

DUAL LANGUAGE PROGRAMME

# SCIENCE

**YEAR 6**

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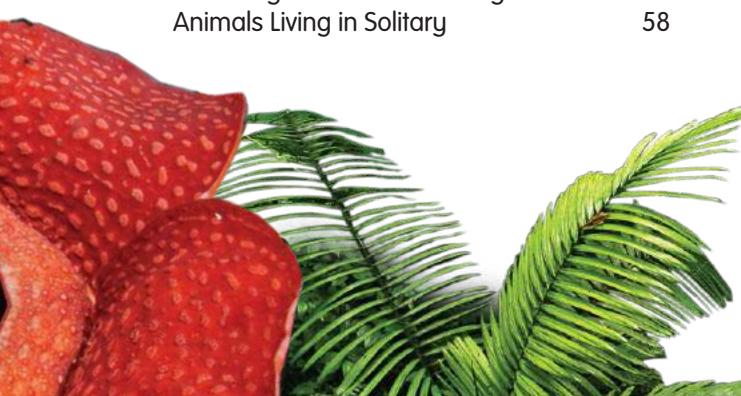
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# FOREWORD

The content of this *Science Year 6* textbook is written based on the Content Standards and Learning Standards in the Year 6, Standard-Based Curriculum for Primary School (KSSR) for Science. The content of this textbook is also written based on performance standards to facilitate teachers in assessing pupils' development and progress. It is written to emphasise the acquisition of knowledge on scientific skills and thinking skills.

This textbook consists of 12 units covering six themes: Introduction to Science, Life Science, Physical Science, Material Science, Earth and Space Science, and Technology and Sustainability of Life. The writing of this book is organised to stimulate and attract pupils' interest to continue to appreciate the learning of Science in the classroom or through self-learning. Every unit in this book starts with a stimulus page, description of the learning content, activity, summary, evaluation, and enrichment activity. To facilitate the teaching and learning, answer pages are provided at the end of the book as a guide for the answers to the questions found in every unit.

In ensuring that the goals and objectives of KSSR for the Science subject are achieved, elements on creativity and innovation, entrepreneurship, information and communication technology (ICT), and Higher Order Thinking Skills (HOTS) are incorporated into the existing elements across the curriculum. In addition, values, positive attitudes, and good working cultures are also embedded in this textbook.

The teaching and learning strategies in KSSR prioritises learning by thinking, emphasising the optimum acquisition and mastery of skills and knowledge. Besides that, the knowledge on science and technology learned is adapted and applied to everyday life, the community, and environment. In order to raise pupils' interest and enjoyment in learning, the presentation of this book is added with elements of educational humour.

Finally, the writers hope that this textbook can trigger ideas for teachers to enhance the effectiveness of their teaching. At the same time, pupils will be excited to use this book for learning.

# EXPLANATION OF TEXTBOOK ICONS



Number for learning standards contained in the Science Curriculum and Assessment Standard Document.



#TEACHER

Information to assist teachers to conduct activities or to obtain extra information.



Activities that pupils need to do to master the learning standards.



Safety measures to be considered when doing activities to avoid injuries or accidents.



Exercises that pupils need to do to master the learning standards.



Questions to test understanding and to reinforce concepts learned by the pupils.



Additional interesting information related to the topic discussed.



Summary of the content for each unit using simple graphic organisers.



Questions to evaluate pupils' achievements in each unit.



Enrichment activities for each unit.



Questions to enable pupils to improve Higher Order Thinking Skills (HOTS).



Elements of entrepreneurship are added across the existing curriculum.



A guide to assist pupils when conducting investigations.



Additional activities needed to be done by the pupils.

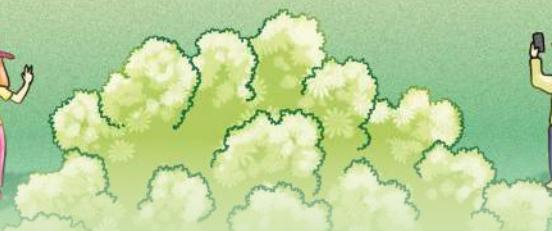


# SCIENTIFIC SKILLS

Why do the hot-air balloons fly at different heights?

Amir, look! There are many hot-air balloons. Some fly high and some fly low.

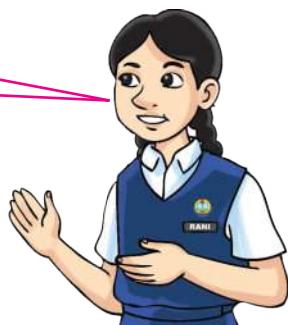
The question above can be answered through an investigation involving scientific skills.



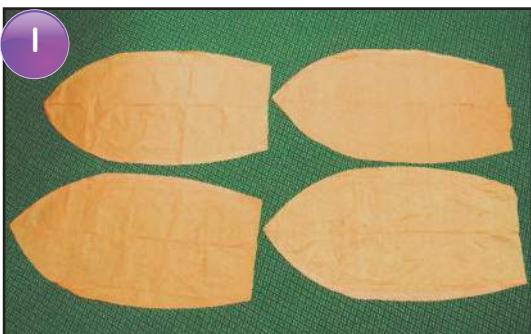
# Science Process Skills

How can scientific skills help in solving Amir's question?  
Let us build a mini air balloon to investigate factors that influence the time taken for a mini air balloon to fly.

Apparatus and materials needed for making the mini air balloon in this investigation are brown paper, card stock, ruler, marker pen, scissors, double-sided tape, adhesive tape, fine wire, wax burner, and matches.



Steps to build a mini air balloon are as follows:



Cut the brown paper into four sections of the same size.



Paste the double-sided tape on the sides of the brown paper. Join the four pieces of paper to form a dome.



Join both ends of the long card stock using adhesive tape to form a circular frame.



Connect two fine wires across each other over the frame.



#TEACHER

- Wax burner is available in hardware stores.

5



Punch a hole in the wax burner and insert the wire. Bend the wire so that the wax burner will not come off easily.

6



Stick the base of the dome to the frame with the fixed wax burner.

7



The mini air balloon is now complete and ready to be flown.

8



Hold the top and bottom of the mini air balloon. Then, light up the wax burner.



Be careful when lighting the wax burner.

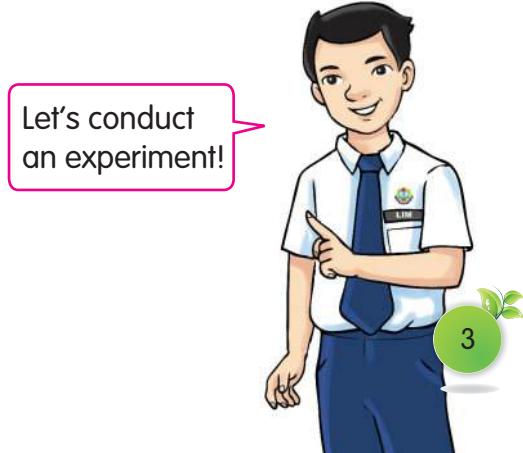
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Release the mini air balloon when it starts to float in the air.

