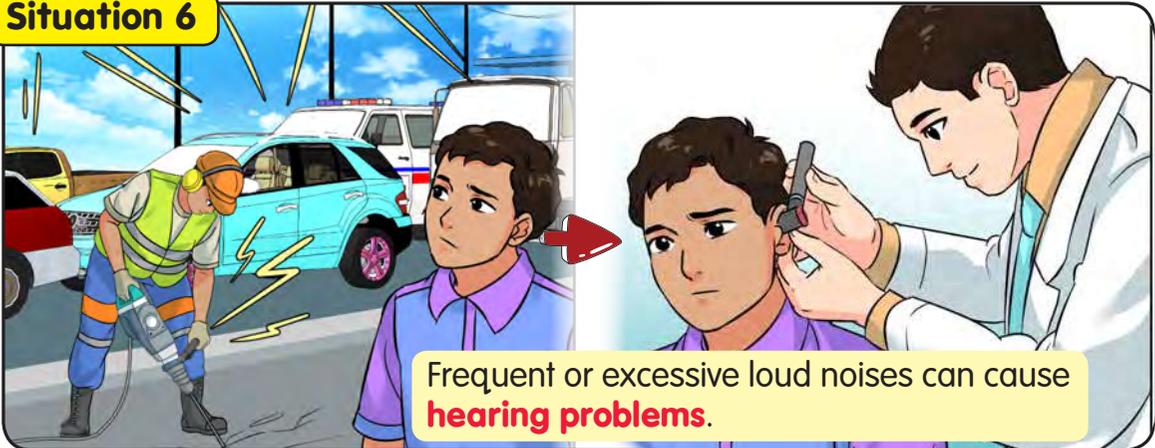
What are you saying?  
I can't hear you!

A noisy environment makes it difficult for us to **communicate**.

**Situation 5**

Noises from vehicles can **cause disturbance and stress**.

### Situation 6



Identify and explain the useful and harmful sounds based on the picture below.



Gather information on the effects of sound in your daily life. Share your information creatively with your friends.



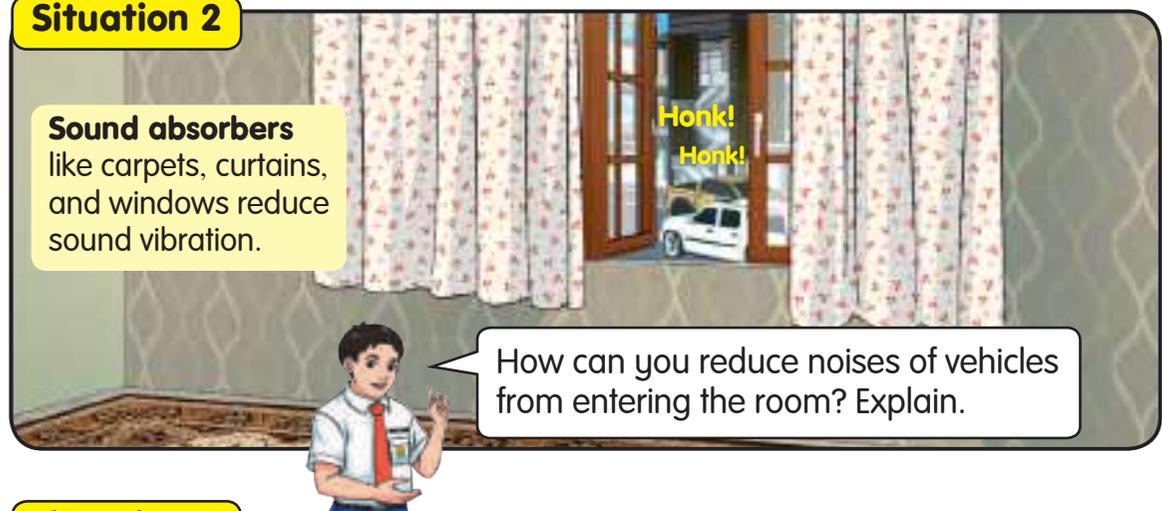
## Reducing Sound Pollution

Loud or unwanted sound can be reduced. Observe the situations below.

### Situation 1



### Situation 2



### Situation 3

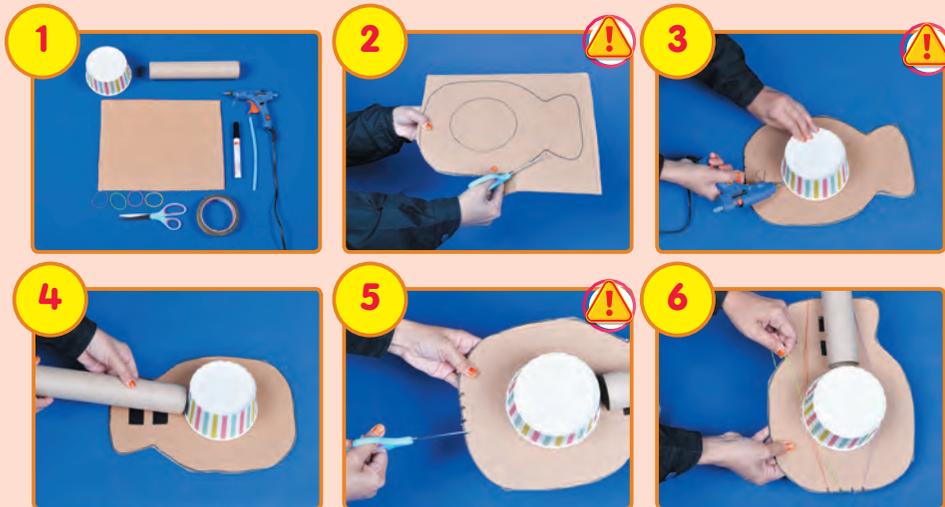


How can trees reduce noise pollution in our environment?



**Steps**

Produce a musical instrument using recycled materials such as a box, a paper bowl, rubber bands, hot glue gun, and adhesive tape based on your creativity.

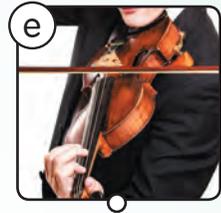
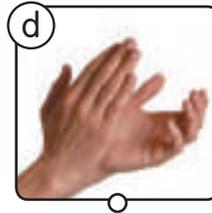
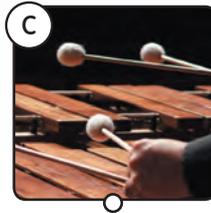
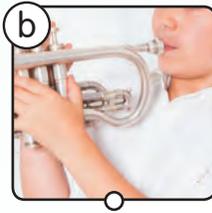
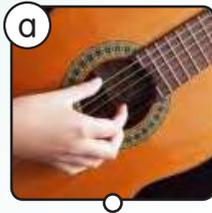
**MIND REFLECTION**

1. Sound is produced by vibrations.
2. Sound can be produced through blowing, knocking, plucking, bowing, and clapping.
3. Sound travels in all directions.
4. Sound can be reflected. For example, echo, sonar, and ultrasound.
5. Uses of sound are for:
  - communication.
  - notification.
  - emergency alert.
  - entertainment.
6. Sound pollution can cause:
  - communication problem.
  - stress.
  - disturbance.
  - hearing problem.
7. Ways to reduce sound pollution are as follows:
  - use ear protectors
  - use sound absorbers

# MIND TEST

Answer all questions in the Science exercise book.

1. Match the ways of producing sounds based on the pictures below.



Bowing

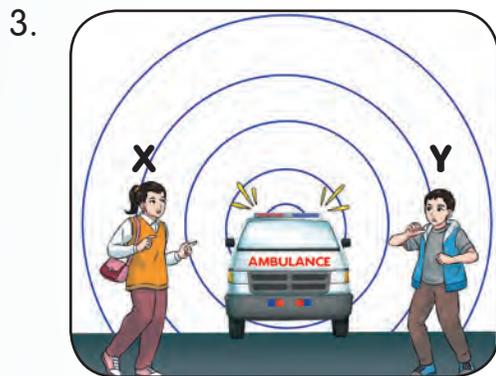
Blowing

Clapping

Plucking

Knocking

2. Vibrations produce .



Based on the diagram,  
 (a) State your observations.  
 (b) Give your inference based on the observations in (a).

4. Siva and his family visited Niah Cave. As soon as they arrived, Siva shouted in the cave. What is the resulting phenomenon? Explain.

5. Mei Lan loves to listen to music. However, she is disturbed by the loud music coming from her neighbour's house.

Tick (✓) to explain the effects of the sound above.

(a) Sound helps to communicate.	
(b) Sound is entertaining.	
(c) Sound provides alertness.	
(d) Sound causes disturbance.	



How can you stop the ringing of the alarm clock without turning it off?



# UNIT 7

# ENERGY



How can the activities above be carried out?

## Energy and Their Sources

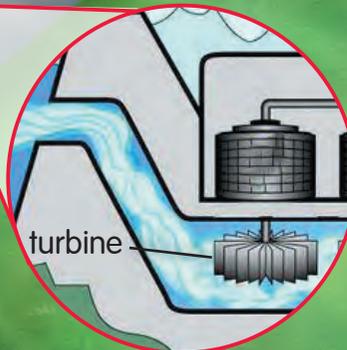
Energy is the ability to do work. Energy can be obtained from a variety of sources. Let us find out the energy sources around us.

### Sun

The **Sun** is the main source of energy. The energy from the Sun is used to generate electricity through the use of solar panels.

### Water

Flowing **water** rotates the turbine in the dam to generate electricity.



Waste from firewood and plants



Hydroelectric dam

Animal faeces



### Biomass

**Biomass** is a substance from plants or animal faeces used to produce fuel and generate electricity.

### SCIENCE INFO

Geothermal is also a source of energy derived from the heat of hot rocks beneath the surface of Earth. This heat is used to rotate the turbine to generate electricity.



Solar panel

What does energy mean?





**Wind**

Blowing **wind** rotates the windmill to generate electricity.

Windmill



Nuclear power station

**Nuclear**

**Nuclear** substances such as uranium are used to generate electricity at nuclear power stations.

**Coal**



**Fossil fuels**

**Fossil fuels** such as petroleum, natural gas, and coal are burned to generate electricity.



Petroleum and natural gas



Wave turbine

**Waves**

**Waves** rotate the turbine in the ocean to generate electricity.

Based on the information above, how is energy obtained?



## Forms of Energy

There are several forms of energy around us. Let us look at the forms of energy in the situations below.



**Solar energy** is the energy obtained from the Sun.



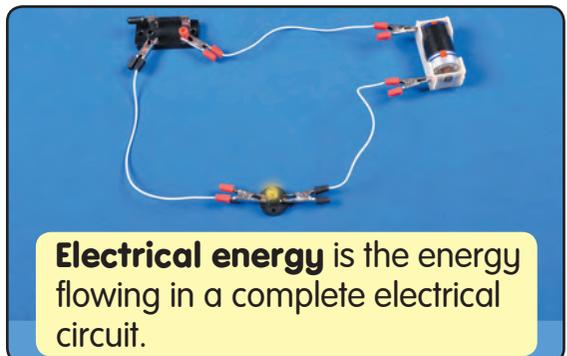
**Heat energy** is the energy stored in objects that are heated.



**Light energy** is the energy produced by objects that emit light.



**Sound energy** is the energy produced by vibrating objects.



**Electrical energy** is the energy flowing in a complete electrical circuit.



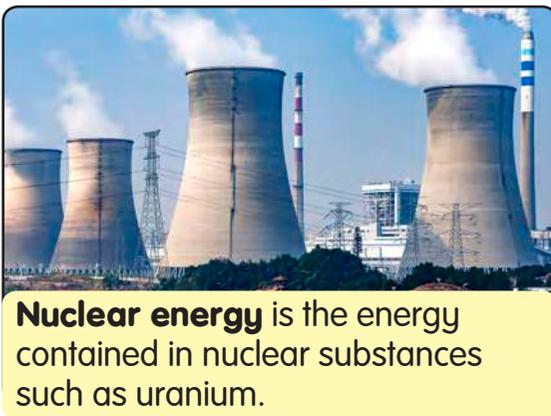
**Chemical energy** is the energy stored in substances such as food, fossil fuels, biomass or batteries.



**Kinetic energy** is the energy present in moving objects.



**Potential energy** is the energy stored in objects that are at a certain height, that are stretched or compressed.



**Nuclear energy** is the energy contained in nuclear substances such as uranium.

Give other situations which involve the forms of energy above. Explain these situations related to the forms of energy.



## Transformations of Energy

Energy can be transformed from one form to another.  
Let us look at the transformations of energy in our daily life.

Symbol  $\rightarrow$  means **change to**.  
Symbol  $+$  means **and**.



### Riding a bicycle

While cycling, the chemical energy of food eaten transforms into kinetic energy.

**Chemical energy**  $\rightarrow$  **Kinetic energy**

of food eaten

energy from food eaten is used in the movement of legs and bicycle.



### Switching on a television

When switching on a television, the electrical energy transforms into light and sound energy.

**Electrical energy**

in the electrical circuit



**Light energy**

the television emits image



**Sound energy**

sound of the television



### Lighting a fire

As the flame burns, the chemical energy stored in the fuel transforms into heat and light energy.

**Chemical energy**

stored in fuel



**Heat energy**

the fire produces heat



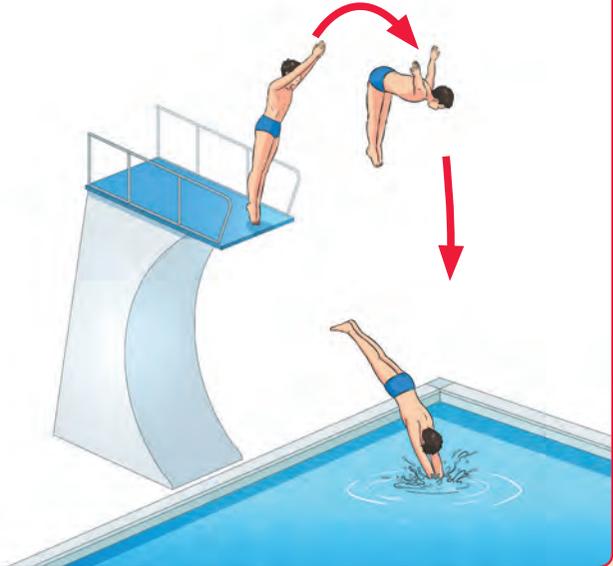
**Light energy**

the fire emits light



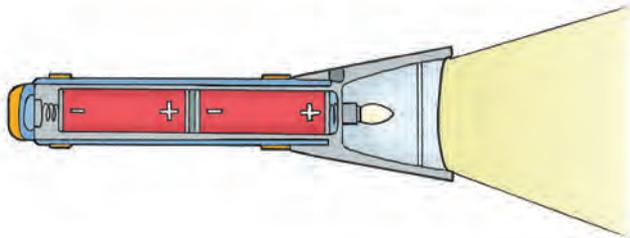
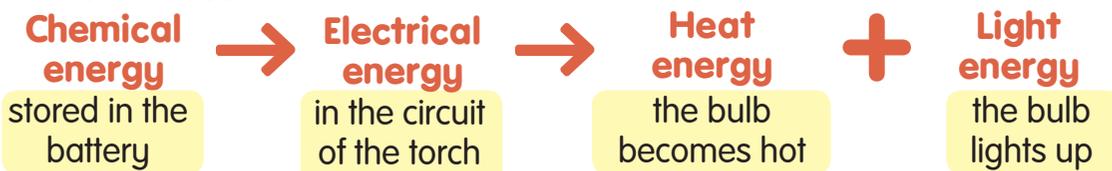
## Plunging from a diving board

As the diver plunges from the diving board, the potential energy transforms into kinetic energy which then transforms into sound energy.



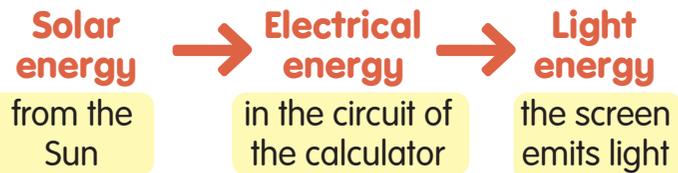
## Switching on a torch

When you switch on the torch, the chemical energy in the battery transforms into electrical energy. Then, the electrical energy transforms into heat energy and light energy.



### Using a solar calculator

Solar energy obtained from the Sun transforms into electrical energy. Then, the electrical energy which flows into the electrical circuit transforms into light energy.



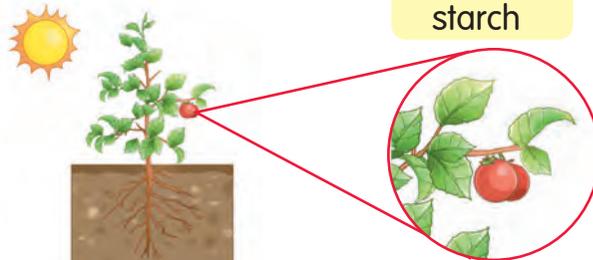
### A moving vehicle

As the vehicle moves, the car engine transforms the chemical energy into kinetic energy.

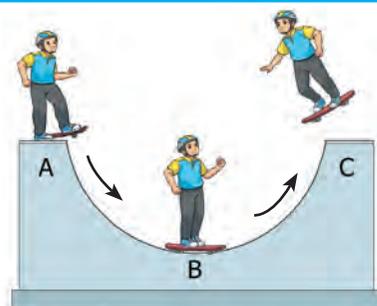


### During photosynthesis

Plants make their own food. During photosynthesis, plants transform light energy into chemical energy that is stored as starch.



State the transformation of energy involved from A to C.





## FUN ACTIVITY

## Observing Energy Transformation

### Apparatus and Materials

Pencil, A4 paper, ping-pong ball, kitchen lighter, bell, toaster



### Steps

1. Form a group and carry out the following activities:



a Drop the ping-pong ball from a high position.



b Light up the kitchen lighter.



c Ring the bell.



d Toast the bread in the toaster.

2. Observe the transformation of energy in each activity and write it on a piece of paper in turns.
3. Discuss the findings of the group. Then, present them in front of the class.

### Questions

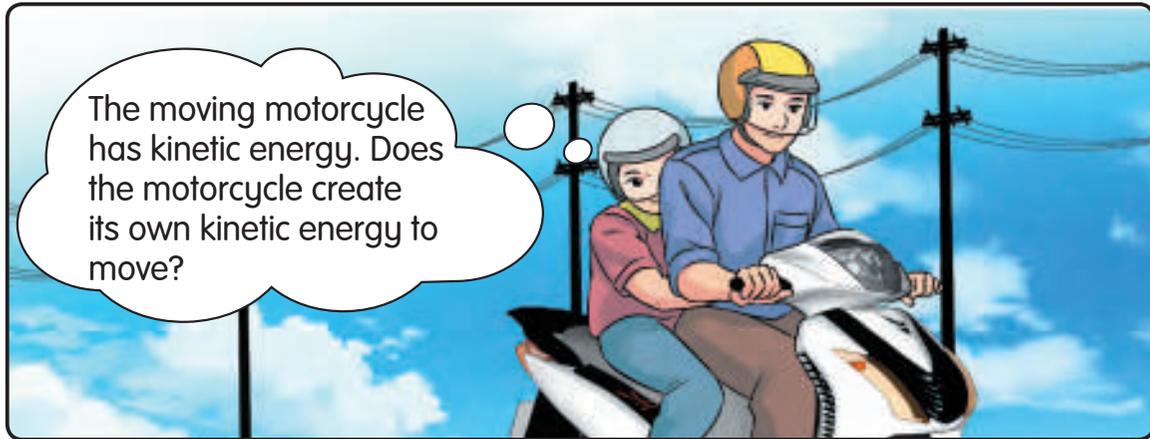
1. Explain the transformation of energy in each of the above activity.
2. Give another example of the transformation of energy that occurs in your daily life.



The above activities may be modified by using other appropriate objects or tools.

## Energy Cannot Be Created or Destroyed

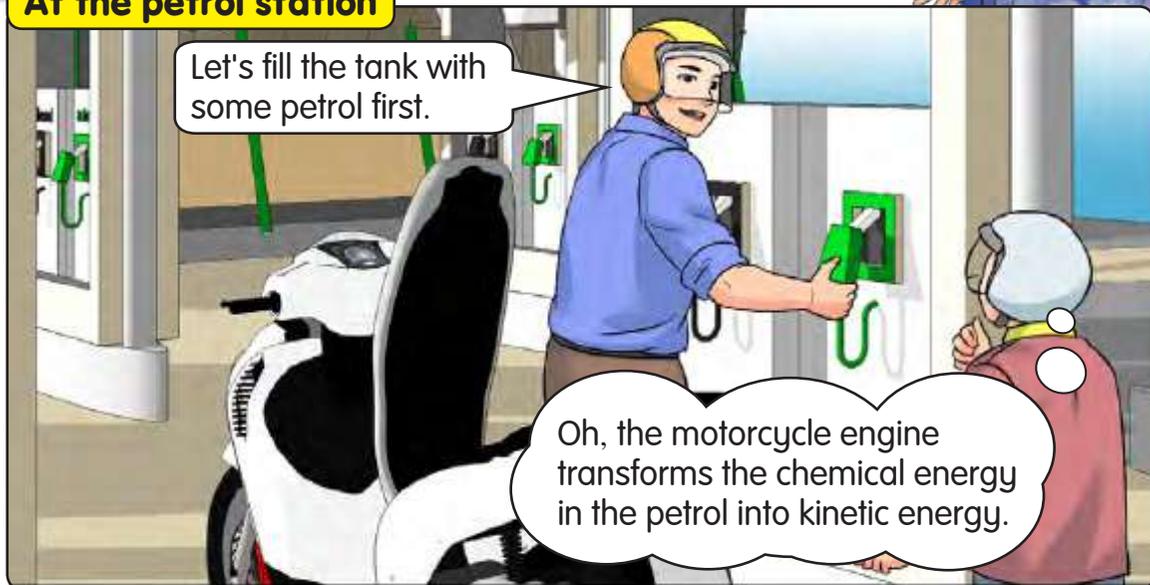
All the changes that occur in the world depend on energy. Do you know that energy can be transformed because it cannot be created or destroyed? Observe the situations below.



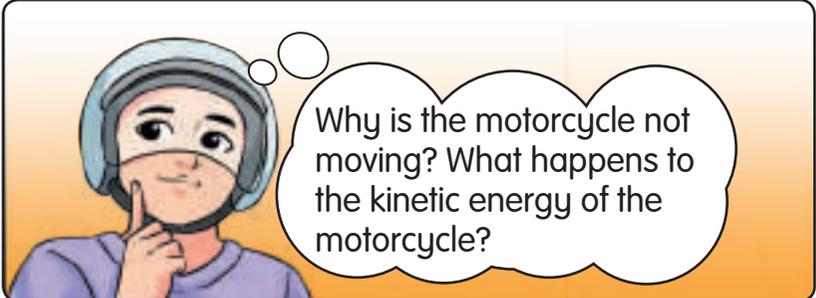
Energy cannot be created. To allow the motorcycle to move, the motorcycle engine transforms the chemical energy into kinetic energy.



### At the petrol station



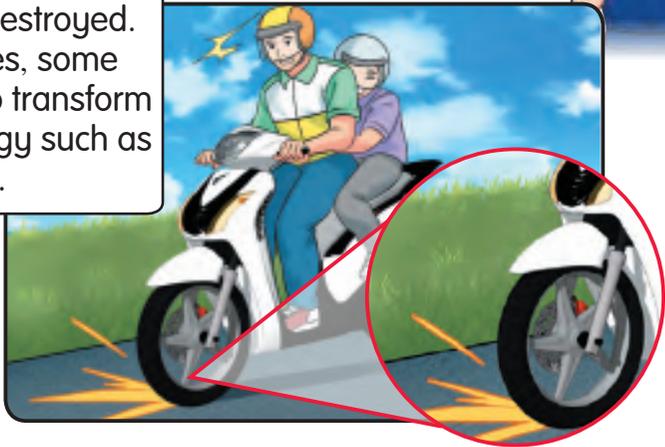
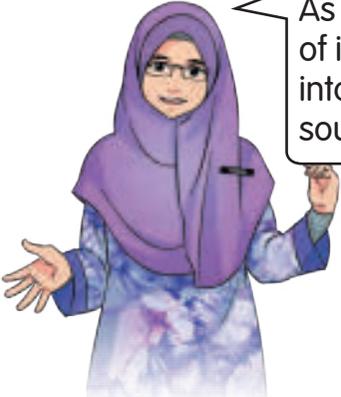
**After a few days**



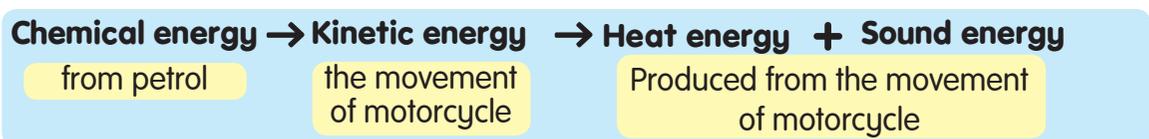
Has the kinetic energy of the motorcycle been destroyed?



No, energy cannot be destroyed. As the motorcycle moves, some of its kinetic energy also transform into other forms of energy such as sound and heat energy.



The motorcycle eventually stops moving when all the chemical energy from the petrol is completely transformed into other forms of energy.

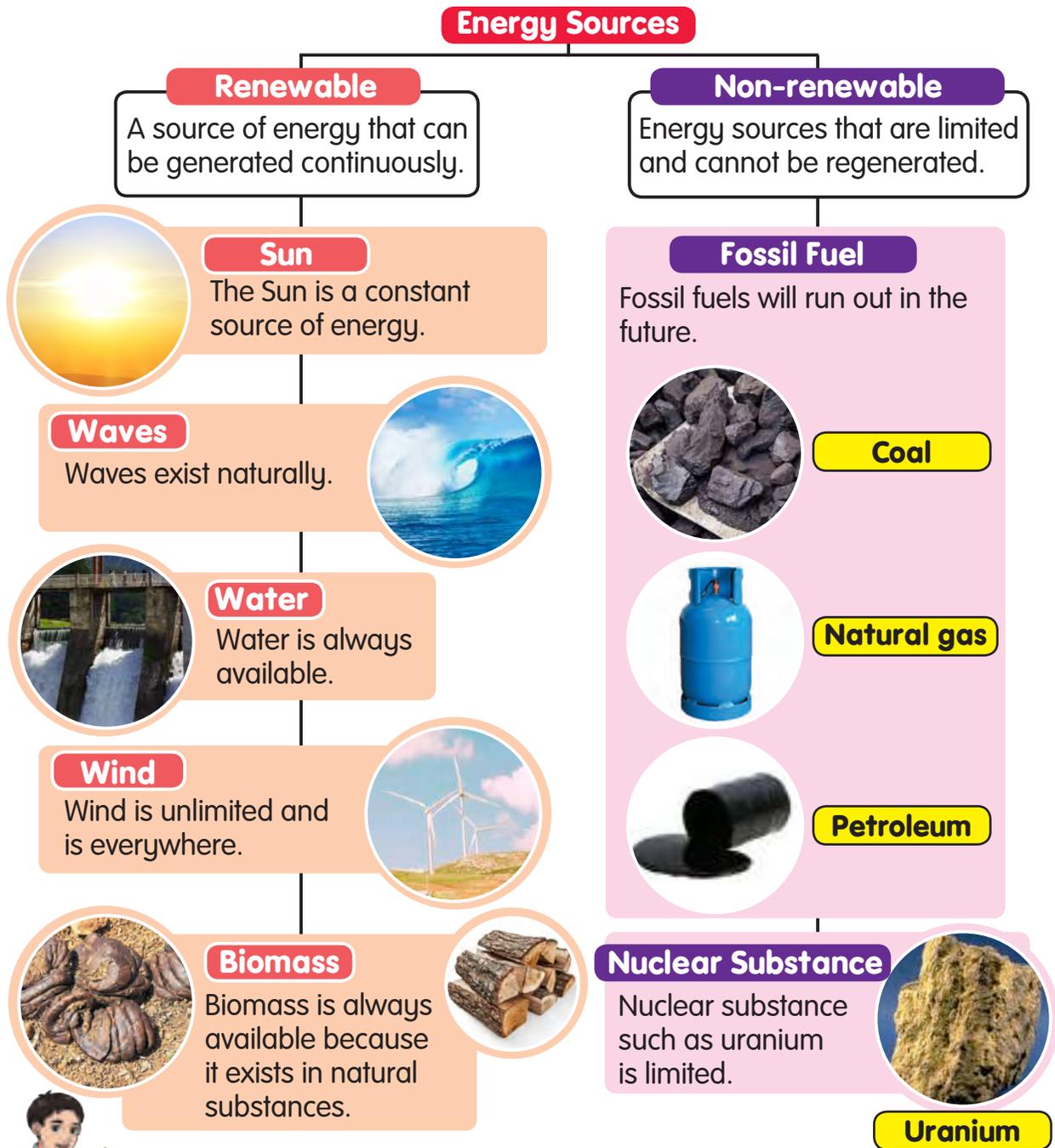


Based on the situations above, what can you conclude about energy?