10 What can you observe before the mini air balloon is successfully flown?



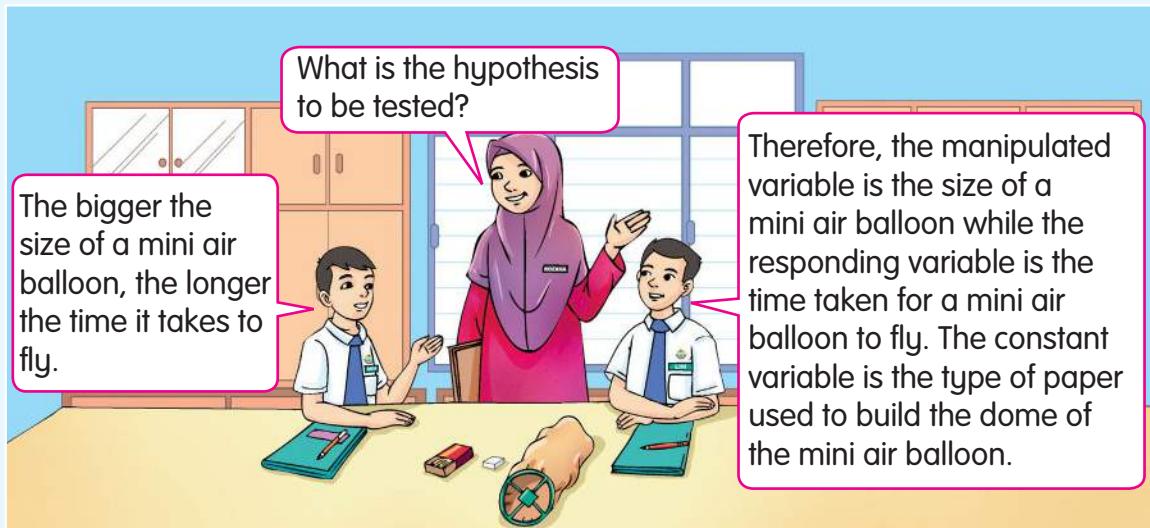
Make inferences based on your observation.



## Experiment I Sizes of Mini Air Balloons

### Problem Statement

Does the size of a mini air balloon affect the time taken for it to fly?



### Apparatus and Materials

- brown paper
- card stock
- ruler
- marker pen
- scissors
- double-sided tape
- fine wire
- wax burner
- matches
- stopwatch



What are other variables that can be made constant?

### Steps

1. Make three mini air balloons of different sizes and label them A, B and C.
2. Test the mini air balloon by flying mini air balloon A.
3. Record the time taken for mini air balloon A to fly from the moment it floats until it falls to the ground.
4. Repeat steps 2 and 3 with mini air balloons B and C.

### Observation

Record your observations in the table as shown below.

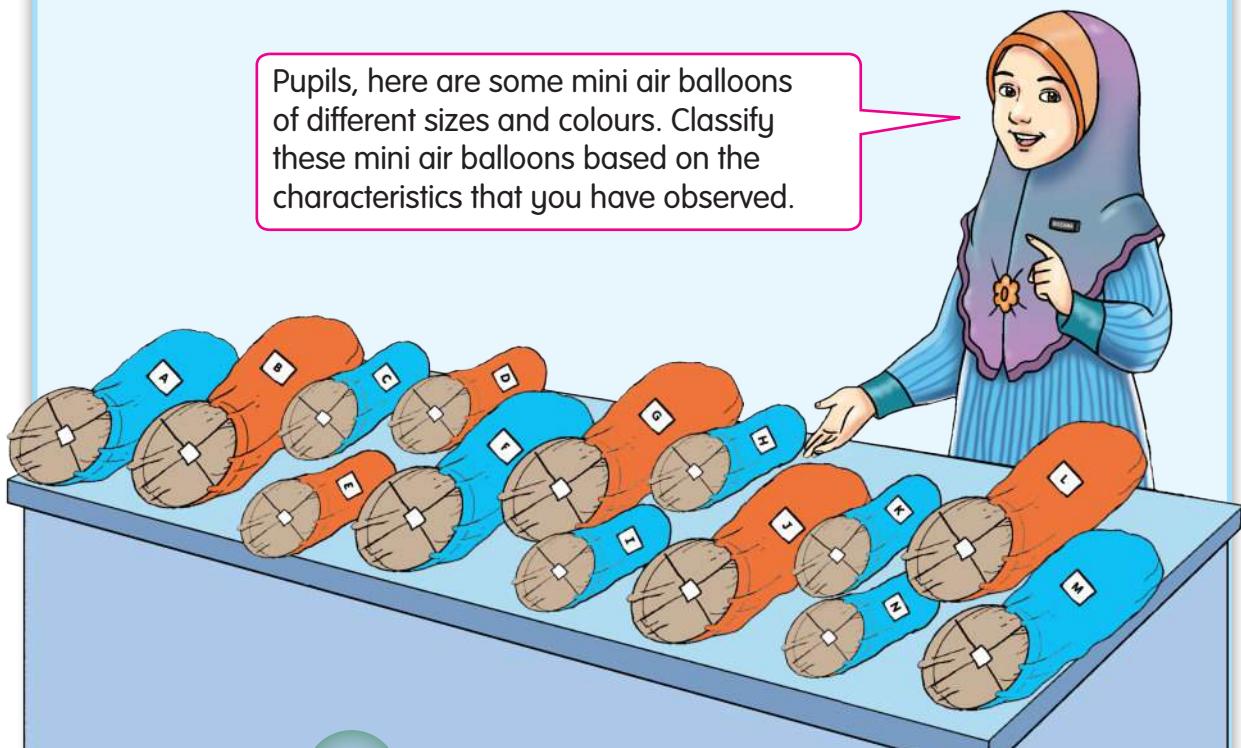
Mini air balloon	Size	Time (mins)
A	/\	/\
B	/\	/\
C	/\	/\

## Questions

1. What are your observations after the mini air balloons are flown?
2. Give an inference based on each of your observations.
3. Which mini air balloon flies for the longest time?
4. What is the relationship between the manipulated and responding variables in your experiment?
5. What is the operational definition for the time taken for a mini air balloon to fly?

## Conclusion

1. Hypothesis (accepted/not accepted).
2. The size of a mini air balloon  the time taken for it to fly.
3. The bigger the size of a mini air balloon, the  the time it takes to fly.



Predict the time taken for a mini air balloon to fly if plastic is used to replace the brown paper.

## Experiment 2 Materials for Mini Air Balloons

Besides brown paper, the dome of mini air balloons can also be made from other materials such as plastic, cardboard, and newspaper.

Does the type of materials affect the time taken for mini air balloons to fly?



Plan and conduct an experiment to test your hypothesis.

Use the checklist below when conducting your experiment.

Checklist	Note	Your Action
1. Identifying a problem		
2. Making a hypothesis		
3. Planning an experiment		
Determine: <ul style="list-style-type: none"><li>• Control variables</li><li>• Apparatus and materials</li><li>• Steps for the experiment</li><li>• Method of collecting data</li><li>• Method of analysing data</li></ul>		
4. Conducting the experiment		
Conduct the experiment according to the planned steps.		
5. Collecting Data		
Record the data		
6. Analysing data		
7. Interpreting data		
8. Making conclusion		
State a conclusion obtained from the experiment.		
9. Writing a report		

# Manipulative Skills

Science manipulative skills need to be practised when a science experiment or investigation is carried out. Manipulative skills will help us to carry out an experiment or investigation more accurately. Let us recall the manipulative skills involved in the following investigation.

**Aim** To observe bread fungi using a microscope.

**Apparatus and Materials** Microscope, cover slip, glass slide, dropper, needle, filter paper, and mouldy bread

## Steps

1



Use the mouldy bread as a specimen.

2



Use a needle to take some fungi from the bread. Place the specimen in the centre of a glass slide.

3



Drip drops of water onto the specimen using a dropper.

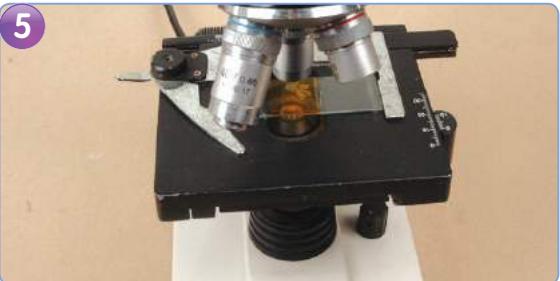
4



Put the cover slip gently on the specimen. Wipe the edges of the cover slip with filter paper.