Energy cannot be created or destroyed but can be transformed.

## Renewable and Non-renewable Energy Sources

Energy sources can be classified into renewable and non-renewable energy sources. Observe the chart below.



Based on the information above, give examples of energy sources which are renewable and non-renewable. Why?



## FUN ACTIVITY

## Future Energy Poster



### Apparatus and Materials

Drawing paper, pen, scissors, glue, computer

### Steps



1. Gather information on innovations for future energy from various sources.



2. Discuss the information gathered with group members.



3. Create a poster based on the group discussion.



4. Display your work in class. Group members can view other groups' work.

### Question

Give an example of renewable energy source that has the potential to be the future source of energy.

### SCIENCE-INFO

Biodiesel is a fuel made from vegetable oil or animal fat. From February 2019, all petrol stations in Malaysia supply diesel that is mixed with palm oil biodiesel.

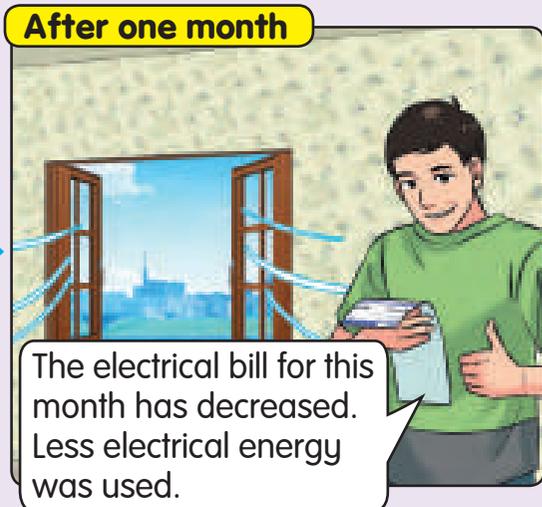
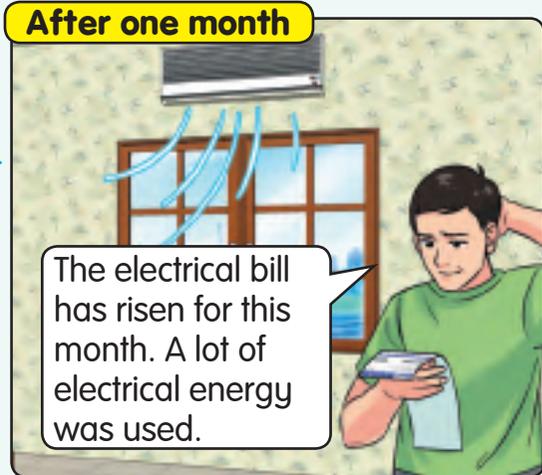


## Using Energy Wisely

Most of the energy we use today comes from non-renewable energy sources. In order to ensure that we have sufficient energy sources in the future, we need to use the energy wisely.



What is the importance of using energy wisely?  
Observe the situations below.



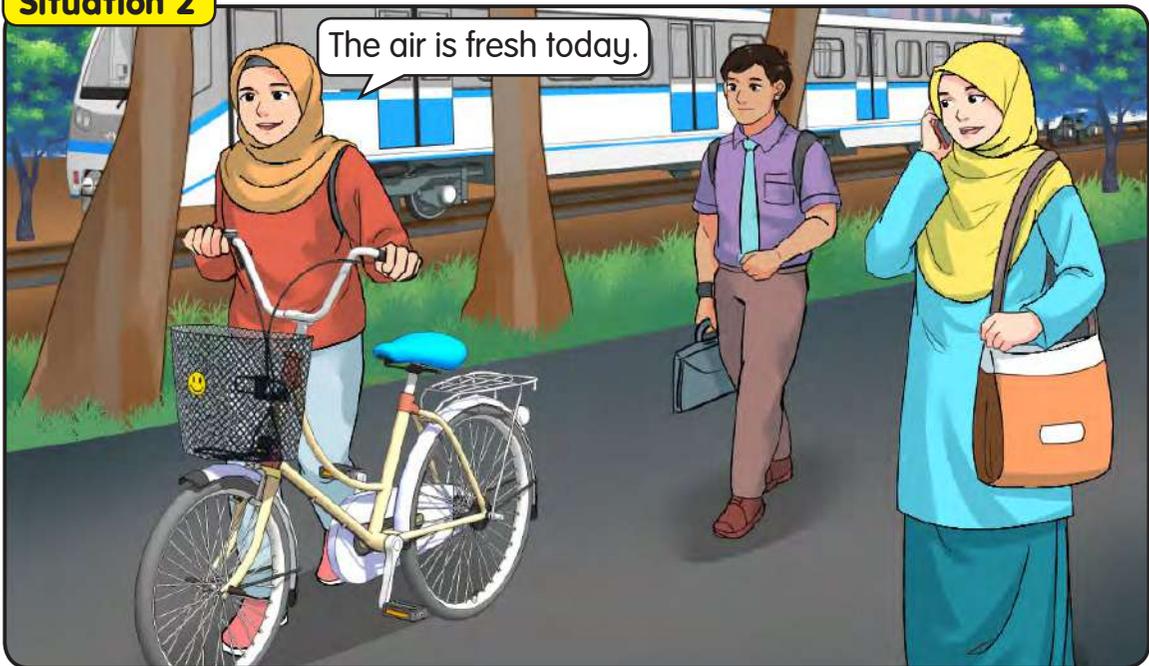
Why do we need to use energy wisely? Explain.



**Situation 1**



**Situation 2**



Based on the situations above, how can we use energy wisely?



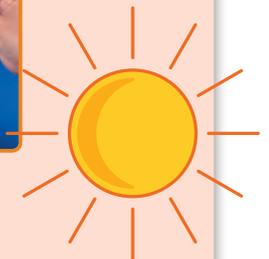
Why is using energy wisely important to the environment?





Steps

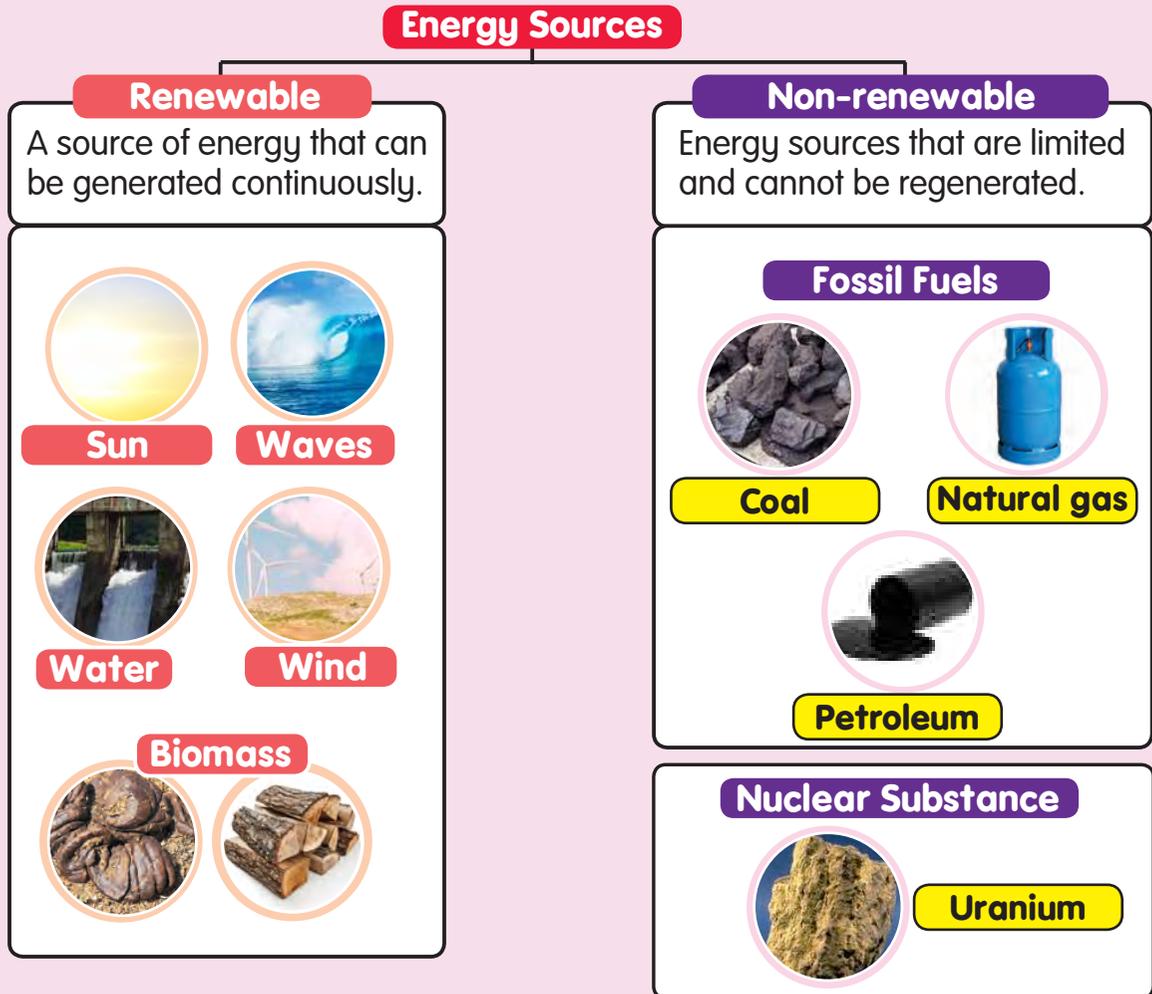
Produce a solar oven using used materials such as a shoe box, polystyrene, aluminium foil, black sugar paper, plastic sheet, adhesive tape, glue, scissors, ruler, marker pen, and an egg.





## MIND REFLECTION

1. Energy is the ability to do work.
2. Energy sources can be classified into 2 types:

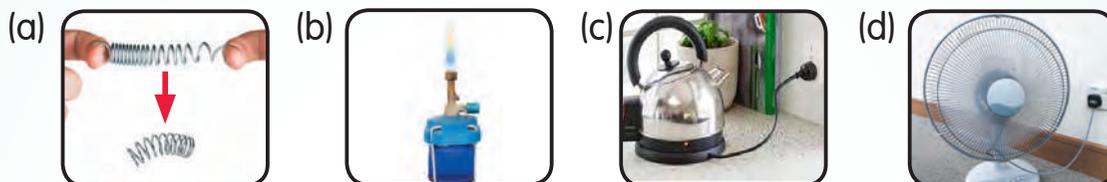


3. Forms of energy are solar energy, potential energy, kinetic energy, light energy, heat energy, nuclear energy, electrical energy, sound energy, and chemical energy.
4. Energy cannot be created or destroyed but it can be transformed. For example, transformation of energy while cycling:  
Chemical energy → kinetic energy.
5. The importance of using energy wisely are:
  - (i) to prevent wastage of energy.
  - (ii) to reduce the environmental pollution.

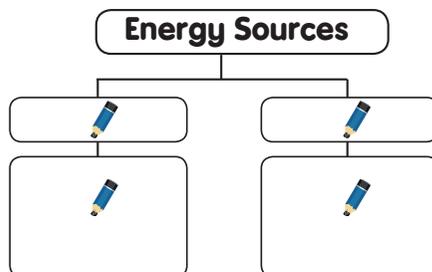
## MIND TEST

Answer all questions in the Science exercise book.

- Energy is  to do work.
- State the transformation of energy which are involved in the situations below.



- Complete the following classification table.



- The diagram below shows the transformation of energy when using the mobile phone.



- What happens to the electrical energy when the phone is being charged?
  - Why does the battery of the phone need to be recharged?
  - What can you conclude about energy in the situation above?
- Read the statement below.

We are constantly using non-renewable energy sources such as petroleum and natural gas, while those energy sources are decreasing.

Based on the statement above, describe how and why it is important to use these sources wisely.

# UNIT 8

# MATERIALS



Mother, why are there many different types of items in this shop?



The items are made from different types of materials.

The items above are made from different types of materials. Why?

## Basic Sources of Materials

There are many objects in our daily lives. The objects are made from a variety of basic sources such as plants, animals, petroleum, and rocks. Observe the objects below.

	Material	Examples of objects
<b>Basic Source</b> <b>Plants</b>	 rubber trees	 tyres
	 rubber	 rubber gloves
	 trees	 wood
	 wooden cupboard	 wooden chair
	 cotton plants	 shirts
	 cotton	 towels

	Material	Examples of objects
<b>Basic Source</b> <b>Animals</b>	 sheep	 woollen cap
	 wool	 sweater
	 cow	 cow skin
	 leather shoes	 leather sofa
	 silkworm	 silk neck tie
	 silk cocoon	 silk cloth

### SCIENCE-INFO

Petroleum is a black oil obtained from the ground to produce petrol and other materials. Petroleum is formed from living things that had died millions of years ago.

	Material	Examples of objects
<b>Basic Source</b> <b>Petroleum</b>	 petroleum	 plastic bag
	 plastic	 plastic bottle
	 synthetic cloth	 rain coat
		 tent

	Material	Examples of objects
<b>Basic Source</b> <b>Rocks</b>	 metal	 gold necklace
	 gold	 pewter objects
	 copper	 coins
	 clay	 ceramic bowl
	 soil	 brick
	 sand	 mirror
		 glass bottle

What are other examples of objects made from plants, animals, petroleum, and rocks? Explain the properties of the materials for the objects you have mentioned.





## FUN ACTIVITY

## Classifying Objects



### Apparatus and Materials

Flip chart paper, various coloured marker pens, envelopes with 16 pictures of various objects



### Steps



1. Each group gets an envelope containing 16 pictures of various objects.



2. Observe all the pictures. Then, identify the properties of each object based on the type of material and its basic source.



3. Based on the discussion, produce a classification chart in a creative way.



4. Present your group work in front of the class.

### Questions

1. Based on this activity, how did you classify the picture of an object by its basic source?
2. How do you identify the characteristics of the objects which have been matched to their basic sources?

## Properties of Materials

Do you know that materials have various properties? Humans invent objects according to their uses based on the properties of materials. Let us investigate the properties of the material around us.



### LET'S TEST

### Knowing the Properties of Materials



#### Activity 1

**Aim** To determine the properties of materials that absorb water.

**Apparatus and Materials** Straw, stopwatch, balloon, tissue paper, rock, cotton, plastic ruler, leather string, polystyrene, glass slide, water

#### Steps

1. Put a few drops of water using a straw onto all the tested objects one by one.
2. Observe the water droplets on the objects after two minutes.
3. Record your observations as shown in the table below.

Tested Object	Observation (✓)		Inference
	water droplets present	water droplets absent	
balloon			

#### Questions

1. What are your observations for this activity?
2. State the properties of the materials tested in this activity.
3. How do you identify the properties of the materials in this activity?

TEACHER'S  
NOTES

- Activities 1-6 are conducted using the “station method”. The materials can be changed to other suitable objects based on the properties that are being tested.
- Water absorbent (non-waterproof) materials absorb water when water droplets are dropped onto them.
- Non-water absorbent (waterproof) materials do not absorb water when water droplets are dropped onto them.

8.2.1  
8.2.4

## Activity 2

**Aim** To determine the properties of materials that can float or sink.

**Apparatus and Materials** Plastic container, water, stopwatch, rock, plastic ruler, key, balloon, popsicle sticks, straw, cotton, leather string, glass cup, pencil

### Steps



1. Fill the plastic container with water until it is half-full.



2. Put all of the objects into the plastic container and start the stopwatch.



After one minute, observe the tested objects, whether the tested objects are above or below the water surface.

4. Record your observations as shown in the table below.

Tested Object	Observation (✓)		Inference
	above the water surface	below the water surface	
balloon			

### Questions

1. What are your observations for this activity?
2. What are the properties of the materials tested in this activity?
3. Which tested objects can float on the water surface?



Why are some materials able to float or sink?

### Activity 3

**Aim** To determine the properties of materials that can conduct electricity.

**Apparatus and Materials**

2 dry cells, dry cell holder, bulb, bulb holder, switch, connecting wires, balloon, skewer, keys, ceramic spoon, plastic ruler, leather string, coins, aluminium foil, pencil lead

**Steps**



1. Build a complete electric circuit as shown in the picture above. Observe the bulb.
2. Replace the switch on the electric circuit with the balloon. Then, observe the bulb.
3. Repeat step 2 with another test object.
4. Record your observations as shown in the table below.

Tested Object	Observation (✓)		Inference
	bulb lights up	bulb does not light up	
balloon			

**Questions**

1. What are your observations for this activity?
2. What are the properties of the materials tested in this activity?
3. Which of the tested objects can conduct electricity in this activity?

## Activity 4

### Aim

To determine the properties of the materials that allow light to pass through.

### Apparatus and Materials



Balloon, clear plastic, coloured paper, glass slide, popsicle sticks, tracing paper, coloured paper

### Steps

1.



Put a test object in front of your eyes. Then, look through it.

2. Observe the clarity of your vision.
3. Repeat steps 1 and 2 with the other test objects.
4. Record your observations as shown in the table below.

Tested object	Observation (✓)			Inference
	clear	not clear	cannot be seen	
balloon				

### Questions

1. What are your observations for this activity?
2. What are the properties of the materials tested in this activity?

## Activity 5

**Aim** To determine the properties of materials that can conduct heat.

**Apparatus and Materials** Aquarium, skewer, stopwatch, adhesive tape, hot water, aluminium foil, popsicle sticks, ceramic spoon, polystyrene, clear plastic, balloon, leather string

### Steps



1. Attach the test objects to a skewer as shown in the picture.



2. Touch the top of each test object and determine its initial condition.



3. Fill the aquarium with hot water. Then, soak the test objects carefully. Start the stopwatch.



4. After 2 minutes, touch the end of each test object and compare its present condition to its initial condition.

5. Record your observations into the table as shown below.

Tested object	Observation of object condition after being soaked (✓)		Inference
	no change	feel warm	
balloon			

### Questions

1. What are your observations for this activity?
2. What are the properties of the materials tested in this activity?
3. Which objects are warm after being soaked in hot water?

## Activity 6

**Aim** To determine the elasticity of materials.

**Apparatus and Materials** Balloon, leather string, rubber band, spring, plastic spoon, popsicle sticks, pencil, straw, nail

### Steps

1.



Hold and pull the balloon with both hands. Then, release it.

2. Observe changes in the conditions of the balloon.
3. Repeat steps 1 and 2 using a spring and other test objects.
4. Record your observations as shown in the table below.

Tested Object	Observation (✓)		Inference
	can be stretched and return to original shape	cannot be stretched	
balloon			

### Questions

1. What are your observations for this activity?
2. What are the properties of the materials tested in this activity?
3. What are the objects that can be stretched and returned to their original shapes?

Based on all the activities that you have carried out, what can you conclude about the properties of the materials?



## Applications of Properties of Materials

Knowledge of the properties of material is important in designing an object. Choosing a suitable type of material will ensure proper functioning of the created objects.

**1 Identifying the problem**



Wow, this toy car is awesome!

Let's invent our own toy car. But how?

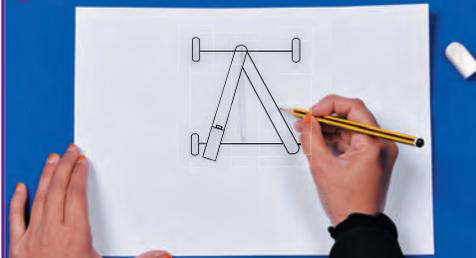
**2 Generating idea**



I would like to suggest that we use recycled materials.

We can use our knowledge of the properties of materials.

**3 Sketching the idea**



**4 Preparing the apparatus and materials**



These are the apparatus and materials that we need.

We will use rubber bands to make the car move since rubber band is elastic.

**5 Building the toy car**

**a**   Stick the popsicle sticks and straw together using hot glue.

**b**  Insert a skewer into the straw and fasten the bottle caps to be the tyres.

**c**   Stick one battery to one of the popsicle stick to act as a weight that will stabilise the toy car.

**d**  Fix the rubber band to the skewer and turn it until it is tight. Then, release the toy car on the floor.



Create other models by applying your knowledge on the properties of materials.



## Choosing Types of Materials to Invent an Object

An object is invented based on the suitability of the materials to the function of the object. Observe the situations below.

### Situation 1



Why are most cooking utensils such as pots made of metal?

### Situation 2



Why is cotton cloth best used for wiping liquid?

Why is choosing the types of materials important in the invention of objects?

**Steps**

Make a lamp shade in a creative way using used materials. Use your knowledge of basic sources of materials and the properties of materials to produce a lamp shade.

**MIND REFLECTION**

1. The basic sources of materials for making objects are:

Basic source	Material	Examples of objects
Plants	wood	wooden chair
	cotton	shirt
	rubber	tyre
Animals	skin	leather shoes
	wool	sweater
	silk	silk cloth
Rocks	metal	coins
	soil	mirror
Petroleum	plastic	plastic bottle
	synthetic cloth	tent

2. Properties of materials of an object are as follows:

- water absorbent and waterproof
- float and sink
- conduct electricity
- ability for light to pass through
- conduct heat
- elastic

3. Choosing the types of materials to be used in the invention of an object is important to ensure that the object works properly and is suitable for its uses.



## MIND TEST

Answer all questions in the Science exercise book.

1. Match the material to its basic source.

Material	Basic Source
wood, cotton, rubber	animals
leather, wool, silk	rocks
plastic, synthetic cloth	petroleum
metal, soil	plants

2. Create a classification table based on their basic sources.

metal pot	plastic bottle	rain coat	sweater
silk clothes	tent	mirror	towel
tyres	wooden chair	leather handbag	bricks

- What are the properties of materials used in the manufacturing of footballs and balloons? Explain.
- Why are most electrical appliances such as rice cookers and irons made of materials that can conduct heat?
- Look at the picture below and answer the following questions.



- What are the basic sources for making parts M and N?
- Suggest other suitable materials to replace part M if it is to be replaced with another type of material. Give your reasons.

# UNIT 9

# EARTH

The rotation of Earth around the Sun has led to several phenomena.



What do you see in the situation above?

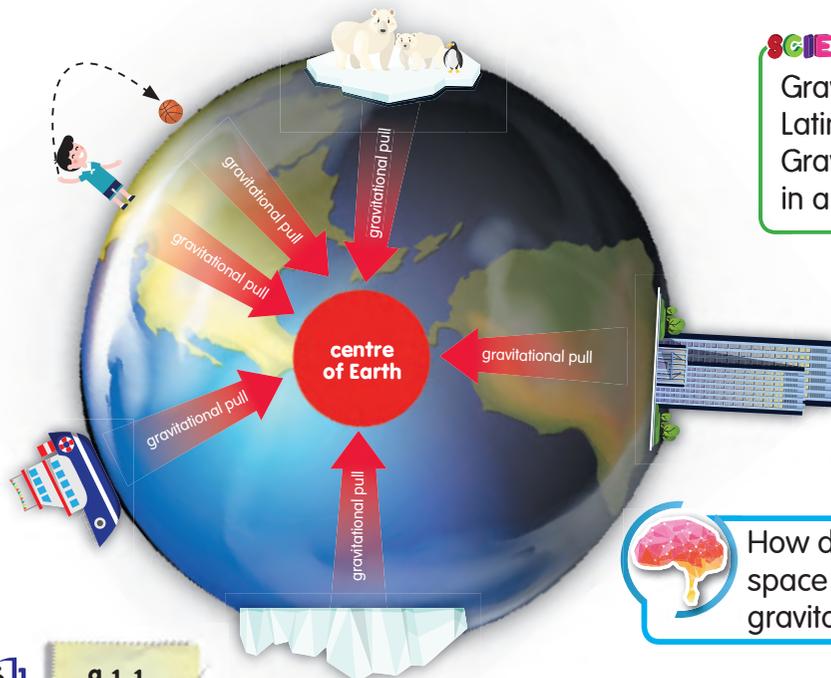
## Gravity of Earth

While Fariz is playing with Jimi and Mei Lan, he discovers that every object which is tossed up will fall to the ground. Why are these objects unable to float in the air?

Why do objects fall back to the ground?



All objects that are around us are pulled towards the centre of Earth by a force known as the **gravitational pull on Earth**.



### SCIENCE-INFO

Gravity or *gravitas* in Latin means weight. Gravitational pull is present in all objects.



How does an astronaut live in space without the presence of gravitational pull? Explain.



## LET'S TEST

## Gravitational Pull on Earth



### Aim

To investigate the gravitational pull on Earth.

### Apparatus and Materials

Plastic ball, chair



### Steps

1. Release a plastic ball from different directions and heights as shown in the pictures below.



Drop from the top of a chair



Drop from the right side



Drop from the left side



Toss up



Throw to the back

2. Observe and record the directions of the movements of the plastic ball as shown in the table below.

Direction of ball released	Observation (upward/downward)
From the top of a chair	

### Questions

1. State the directions of the movement of the plastic ball as you have observed.
2. Why was the ball moving in that direction?

9.1.1  
9.1.3

TEACHER'S  
NOTES

The plastic ball can be replaced by other objects that are not dangerous such as bean bag.

## Gravitational Pull on Earth

The gravity of Earth is the force that pulls objects towards the centre of Earth. Without the gravitational pull on Earth, all objects will float in the air.



### LET'S TEST

## Effects of the Gravitational Pull on Earth

### Aim

To investigate the effects of the gravitational pull on Earth on the position of objects.

GROUP  
ACTIVITY

### Apparatus and Materials

Adhesive clay, marker pen, models of objects, globe, scissors

### Steps



1. Sketch an object on a white paper and cut it using scissors.
2. Paste the models of objects on the globe using the adhesive clay.
3. Rotate the globe slowly and observe what happens to the models of objects on the globe.
4. Record your observations.

### Questions

1. Why are the models of objects able to remain in their position on the globe? Explain.
2. What is your conclusion for this activity?



What can you summarise about the effect of gravitational pull and the position of objects on Earth?

All objects on Earth remain in their positions because of the presence of **gravitational pull on Earth**.

- Teacher helps pupils to build a simple analogy on the effects of gravitational pull on Earth without including the effects of other types of forces.
- All objects on Earth remain in their positions. A globe can be used to demonstrate how.

## Importance of Gravitational Pull on Earth

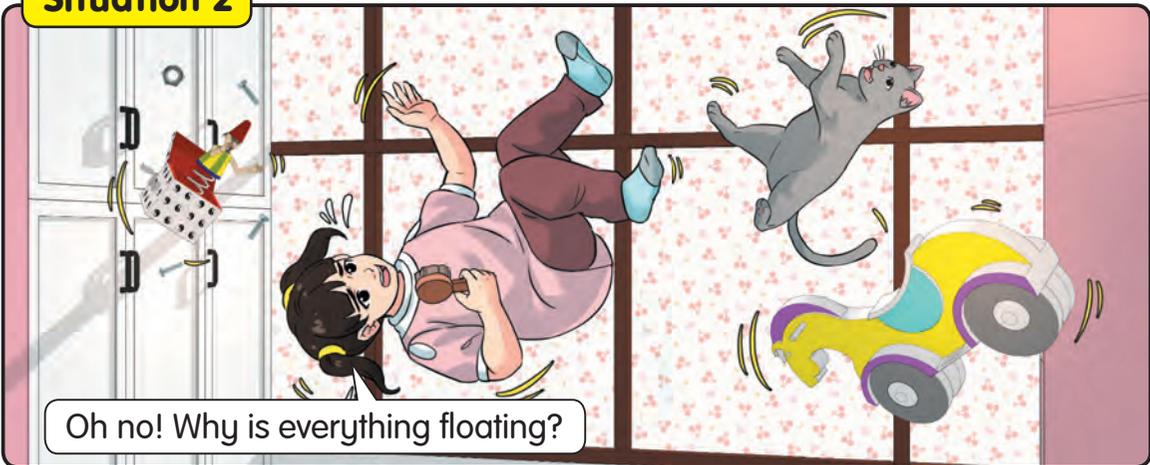
The gravitational pull on Earth is important for the objects to remain in their positions. Observe the situation below.

### Situation 1



What would happen if Earth does not have gravitational pull? Observe the situation below.

### Situation 2



Why are the objects floating in the air?