Be careful when adjusting the microscope lens to avoid breaking the cover slip.



5

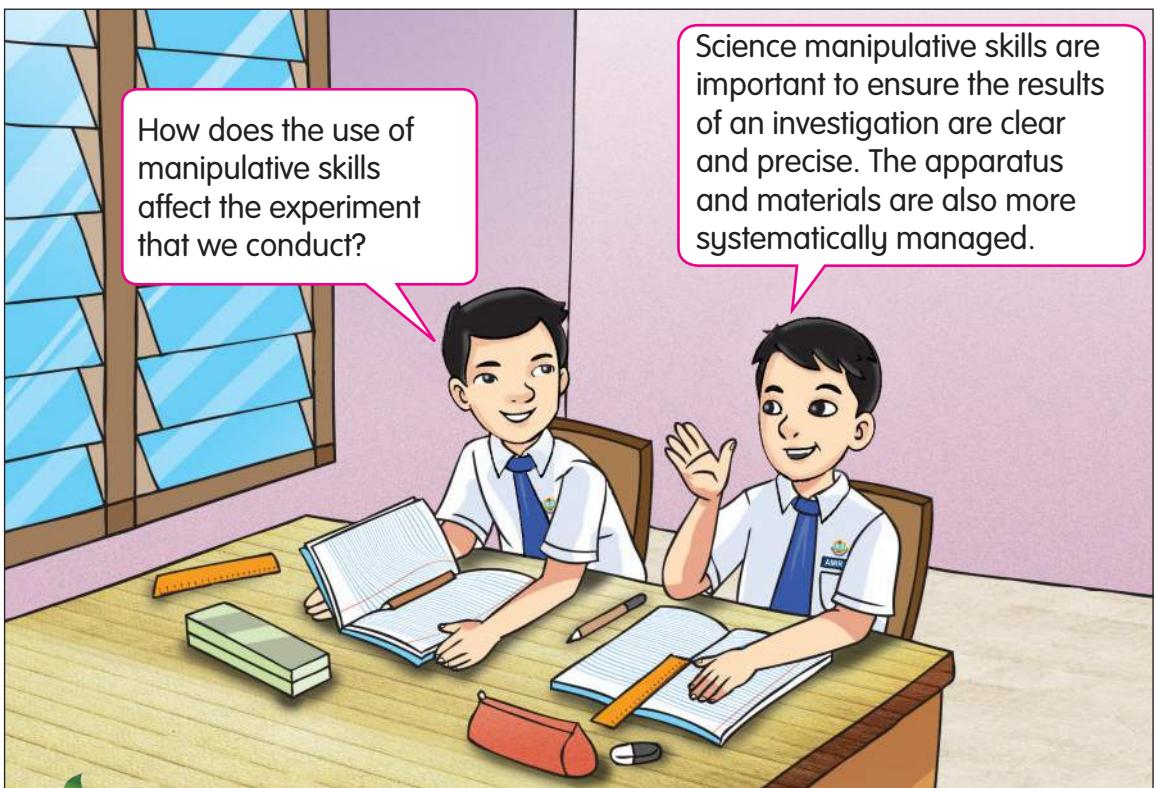
Place the glass slide carefully under the microscope.



6

Observe the specimen under the microscope and sketch the specimen that you see.

- 7 Throw the used specimen into the dustbin. Clean the cover slip and glass slide.
- 8 Keep the apparatus and materials properly and carefully.
- 9 Compare what you had sketched with a friend.



### Questions

1. Why do we need to handle the specimen correctly and carefully when conducting the investigation?
2. What are the science manipulative skills that you have used in this investigation?



# Manual Air Conditioner

## Aim

To build an air conditioner using energy from batteries.

## Apparatus and Materials

Batteries, battery holder, wires, motor, cutter, screwdriver or nail, ice cream stick, plastic bottle, and cotton

## Steps

(1)



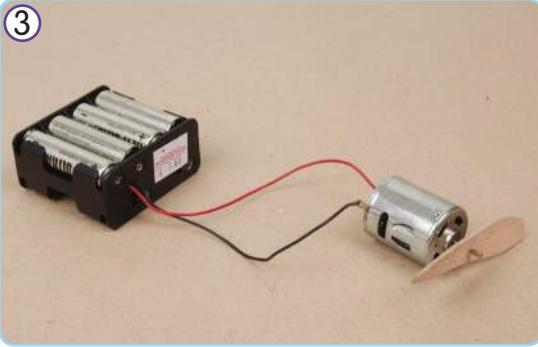
Make a hole in the middle of the ice cream stick using a screwdriver.

(2)



Shape the ice cream stick into a fan blade. Fix the ice cream stick into the shaft of the motor.

(3)



Connect the motor to the batteries.

(4)



Cut the plastic bottle and use the middle section of the bottle.

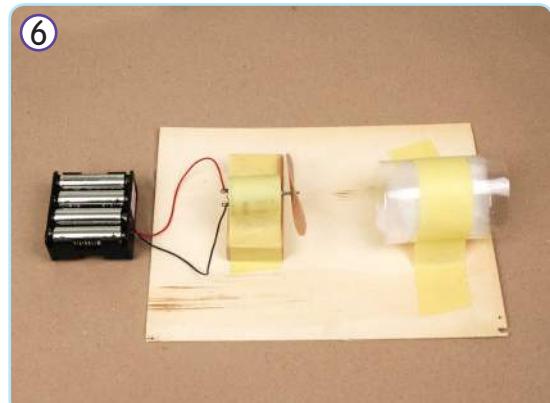


Be careful while using a cutter.





Wet the cotton with water and place it in the middle of the cut out section.



Place the model on a flat surface. Connect the circuit and observe.

## Questions

1. What did you observe?
2. What are the manipulative skills involved in doing this project?
3. What transformation of energy occurs in this project?



State a few examples of manipulative skills that we use in our daily life.



Science process skills and manipulative skills are not only used in the laboratory, they can also be applied in the fields below.



Pharmacy: Classification and arrangement of medicines.



Engineering: Construction of building structures.