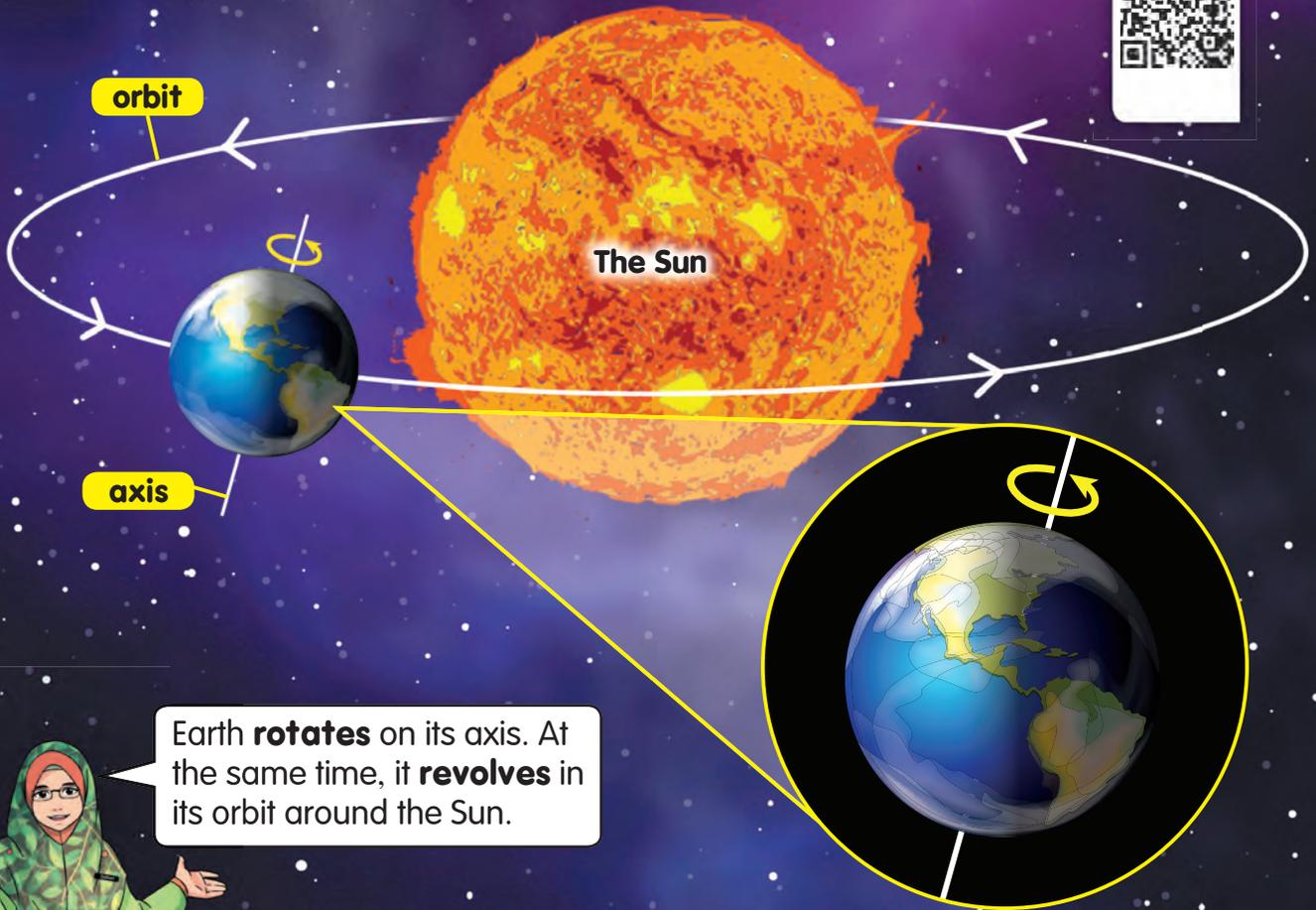
In both situations, why is gravitational pull on Earth important?

Gravitational pull on Earth causes the objects to remain in the positions and not float in air.



## Rotation and Revolution of Earth

You have learned that Earth and all other planets **revolve** around the Sun in their own orbits. Besides revolving, does Earth have other types of movements? Observe the situation below.



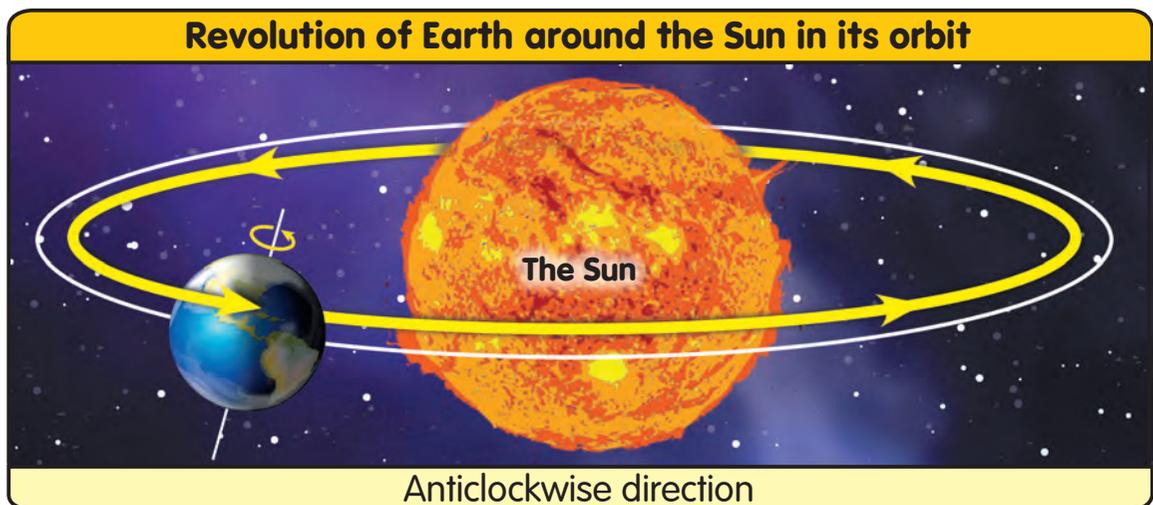
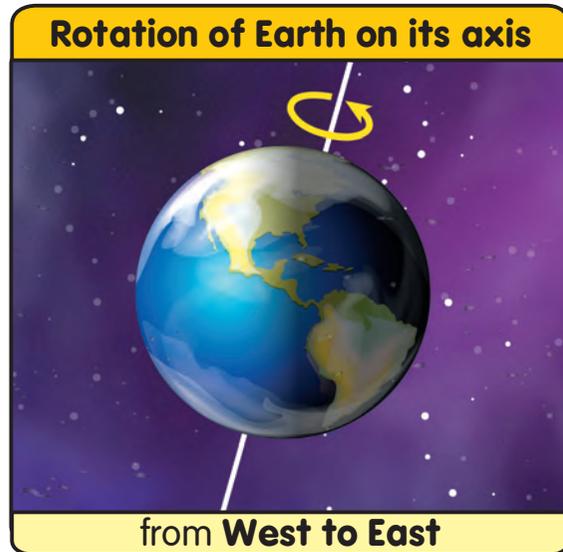
Earth **rotates** on its axis. At the same time, it **revolves** in its orbit around the Sun.

What are the two types of movements that Earth makes as it orbits around the Sun?



## Direction and Duration of Rotation and Revolution of Earth

Observe the direction of rotation and revolution of Earth in the figures below.



### SCIENCE-INFO

Earth rotates on its axis in an anticlockwise direction.



anticlockwise



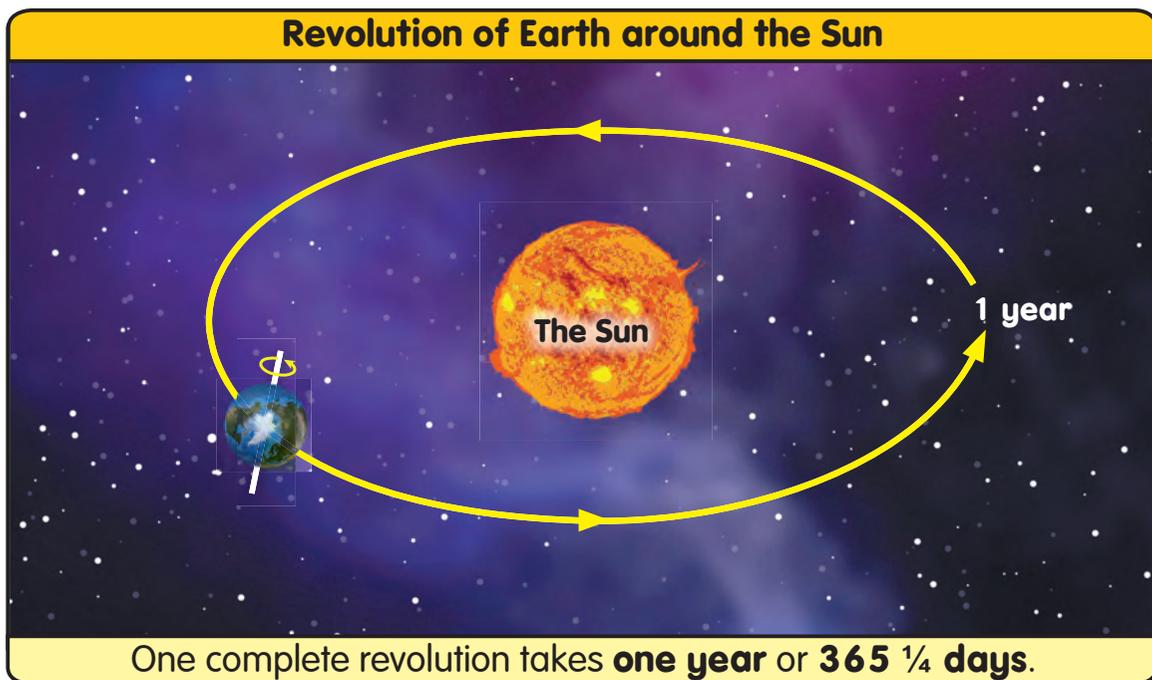
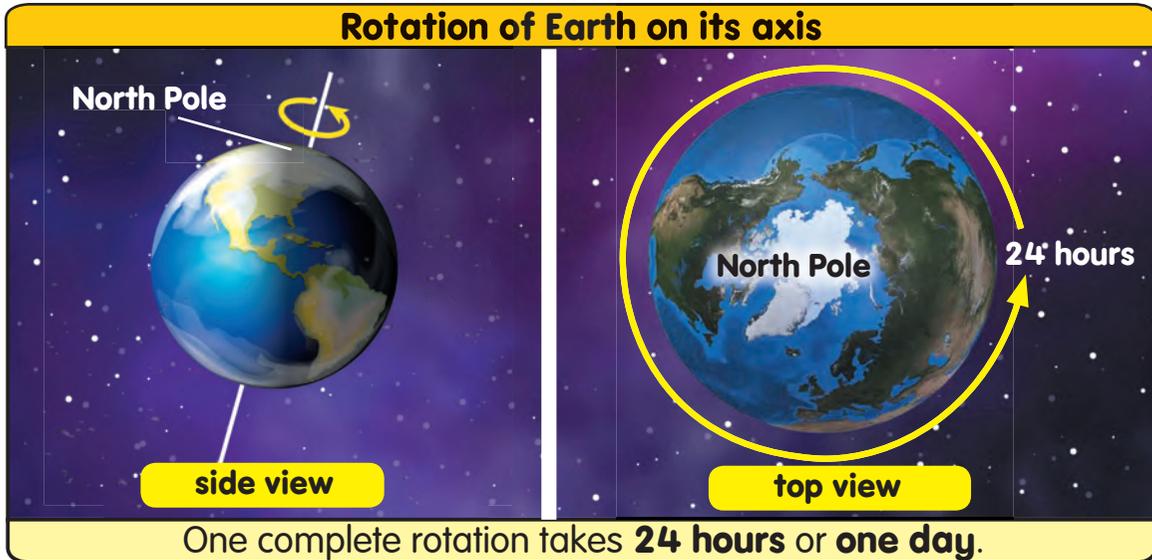
clockwise

Based on the information above, what can you state about the direction of the rotation and revolution of Earth?



q.2.2  
q.2.4

How about the duration for Earth to rotate and revolve? Observe the figures below.



Based on the information above, what can you state about the duration of the rotation and revolution of Earth?

## Effects of the Rotation of Earth on Its Axis

The rotation of Earth causes several phenomena to happen. Look at the situations below.

### 1 Occurrence of day and night



### 2 The Sun seems to change its position



### 3 Changes in length and direction of the shadow



Morning

Noon

Evening



How do you know that Earth rotates from West to East?



## Activity 1

**Aim** To investigate the effects of rotation of Earth on its axis.

**Apparatus and Materials** Globe, torch, red and yellow modelling clay

### Steps

1.



Mark the position of Malaysia on the globe using the red modelling clay and the position of Canada using the yellow modelling clay.

2.



Darken the science room. Then, direct the torch towards the globe.

3.



Rotate the globe in an anticlockwise direction. Then, observe and record your observation.

### Questions

1. What is the difference between the side that is facing the torch and the side which is not facing the torch?
2. Based on your observations, what is a phenomenon on Earth that you can relate to?

## Activity 2

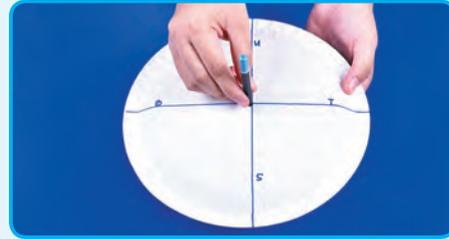
### Apparatus and Materials

Paper plate, plastic plate, 5 cm-pencil, marker pen, ruler, adhesive tape

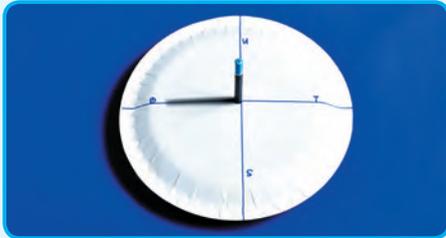
### Steps



1. Stick the paper and plastic plates together using adhesive tape.



2. Make a hole in the centre of the paper plate and hold the pencil upright like a pole.



3. Place the plate on the floor in the sunlight.



4. Draw the direction and length of the shadow starting from 8:00 a.m. to 4:00 p.m. at two-hour intervals.

5. Record your observation as shown in the table below.

Time	Direction of the Sun (East/West)	Direction of shadow (East/West)	Length of shadow (cm)
8:00 a.m.			

### Questions

1. What are the changes in the direction of the Sun throughout your observation?
2. What happens to the direction and length of the shadow?

Based on the activities above, what can you explain about the effects of the rotation of Earth on its axis?



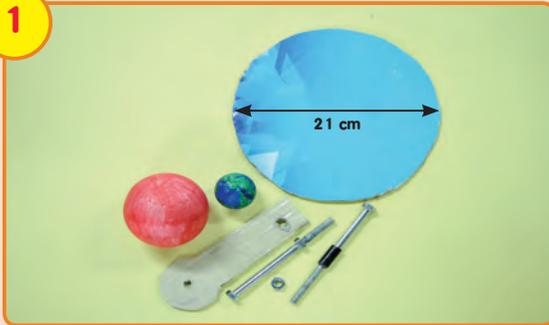
What about the phenomena caused by the revolution of Earth? Gather information and discuss with your friends.



Steps

Produce a simulation model of Earth using a used box, nuts and bolts, two polystyrene balls in different sizes, and adhesive tape. The model is produced based on your creativity.

1



2



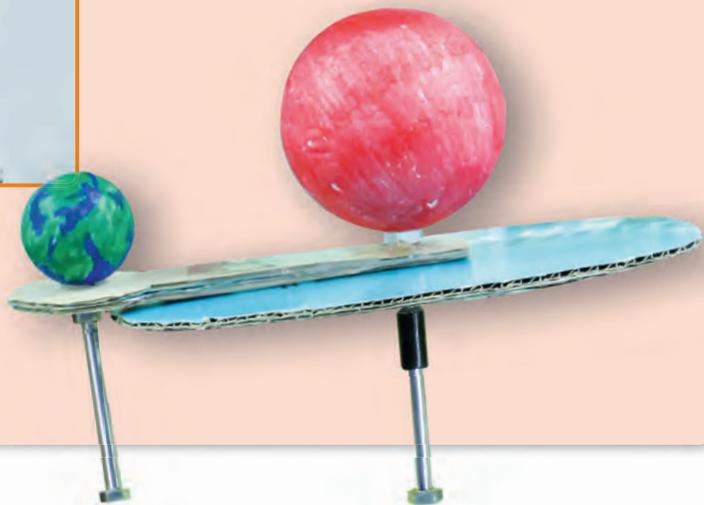
3



4



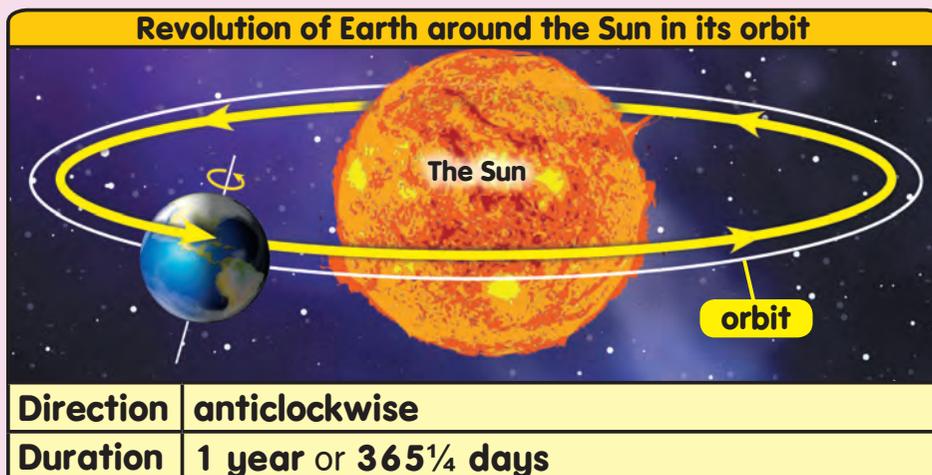
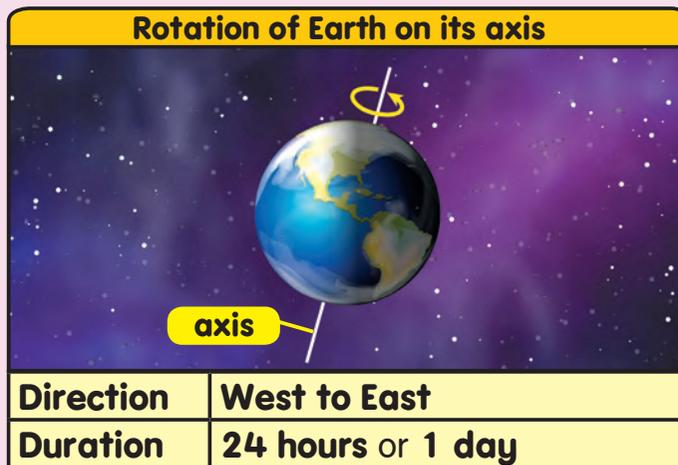
5





## MIND REFLECTION

1. Gravity of Earth is a force that pulls objects towards the centre of Earth.
2. The effects of gravitational pull on Earth are:
  - (a) objects fall freely.
  - (b) objects remain in their positions.
3. Earth rotates on its axis and at the same time revolves around the Sun in its orbit.
4. The direction and duration of the rotation and revolution of Earth are as follows:

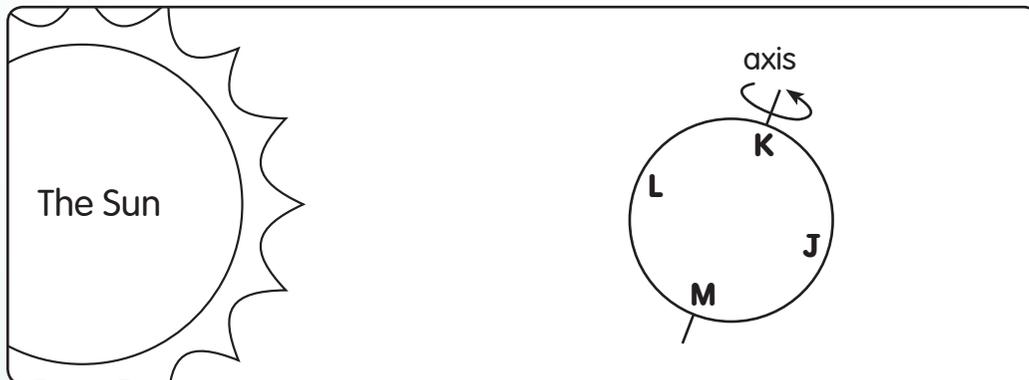


5. The effects of the rotation of Earth on its axis are:
  - (a) occurrence of day and night.
  - (b) the Sun seems to change its position.
  - (c) changes in the length and direction of the shadow.



**Answer all questions in the Science exercise book.**

1. What is gravitational pull on Earth?
2. State the effects of gravitational pull on Earth.
3. Which of the following is not the effects of the rotation of Earth?
  - A Occurrence of day and night.
  - B The objects remain in their position.
  - C Changes in length and direction of the shadow.
  - D The Sun seems to change its position.
4. (a) All objects on Earth remain in their positions because of \_\_\_\_\_  
(b) Earth \_\_\_\_\_ on \_\_\_\_\_ and at the same time \_\_\_\_\_ in \_\_\_\_\_ around the Sun.  
(c) The rotation of Earth on its axis in its revolution around the Sun is from \_\_\_\_\_ to \_\_\_\_\_.
5. What would happen if Earth has no gravitational pull?
6. The diagram below shows the rotation of Earth on its axis.

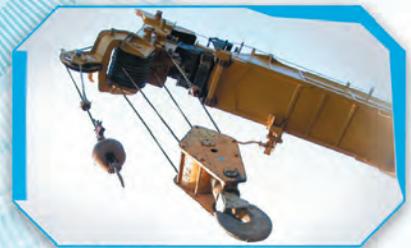
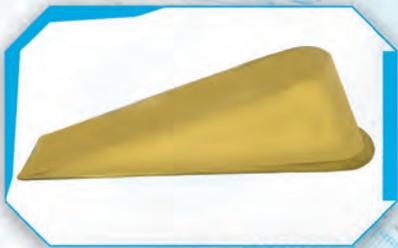


- (a) What is the duration for one complete rotation of Earth?
- (b) If it is day time at J, which part is night time?

# UNIT 10

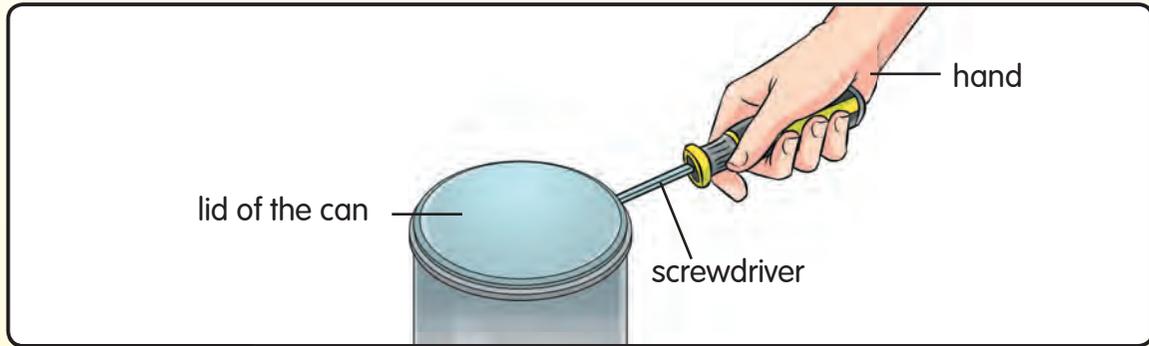
# MACHINES

What are the machines found in the pictures below that facilitate our daily work?

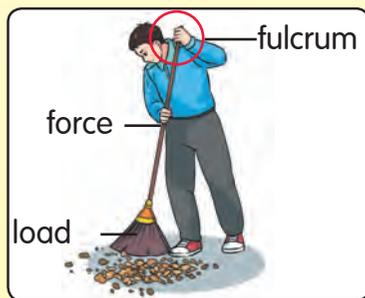
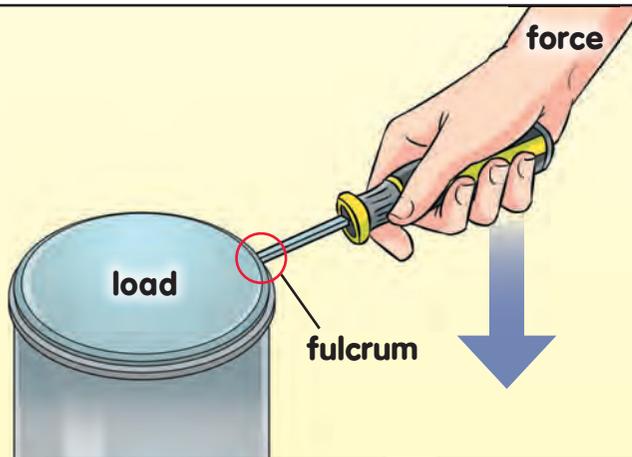


## Lever

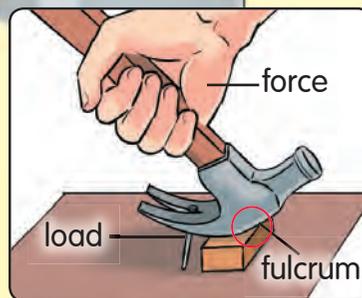
Siva wants to open the lid of a can of paint using a screwdriver. Do you know that the screwdriver Siva uses functions as a lever? A lever is used to lift or pry out an object. The lever consists of three parts; **load**, **fulcrum**, and **force**.



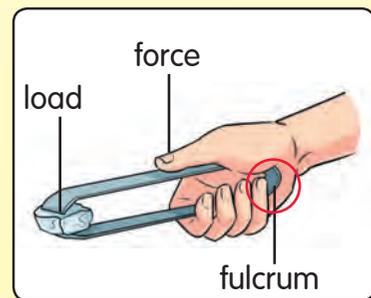
The lid of the can acts as the **load**. The tip of the screwdriver that touches the can lid is the **fulcrum**. The hand that pushes the screwdriver downwards acts as a **force**.



**Sweeping**



**Pulling out a nail**



**Gripping ice**

- Load is the weight of an object.
- Fulcrum is a point on a beam that functions to support and balance the beam.
- Force is the push and pull action which gives effects to an object.



## FUN ACTIVITY

## Determining the Positions of Load, Fulcrum, and Force



### Apparatus and Materials

Task cards, answer cards, tongs, scissors, stapler, static duster, pencil, paper

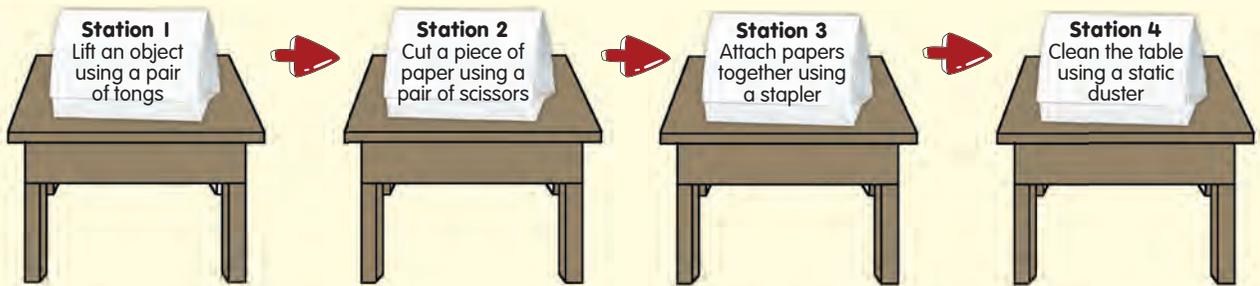
ANSWER CARD	
Station 1 	Station 2 
Station 3 	Station 4 



Example of an answer card

### Steps

1. Each group is provided with a piece of answer card as shown in the example.
2. Each group takes turns to move to every station to perform the activities.
3. A team member performs the activity based on the task card at each station as follows:



4. The other group members observe and determine the positions of the load, fulcrum, and force for each object. Record the results of the discussion by labelling the group's answer card.
5. After completing the activities in all the stations, compare the results of your group discussions with the other groups.

### Question

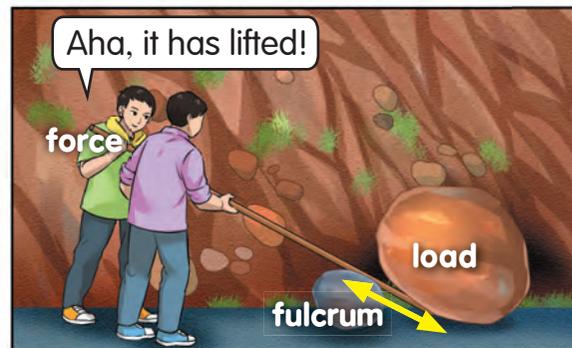
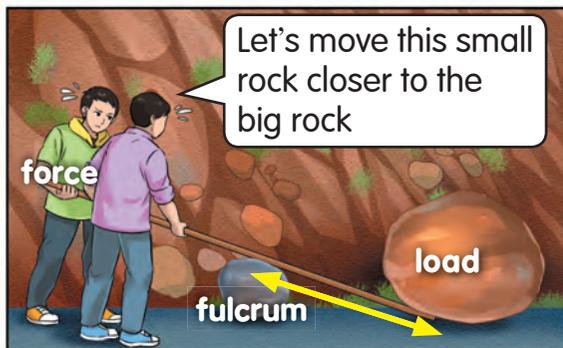
Based on the activities above, are the positions of the fulcrum, force, and load that you have identified the same for all the objects?