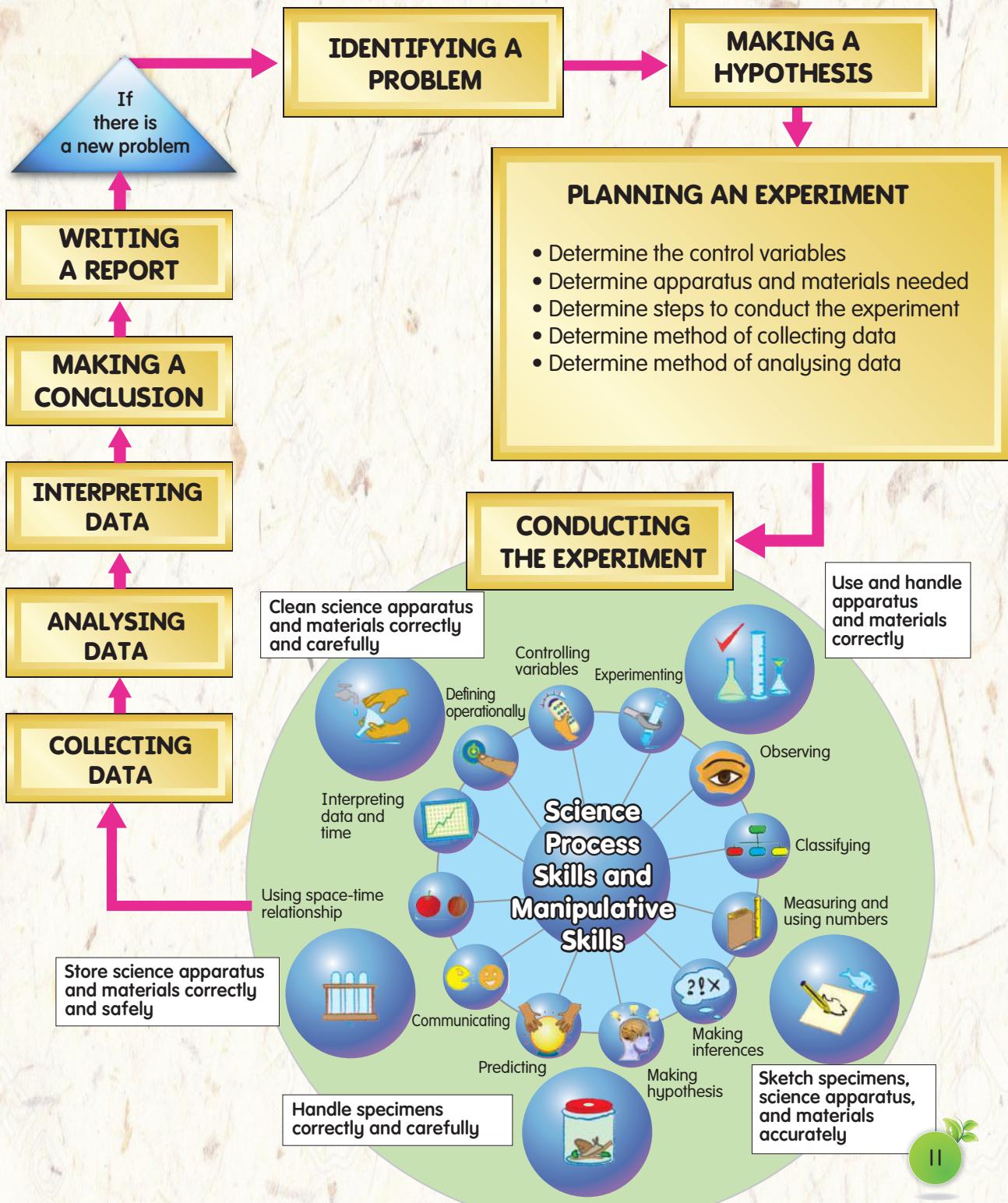
Agriculture: Production of plants through bud grafting.



## Let's Remember

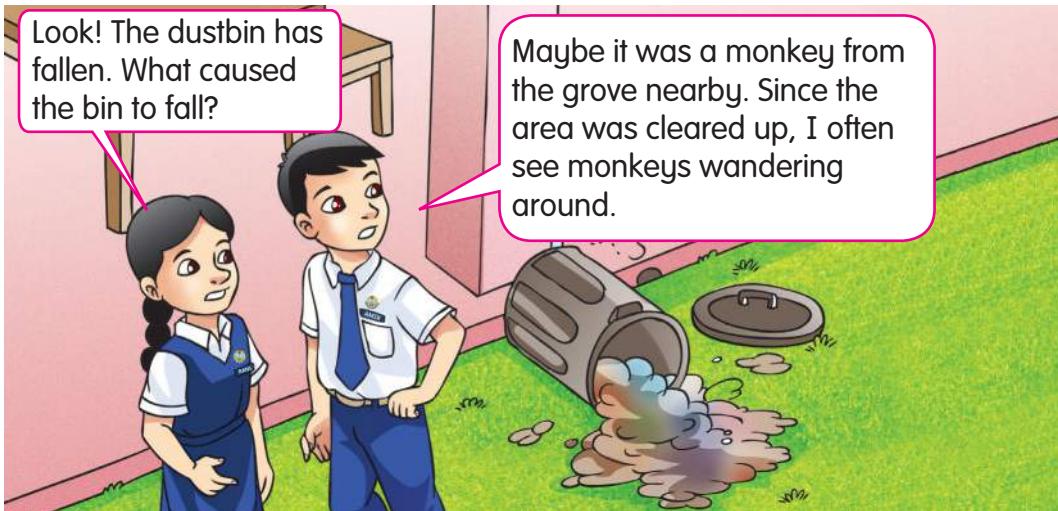
# SCIENTIFIC SKILLS

## Science Process Skills: Experimenting



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

- Based on the situation below, identify an inference from the incident that happened.



- Lim made the hypothesis below while playing spinning top with his friends.

The greater the number of turns of the string around the top, the longer it takes to spin.

From the hypothesis above, identify the:

- i. manipulated variable
- ii. responding variable

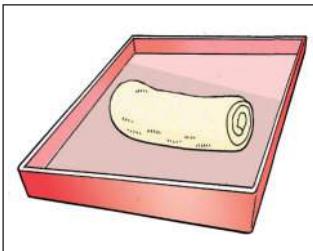


- Observe the situation below.

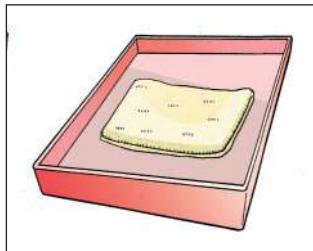


- Predict what will happen after picture C.
- What are the manipulated and responding variables from the situation above?

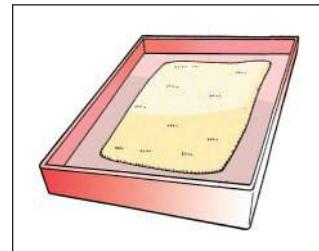
4. Amir conducted an investigation on three towels of the same type and size. He poured 50 ml of water on each towel and weighed them. The initial mass of each towel was recorded. He placed towels X, Y and Z under the sun as shown below.



towel X



towel Y



towel Z

After three hours, Amir weighed the mass of each towel again.

- What is the aim of this investigation?
- Predict the final mass of the towels in ascending order.



5. An agricultural officer recorded observations made on the volume of milk produced in 2015 as shown in the table below.

Goat herder	Volume of milk by month (litre)			
	February	March	April	May
Encik Yusof	350	405	608	704
Encik Ramli	150	245	365	526

- Write an inference based on the difference in the volume of milk produced by Encik Yusof and Encik Ramli's livestock.
- Provide another inference based on your observation above.
- State the relationship between the manipulated and responding variables based on the inference made in (a).
- Transfer the data in the table into another suitable form of communication.



## Let's Try

# Air Bags

### Aim

To investigate the effects of different amounts of baking soda on the volume of gas produced.

### Problem

Is the volume of gas produced inside the plastic bag influenced by the amount of baking soda used?

### Apparatus and Materials

Measuring tape, three ziplock bags, tissue, vinegar, and baking soda

### Steps

1. Make your hypothesis.
2. Determine the constant, manipulated, and responding variables.
3. Do this experiment in a small group.
4. Record the data from your observation.
5. Write a report of the experiment and discuss it together with the other groups.
6. Plan another experiment to test a new hypothesis from questions raised in the discussion.



Baking soda mixed with vinegar solution produces carbon dioxide, water, and salt.

### Questions

1. What did you observe?
2. What is the relationship between the amount of baking soda used and the volume of gas produced?
3. Predict what will happen if the vinegar solution is replaced with water.