The answer cards can be accessed through the QR code. Teachers are encouraged to print the cards before conducting the activities.

## Relationship between Load, Fulcrum, and Force

Do you know that the position of fulcrum from the load affects the force needed to lift an object? Observe the situation below.



Based on the situation above, what can you conclude about the relationship between the distance of the load from the fulcrum and the force needed to lift the load?

The closer the load from the fulcrum, the lesser the force that is needed to lift the load.



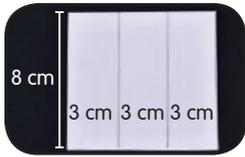
## LET'S TEST

# Relationship Between Distance of Load from Fulcrum and Force

GROUP ACTIVITY

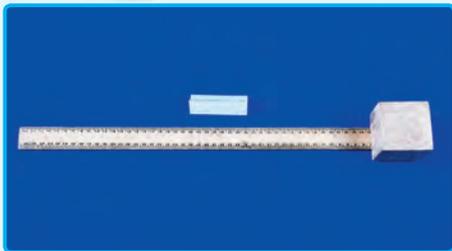
**Aim** To investigate the relationship between the distance of load from the fulcrum and the force needed to lift the load.

**Apparatus and Materials** 50 cm-ruler, wooden block (5 cm x 5 cm x 5 cm), fulcrum triangle

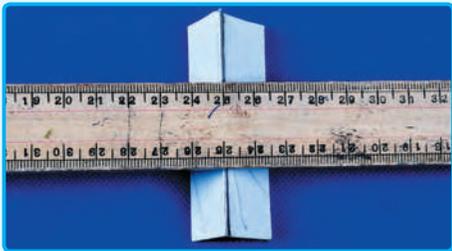


### Guide to make a fulcrum triangle

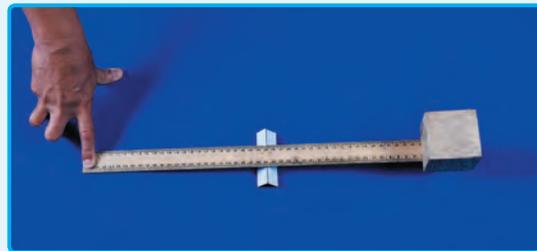
### Steps



1. Place the wooden block at one end of the ruler.



2. Place the fulcrum triangle at a position of 25 cm from the wooden block.



3. Press the other end of the ruler to lift the wooden block.

4. Repeat the step by placing the fulcrum triangle at a distance of 20 cm and 15 cm from the wooden block.

5. Identify the difference in the force needed for each change in the position of the fulcrum triangle.

6. Present the result of the investigation in the form of MS PowerPoint slides.

### Questions

1. In which position of the fulcrum triangle would the wooden block be difficult to lift?

2. What is the relationship between the difficulty in lifting the wooden block and the force needed?

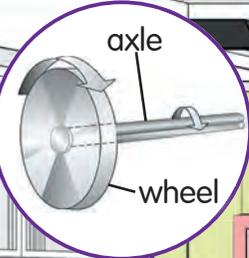
3. What is the relationship between the distance of load from the fulcrum triangle and the force needed?

TEACHER'S NOTES

The fulcrum triangle may be replaced with other suitable objects.

## Simple Machines

The simple machine is a tool that helps us to work more easily and quickly. There are various types of simple machines around us. Each simple machine has its own specific use. Let us learn about the types of simple machines in the situation below.



A diagram showing a circular wheel attached to a central rod (axle). The axle is labeled 'axle' and the wheel is labeled 'wheel'.

### Wheel and axle

Wheel and axle is a tool that consists of a wheel fixed on a rod called an axle. For example, door knobs.

### Lever

Lever is a tool that consists of a rod fixed on a fulcrum to lift or pry up the load of objects. For example, brooms.



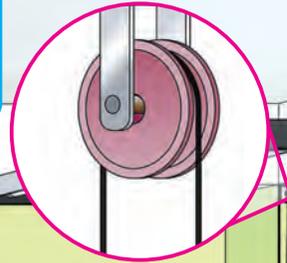
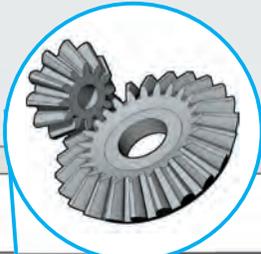
### Screw

Screw is a grooved cylindrical tool that can be inserted into objects by rotating it to unite or tighten two parts of an object. For example, a bottle and its cap.



### Gear

Gear is a tool that consists of jagged wheels. For example, gears in the clock.



### Pulley

Pulley is a tool that consists of a wheel with a groove that allows a rope to pass through it to lift or lower a load. For example, a pulley on the window blinds.



### Inclined plane

Inclined plane is a tilted flat surface which has one of its ends at a different height. For example, the stairs.



### Wedge

Wedge is a tool which has one pointed end and is used to cut, hold and stop an object. For example, knives and doorstops.





## FUN ACTIVITY

## Simple Machines and Their Uses

### Tools and Materials

Manila card, various coloured marker pens



### Steps

1.



Every group identifies simple machines that are found all around the school.

2. List the simple machines on the manila card in the form of a table as shown below.

No.	Object	Type of simple machine	Use
1	chopsticks	lever	pick up pieces of food
2			

3. Discuss the types of simple machines and their uses. Present the result of discussion in front of the class.

### Question

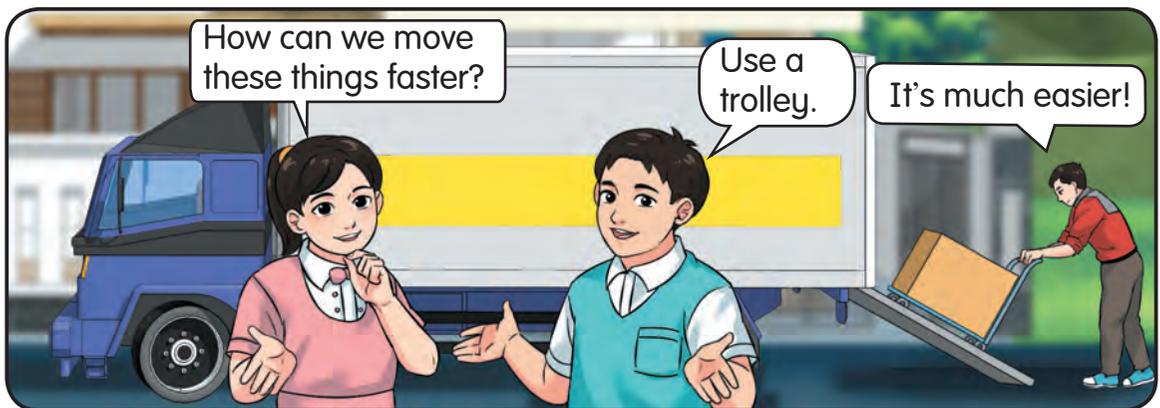
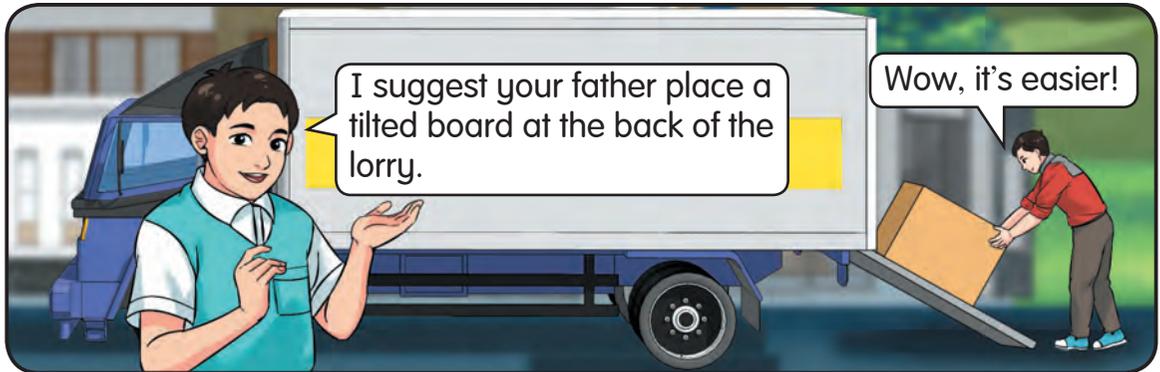
Give one example for each type of simple machine that is found in your daily life. Explain the uses of these simple machines.



Is a rubber able to lift a textbook using the lever machine? Explain.

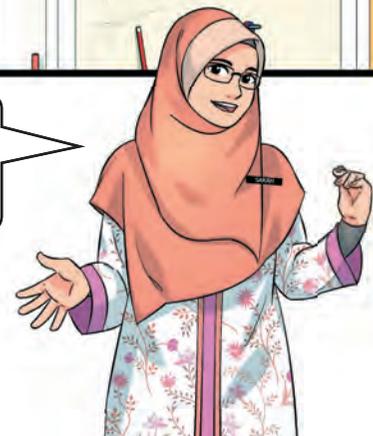
## Uses of Simple Machines to Solve Problems

Teruni and her father are having a problem moving heavy things into the lorry. Observe the situations below.



The problem in the situation above can be solved by using two types of simple machines; a tilted board and a trolley. The tilted board is an inclined plane, while the trolley is a wheel and axle. The more the number of simple machines used, the easier and faster the work can be done.

Observe the situations below.





## FUN ACTIVITY

## The Problem Solver Machine



### Apparatus and Materials

Manila card, various coloured marker pens

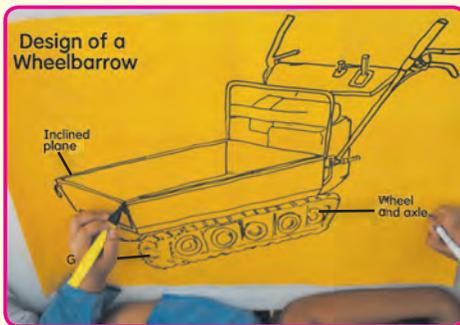
### Steps

1.



Each group identifies a problem faced in their daily lives. Then, discuss ways to solve the problem by designing model of a machine.

2.



Sketch the design of the model based on the group discussion.

3.



The group work is presented in front of the class.

### Question

Based on the design of your model, what are the types of simple machines that can be found in it?



Why do the hands of a clock (seconds, minutes, and hours) move at different speeds?

## Complex Machines

Do you know that some of the tools used in our daily lives consist of a combination of a few types of simple machines? Let us identify the simple machines found in the objects below.

A tool that consists of a combination of more than one simple machine is a **complex machine**.



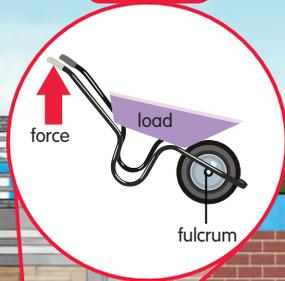
Screw



Wedge



Lever



Inclined plane

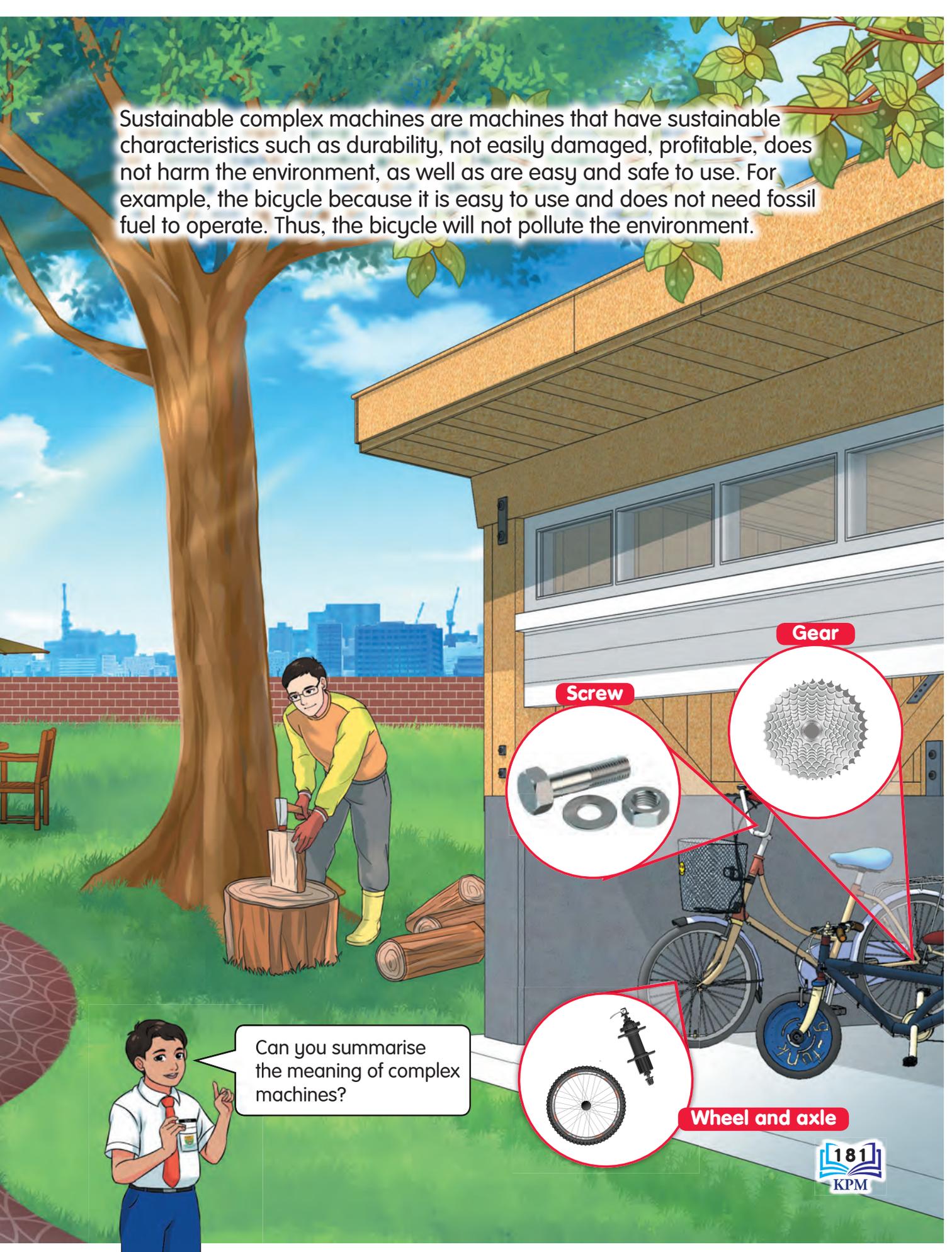


Screw



Wheel and axle

Sustainable complex machines are machines that have sustainable characteristics such as durability, not easily damaged, profitable, does not harm the environment, as well as are easy and safe to use. For example, the bicycle because it is easy to use and does not need fossil fuel to operate. Thus, the bicycle will not pollute the environment.