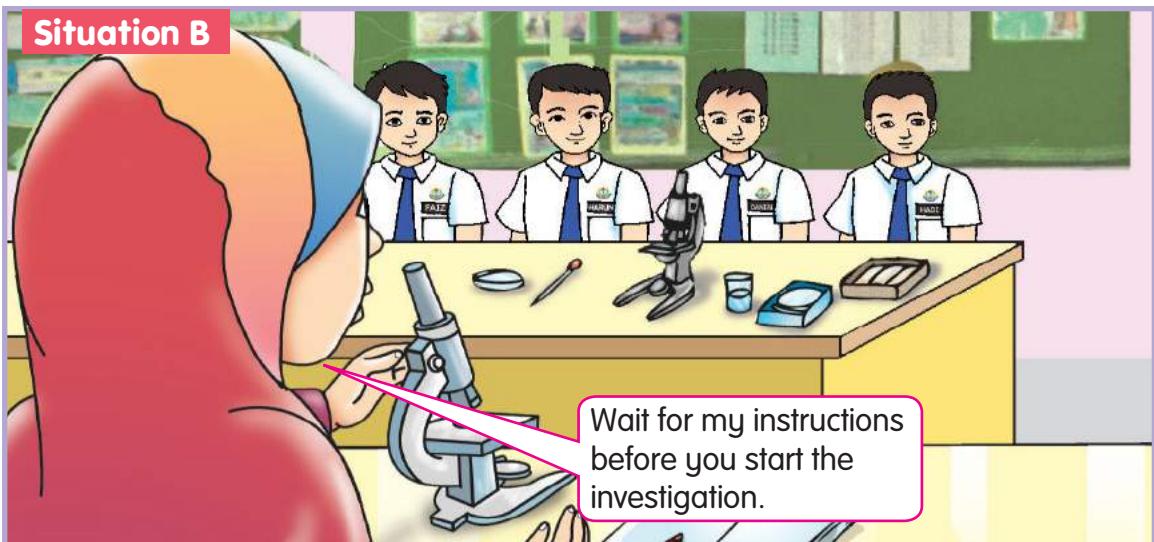
# SCIENCE ROOM RULES

We have learned about Science Room Rules in Year 4 and Year 5.  
Let's observe the two situations below.

**Situation A**



**Situation B**



What can you observe in Situation A?

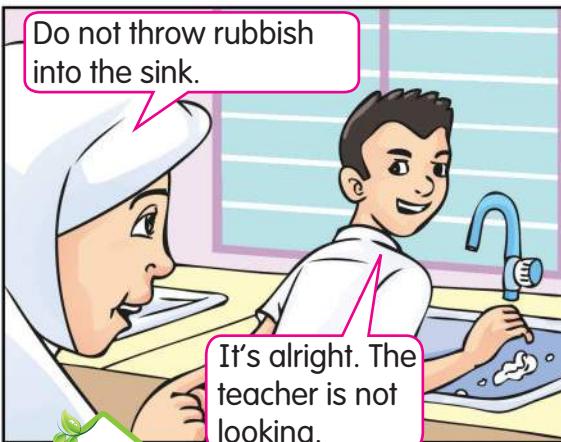
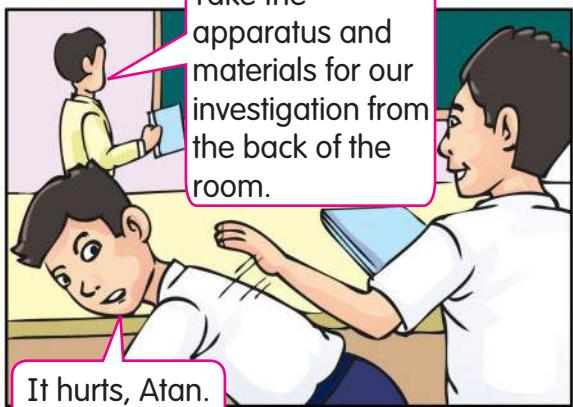
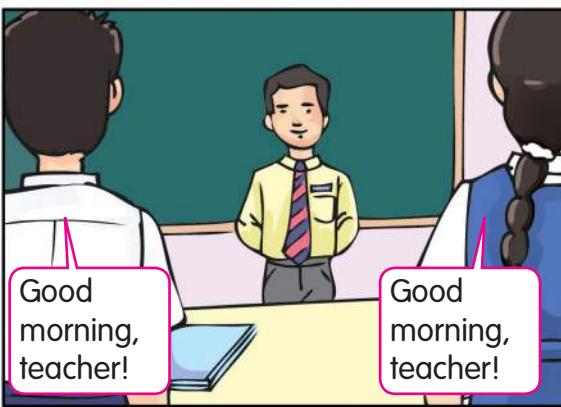
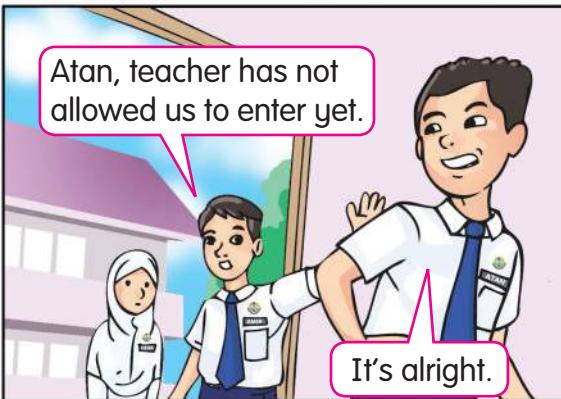
What are the Science Room Rules that are not followed in this situation?

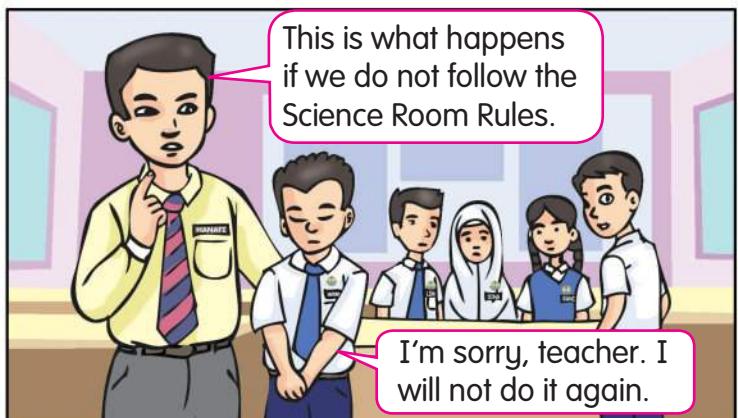
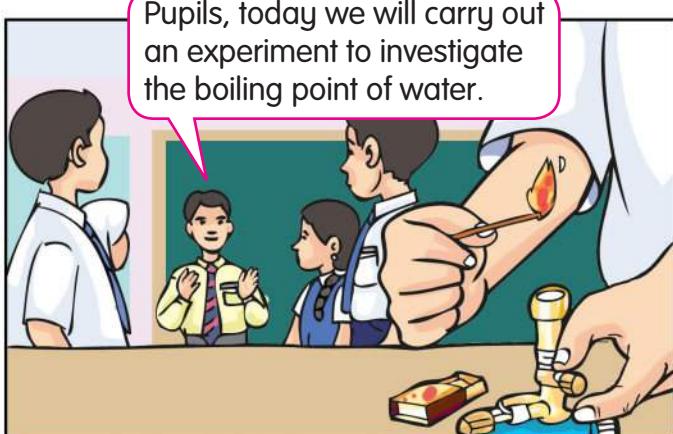
Why do we need to obey the Science Room Rules?

# Follow the Science Room Rules



Last week, my friend and I entered the Science Room. We were very excited to learn a new topic. We lined up in front of the classroom and walked in a single line towards the Science Room. We lined up outside the Science Room. Then...





Since then, Atan started to follow the Science Room Rules. He regretted his actions. There would be no more accidents.



Based on Amir's story, what are the Science Room Rules which Atan did not follow? What is the importance of following the Science Room Rules? How do we make sure that everyone who uses the Science Room always follow the Science Room Rules?



## Let's Test

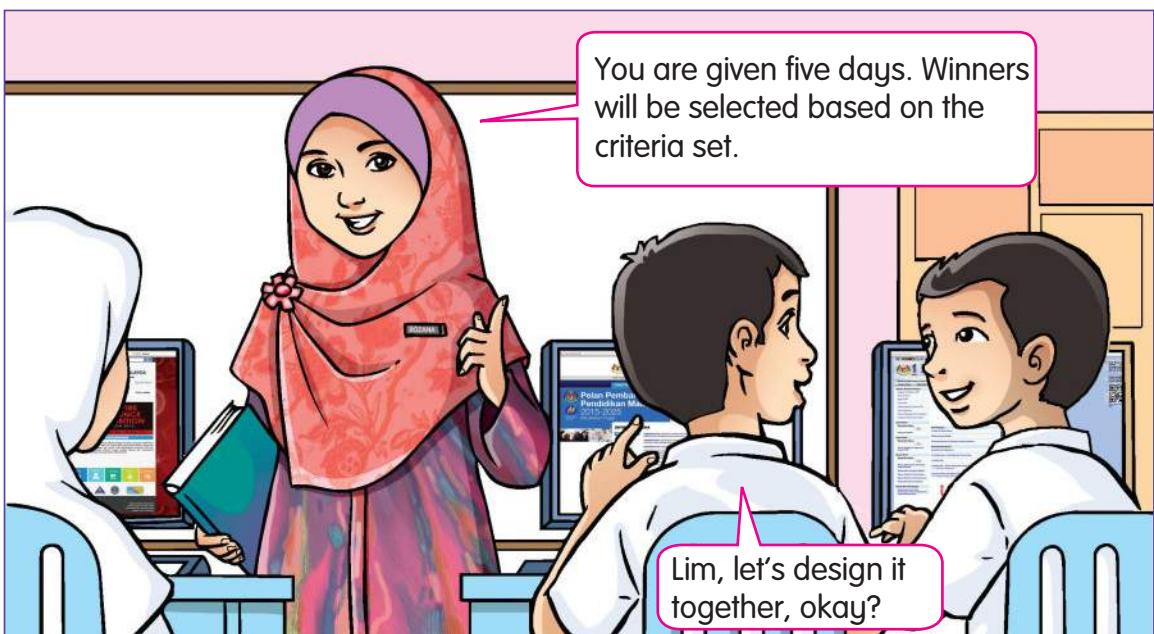
# Pamphlet Competition

### Aim

To organise a pamphlet design competition entitled "Science Room Rules".

### Apparatus and Materials

Computer, printer, and A4 paper



### Steps

1. Design a pamphlet entitled Science Room Rules in pairs.
2. List the Science Room Rules and include information on the needs of these rules in the pamphlet.
3. Design and decorate your pamphlet based on your own creativity using suitable software.
4. Present your pamphlet in front of the class.

### Question

You found out that one of your friends did not follow the Science Room Rules. How can you overcome this problem?



**Let's  
Remember**

# SCIENCE ROOM RULES

## Adhere to the following:

Enter the Science Room with the teacher's permission.

Open the windows and switch on the fan.

Carry out the activity according to the teacher's instructions.

Light the Bunsen burner using the correct method.

Tie your hair neatly when conducting experiments.

Dispose liquid wastes into the sink with running tap water.

Put off burning or smoldering materials before throwing them into the dustbin.

Throw rubbish into the dustbin.

Report immediately to the teacher any accidents, injuries or damages.

Use the first-aid kit with the help from the teacher.

Arrange the stools and clean up the Science Room before leaving.

## Do not do the following:

Playing or running in the Science Room.

Eating or drinking in the Science Room.

Touching, smelling or placing any substances into the mouth without the teacher's permission.

Bringing out science apparatus without the teacher's permission.



**Answer all of the following questions in your Science exercise book.**

- I. Observe the picture.

A pupil did something which is prohibited while he was in the Science Room. Apart from what the pupil did, what else are not allowed in the Science Room?



- I. Eating in the Science Room.
  - II. Running or playing in the Science Room.
  - III. Arranging stools before leaving the Science Room.
  - IV. Reporting accidents or injuries in the Science Room.
- A. I and II      B. I and III      C. II and IV      D. III and IV

2. There are Science Room Rules which can be practised in other areas of your school. State the rules.
3. Read the statement below. Discuss.

Practising Science Room Rules can ensure everyone's safety.



### Let's Try

### Design an Icon

#### Aim

To design an icon for Science Room Rules.

#### Apparatus and Materials

Computer, printer, paper, and Internet

#### Steps

- I. Design an icon for the Science Room Rules using a suitable software.
2. Print the icon you have designed.
3. Present the icon to the class.

### Question

How does the icon you have designed explain the Science Room Rules?



# MICROORGANISMS

Do you know how to make bread?



Mix all the ingredients above into a mixing bowl.



Knead the dough until it is soft.



Cover the dough with a clean towel and leave it for an hour.



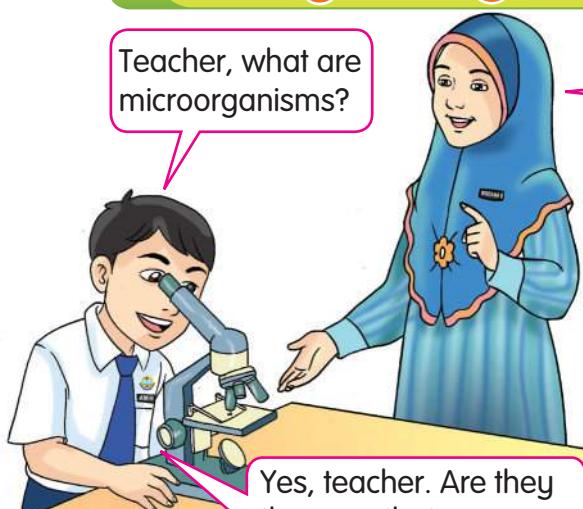
Observe the dough.

Based on the situation above, what do you observe after one hour? How did the dough rise? What is the microorganism used in making bread? Does this microorganism provide benefits to us?

# Tiny Living Things

Teacher, what are microorganisms?

Microorganisms are tiny living things. Can you see them?



Yes, teacher. Are they the ones that are moving?

**Micro** means very tiny and cannot be seen with the naked eye while organisms mean living things.

**Microorganisms** are very tiny living things that are not visible to the naked eye.

Microorganisms can be found around us. There are several types of microorganisms. How do they look and what are their shapes?

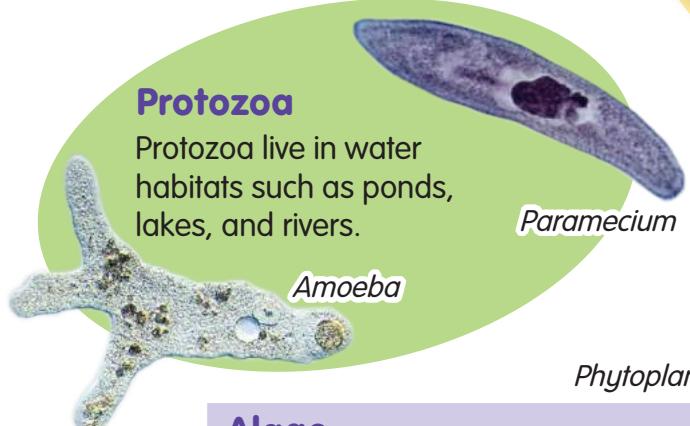
## Fungi

A group of fungi that can be seen with the naked eye is known as mould. Yeast, mucor, and *Penicillium* can only be seen using a magnifying glass or a microscope.



## Protozoa

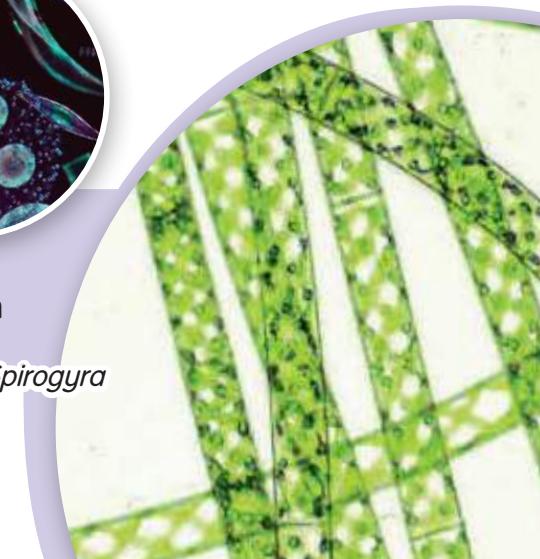
Protozoa live in water habitats such as ponds, lakes, and rivers.