Can you summarise the meaning of complex machines?

Screw

Gear

Wheel and axle



## FUN ACTIVITY

## Past and Present



### Apparatus and Materials

Picture cards, flip chart paper, marker pen

### Steps



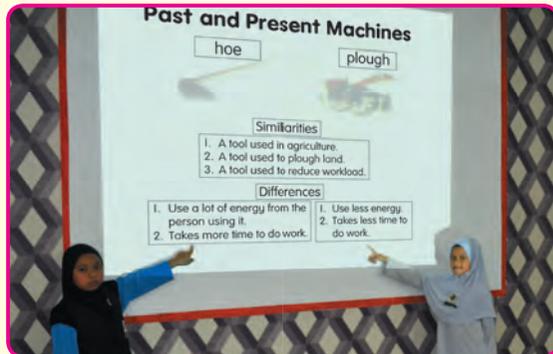
1. Each pair is given two picture cards of machines used in the past and present.



2. Gather information on the importance of inventing a sustainable machine based on picture cards received from various sources.



3. Share the information with your partner.



4. Present creatively in the form of a graphic organizer using MS PowerPoint slides.

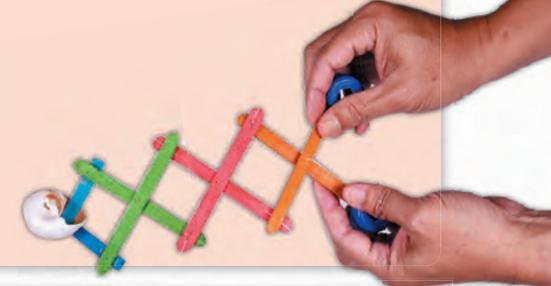
### Question

Why is the invention of a sustainable machine important?



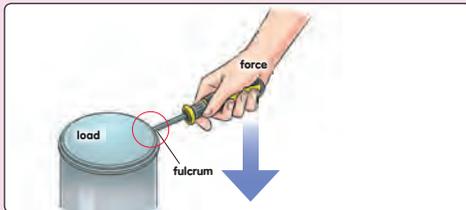
## Steps

Build a simple machine in the form of a robotic hand using hot glue gun and recycled materials such as popsicle sticks, skewer, and bottle caps. The design of the robotic hand can be modified depending on your creativity.



## MIND REFLECTION

1. Lever is an example of a simple machine that consists of three parts; **load**, **fulcrum**, and **force**.



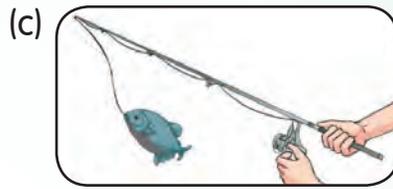
2. A fulcrum placed near to the load needs only a little force to lift the load.
3. A simple machine is a tool that enables us to do things faster and easier.

4. There are various types of simple machines such as **lever, gear, pulley, wedge, screw, inclined plane** as well as **wheel and axle**.
5. A complex machine consists of a combination of more than one simple machine.
6. Sustainable machines are machines that are durable, not easily damaged, profitable, have no harmful effects on the environment as well as easy and safe to use.

 **MIND TEST**

Answer all questions in the Science exercise book.

1. Label the load, fulcrum, and force on the lever machine below.

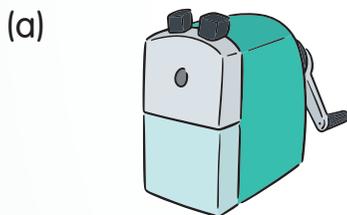


2. (a) Simple machines consist of wedge, \_\_\_\_\_, wheel and axle, \_\_\_\_\_, gear, \_\_\_\_\_, and lever.

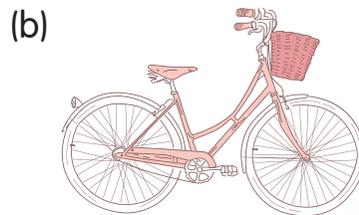
(b) \_\_\_\_\_ is a tool consists of a wheel fixed on a rod called an axle.

(c) The screw is a grooved cylindrical tool that can be inserted into an object by rotating it to \_\_\_\_\_ two parts of an object.

3. State the simple machines found in the following tools:



Mechanical pencil sharpener



Bicycle

4. What is a complex machine?

5. Tick (✓) the most suitable tool to open the object below.



## ANSWERS AND REFERENCES

### Unit 1: Scientific Skills

#### Suggested answer for HOTS (page 7)

The size of the balloon decreases, the position of the balloon changes, the distance travelled by the balloon increases.

#### Suggested answer for HOTS (page 11)

The elasticity limit of a rubber band is the maximum length that can be stretched before it snaps.

#### Mind Test (page 22)

- (a) The coin sinks, while the pencil floats.  
(b) The coin is denser than water in comparison to the pencil.  
(c) The pencils sink.
- (a) Manipulated variable: The thickness of the string.  
Responding variable: The tone of the sound.  
Constant variable: The length of the string.  
(b) The thinner the string, the higher the tone of the sound.

### Unit 2: Humans

#### Suggested answer for HOTS (page 34)

The oxygen level in that particular location. For example, oxygen level decreases in crowded places such as in the lift or train because more people are using the oxygen. Therefore, the breathing rate also increases.

#### Suggested answer for HOTS (page 39)

Similarity: Both processes remove waste products from the body.  
Difference: The excretion products are removed through the skin, lungs, and kidneys while faeces is removed through the anus.

#### Mind Test (page 51)

- (a) P: Nose; Q: Trachea; R: Lung  
(b)  $R \rightarrow Q \rightarrow P$   
(c) Organ R will get a disease.  
(d) Exhaled air has less oxygen in comparison to inhaled air.
- (a) The number of upward and downward movements in one minute for running is the most in comparison to walking and reading.  
(b) Because running needs the most amount of oxygen.  
(c) The more intense the activity, the higher the rate of breathing.
- (a) Excretion is the process of removing waste products from the body, while, defecation is the process of removing faeces through the anus.  
(b) (i) Carbon dioxide and water vapour (ii) Sweat (iii) Urine  
(c) So that the waste products do not accumulate in the body as it can cause diseases.
- (a) Nose  
(b) Stimulus: Unpleasant smell of rubbish. Response: Covering the nose.  
(c) To avoid germs from entering the body through breathing and to avoid from getting diseases.
- Drinking alcoholic beverages because it slows down human response towards stimuli.

### Unit 3: Animals

#### Suggested answer for HOTS (page 61)

Dolphins breathe through lungs.

#### Suggested answer for HOTS (page 65)

Because that animal is an invertebrate / has no backbone.

#### Mind Test (pages 67-68)

- D
- (a) Gills (b) Lungs (c) Lungs (d) Gills (e) Spiracles (f) Lungs  
(g) Spiracles (h) Moist skin
- D
- Vertebrates are animals with backbones, while invertebrates are animals with no backbones.
- Vertebrates: Tortoise, Caecilia, Tiger  
Invertebrates: Centipede, Starfish, Grasshopper
- (a) Mammal. Specific characteristics: give birth, breathe using lungs, have fur, live on land.  
(b) Bird. Specific characteristics: lay eggs, breathe using lungs, have feathers, live on land.  
(c) Reptile. Specific characteristics: lay eggs, breathe using lungs, have thick scales, live on land and in water.

- (d) Amphibian. Specific characteristics: lay eggs, breathe using lungs and moist skin, live on land and in water.  
(e) Fish. Specific characteristics: lay eggs, breathe using gills, have scales, live in water.
- Frog, because it has two breathing organs. Frogs breathe using their lungs when on land, and breathe using their moist skin when in water.
- Whales are mammals that breathe using their lungs and give birth to young.

### Unit 4: Plants

#### Suggested answer for HOTS (page 79)

Response in plants enables the plants to obtain the needs for photosynthesis such as sunlight and water.

#### Mind Test (pages 85-86)

- (a) stimulus  
(b) shoot, root, leaf  
(c) sunlight, water, gravity, touch
- (a) Sunlight  
(b) Touch
- (a) Touch  
(b) Leaf  
(c) Venus flytrap – leaf
- (a) Process in which plants make their own food.
- (a) Water  
(b) Chlorophyll  
(c) Oxygen
- (a) Photosynthesis supplies food for living things.  
(b) Oxygen and glucose are products of photosynthesis.
- (a) Light  
(b) Plant M : Normal (still alive); Plant N: Yellowish because the plant did not receive sunlight for photosynthesis in comparison to plant M.  
(c) Plant M: Wilted because it did not get water for photosynthesis.

### Unit 5: Properties of Light

#### Suggested answer for HOTS (page 94)

To enable light to be reflected and to increase the brightness.

#### Mind Test (pages 109-110)

- In a straight line, reflected, refracted
- Light travels in a straight line.
- (a)
- (a) Opaque – Clear; Transparent – None; Translucent – Less clear  
(b) Opaque objects form clearer shadows in comparison to translucent objects.
- Orientation of object and position of light source.
- Distance between object and light source and distance between object and screen.
- (a) Decrease the distance between the light source and the object.  
(b) The longer the distance between the light source and the object, the smaller is the shadow formed.  
(c) (i) Distance between light source and object  
(ii) Size of object / Distance between object and screen  
(iii) Size of shadow
- Light can be reflected. The function is for us to be able to see blocked objects at the side or behind the car easily.
- 9.



10. When the sun shines on the droplets of rain, light is refracted and a rainbow is formed.

#### Suggested answer for HOTS (page 110)

Use a thicker glass to enable the refraction to form a bigger image of the fish.

## Unit 6: Sound

### Mind Test (page 122)

- (a) Plucking (b) Blowing (c) Knocking (d) Clapping (e) Bowing
- Sound
- (a) X and Y can hear the siren of the ambulance.  
(b) Because sound travels in all directions.
- Echo. This phenomenon happens when the sound is reflected to all directions when it hits the wall of the cave.
- (b) Sound is entertaining.; (d) Sound causes disturbance.

### Suggested answer for HOTS (page 122)

The ringing of the alarm clock can be stopped by stopping the vibrations of the hammer part of the clock.

## Unit 7: Energy

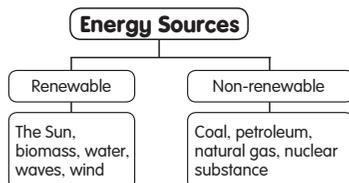
### Suggested answer for HOTS (page 130)

Potential energy → Kinetic energy → Potential energy

### Mind Test (page 140)

- ability
- (a) Potential energy → Kinetic energy → Potential energy  
(b) Chemical energy → Heat energy + Light energy  
(c) Electrical energy → Heat energy + Sound energy  
(d) Electrical energy → Kinetic energy

3.



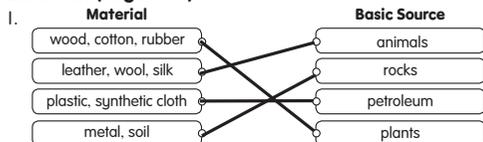
- (a) Electrical energy is transformed into chemical energy.  
(b) The chemical energy in the battery has run out because it has been transformed completely into other form of energy.  
(c) Energy cannot be created or destroyed but energy can be transformed.
- (i) Reduce the use of electrical appliances, for example, drying the clothes by using heat from the Sun compared to using the drying machine. This method can save energy.  
(ii) Using renewable source of energy, for example, using electrical energy generated by the wind compared to using electrical energy generated from fossil fuels. This can reduce environmental pollution.  
(iii) Save energy for example, car pooling or using public transport. This can sustain the energy sources.

## Unit 8: Materials

### Suggested answer for HOTS (Page 146)

Some objects may float or sink depending on the density of object to the density of the water. Objects that are denser than water will sink, while objects that are less dense than water will float.

### Mind Test (Page 154)



2.

Rocks	Animals	Plants	Petroleum
metal pot	sweater	towel	plastic bottle
mirror	silk clothes	tyres	raincoat
bricks	leather handbag	wooden chair	tent

- Elastic and waterproof. To enable the ball to be kicked around and the balloon to expand.
- Because materials that conduct heat become hot very fast. The food in the rice cooker will cook faster and the clothes can be ironed easily.
- (a) M-Animals (skin); N-Plants (rubber)  
(b) Rubber because it is elastic and is flexible / cotton because it absorbs sweat on the feet and is not warm / plastic because it is waterproof.

## Unit 9: Earth

### Suggested answer for HOTS (page 156)

Without gravity, astronauts will float in the air. Therefore, they need to wear space suits and use special items to prevent things around them from floating.

### Suggested answer for HOTS (page 163)

Earth rotates from West to East. Hence, the Sun rises in the East and sets in the West.

### Mind Test (Page 168)

- The force that pulls objects towards the centre of Earth.
- Objects fall freely or remain in their positions.
- (b) The objects remain in their positions.
- (a) the gravitational pull on Earth  
(b) Rotates, its axis, revolves, its orbit  
(c) West, East
- All objects will float in the air.
- (a) 24 hours or one day.  
(b) L

## Unit 10: Machines

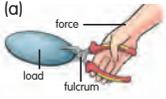
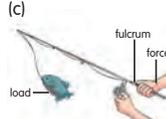
### Suggested answer for HOTS (page 176)

Yes. Use a long rod and put the textbook on one end that is near to the fulcrum. Put the rubber on the opposite end.

### Suggested answer for HOTS (page 174)

Because the size of the gears on the clock hands is different. Hence, the speed of their movements is also different.

### Mind Test (page 184)

- (a)  (b)  (c) 
- (a) inclined plane, pulley, screw  
(b) wheel and axle  
(c) unite or tighten
- (a) wedge, screw, wheel and axle  
(b) gear, screw, wheel and axle
- A complex machine consists of a combination of more than one simple machine.
- (b) Can opener.

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Dengan ini, **SAYA BERJANJI** akan menjaga buku ini dengan baiknya dan bertanggungjawab atas kehilangannya, serta mengembalikannya kepada pihak sekolah pada tarikh yang ditetapkan.

<b>Skim Pinjaman Buku Teks</b>			
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Nombor Perolehan: \_\_\_\_\_

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