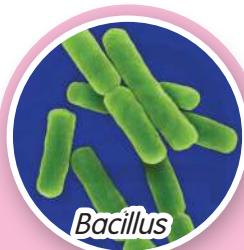


## Algae

Algae are microorganisms which have the characteristics of plants. Algae make their own food through the process of photosynthesis.

*Spirogyra*



**Bacteria**

Salmonella

**Virus**

Viruses are finer than other microorganisms. Viruses can only be seen under an electron microscope. HIV and influenza virus are examples of viruses.



Escherichia coli

Streptococcus

Most microorganisms cannot be seen by the naked eye. A microscope is an instrument used to observe microorganisms clearly.



What is the size of this microorganism? A needle tip of 0.2 mm in diameter can accommodate millions of these microorganisms. Imagine how tiny these microorganisms are!





## Let's Test

# Microbial Interactive Catalogue

### Aim

To identify the types of microorganisms.

### Apparatus and Materials

Computer, Internet, printer, scissors, manila card, and glue

### Steps

1. Conduct this activity in pairs.
2. Search information and pictures on different types of microorganisms from suitable websites.
3. Keep the information and pictures you have collected in a folder.
4. Print out the pictures that you have collected.
5. Make a catalogue of the microorganisms based on the information you have gathered using your creativity.
6. Display the catalogue and share it with the other groups.



### Questions

1. What types of microorganisms have you identified?
2. What are the shapes of these microorganisms?

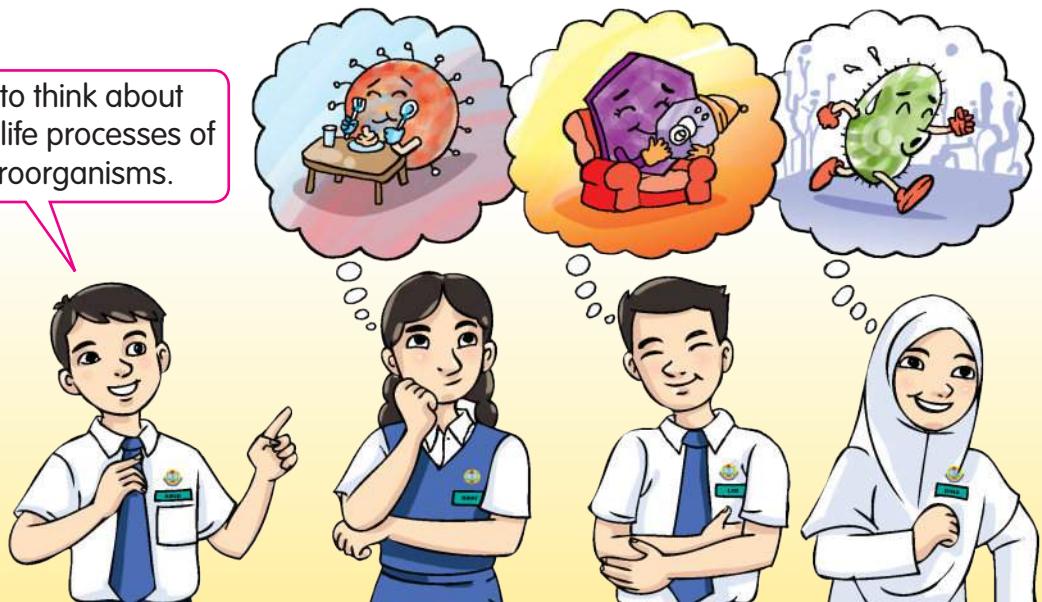
### INFO CLICK

There are differences between a virus and other microorganisms. Fungi, algae, protozoa, and bacteria are living things. However, virus is a microorganism that is partially living and partially non-living but can reproduce by inhibiting other cells.

# Life Processes of Microorganisms

Microorganisms such as fungi, protozoa, algae, and bacteria carry out life processes.

Try to think about the life processes of microorganisms.



Life processes of microorganisms are not the same as ours.



Let us conduct an investigation to find out the life processes of microorganisms.



## Let's Test

# Microbes Alive!

Can microorganisms breathe?



## Activity 1

### Aim

To show that yeast breathes and releases gas.

### Apparatus and Materials

Plastic bottle, teaspoon, tablespoon, thread, ruler, lukewarm water, balloon, yeast, and sugar

### Steps

- Pour 250 ml of lukewarm water into a plastic bottle.
- Put in three teaspoons of yeast into the bottle.
- Add one tablespoon of sugar and shake the bottle.
- Place the balloon over the mouth of the bottle.
- Observe the size of the balloon.
- Measure the diameter of the balloon using a thread and ruler every 5 minutes for a duration of 20 minutes.
- Discuss your observations in front of the class.



### Questions

- What are the changes you observed?
- State your inference on the changes that you have observed.
- Why is sugar used in this investigation?
- What conclusion can you make?



What is the gas released during the breathing process of microorganisms?



What will happen if sugar is replaced with salt?

Do microorganisms move?



## Activity 2

### Aim

To observe that microorganisms move.

### Apparatus and Materials

Microscope, dropper, cover slip, glass slide, beakers, petri dish, filter paper, and pond water



- Be careful when using cover slip which breaks easily.
- Wash your hands after the investigation.

### Steps

1. Put some pond water into the beaker.
2. Use a dropper to take some of the water from the beaker.
3. Put a drop of pond water on the glass slide.
4. Cover the drop with a cover slip.
5. Remove excess water on the glass slide with a filter paper.
6. Place the glass slide on the microscope stage.
7. Adjust the lens of the microscope until a clear image is obtained.
8. Observe the movement of microbes under the microscope.
9. Sketch the microbes you observed.
10. Record and report your observations.



### Questions

1. Make an inference based on your observations of the pond water under the microscope.
2. State your conclusion for this investigation.



### #TEACHER

Prepare additional resources from the Internet to show pupils the movement of microorganisms.



Do microorganisms grow?

## Activity 3

### Aim

To show that moulds grow.

### Apparatus and Materials

Transparent plastic, spray bottle, bread, and water

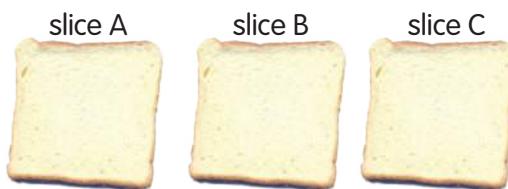
### Steps

- I. Spray water on the slice of bread as shown below.

Slice A: 1 spray

Slice B: 2 sprays

Slice C: 3 sprays



### #TIPS

1. Use three slices of bread from the same loaf.
2. Do not open the plastic bags while observing and measuring.



Put each slice into separate transparent plastic bags and label them as A, B and C.



Why are there changes in the colours of the mould? Explain.

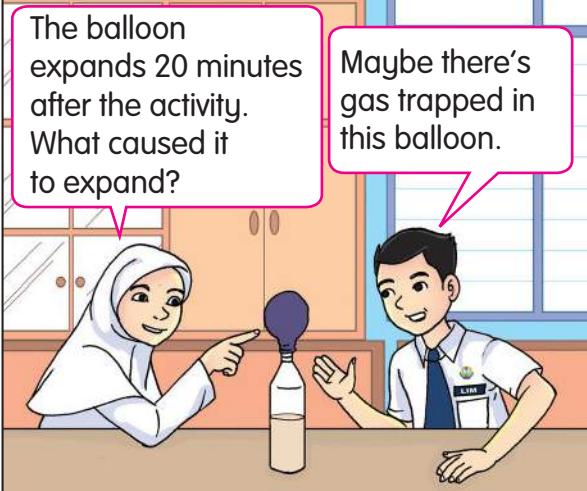
2. Observe bread slices A, B and C for one week. Record the changes in size and colour of the moulds on the slices of bread.
3. Discuss your observations with your friends.

### Questions

1. What is the evidence that shows moulds grow?
2. State your conclusion based on this investigation.

The situations below show a number of incidents that happened while Amir and his friends were doing activities 1, 2 and 3.

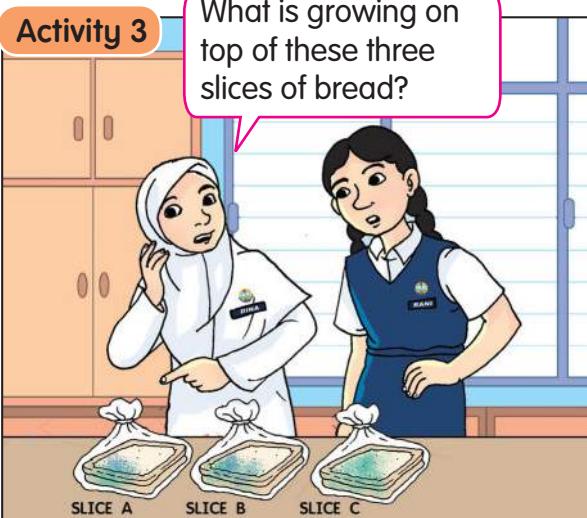
### Activity 1



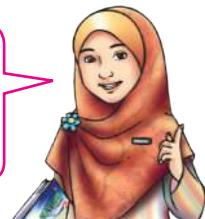
### Activity 2



### Activity 3



What conclusion can you make from these three activities?



All three activities indicate that microorganisms are living things. Microorganisms such as fungi, protozoa, algae, and bacteria carry out life processes like breathing, moving and growing. Most microorganisms cannot be seen with the naked eye.



Choose one type of microorganism you have identified. Build a model of the microorganism using recycled materials and present it with extra information about the microorganism.



### Q U I Z

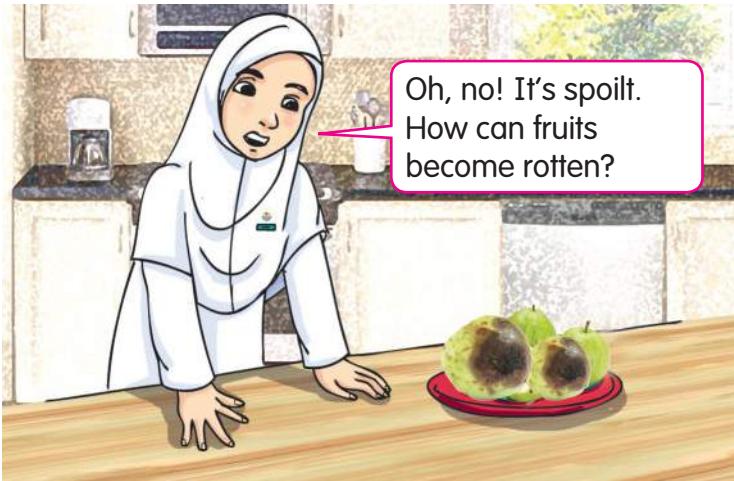
Which of the following microorganisms makes its own food through photosynthesis?

- Fungi
- Protozoa
- Algae



# Growth of Microbes

Dina found fungi growing on the guavas she bought a week ago.



Fruits become rotten because of the actions of microorganisms.

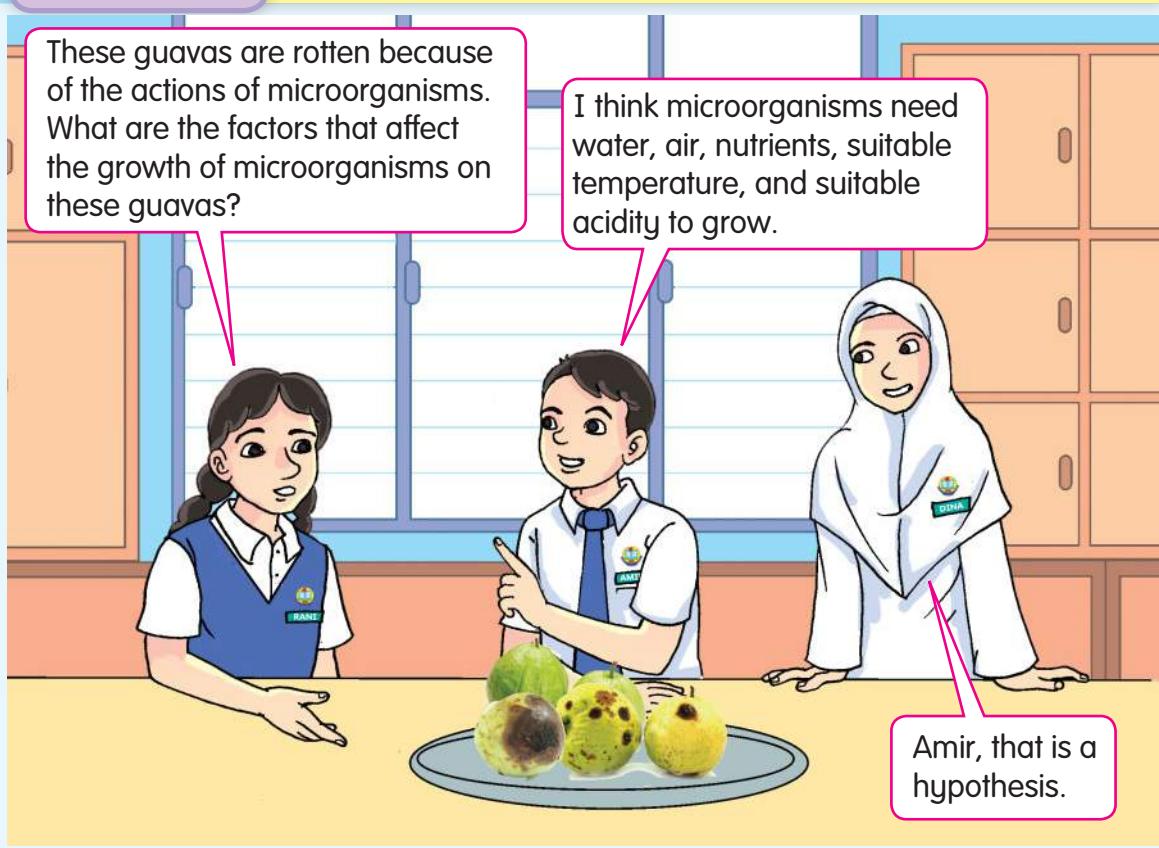
Let's conduct an experiment to investigate the factors which cause guavas to rot.



## Experiment Factors that Affect the Growth of Microorganisms

These guavas are rotten because of the actions of microorganisms. What are the factors that affect the growth of microorganisms on these guavas?

I think microorganisms need water, air, nutrients, suitable temperature, and suitable acidity to grow.



Amir, that is a hypothesis.

Let us plan an experiment to test the hypothesis. We can determine the factors by using different situations as shown in this table.

We set the size of the pieces of guava as the constant variable.



Let us conduct the experiment. Make observations after a week to test the hypothesis and record them.

Record your observations in a table as shown below.

Plastic bag	Observations on the piece of guava after one week
A	
AI	
B	

Write a report on your experiment.

The following questions can help you make a conclusion.

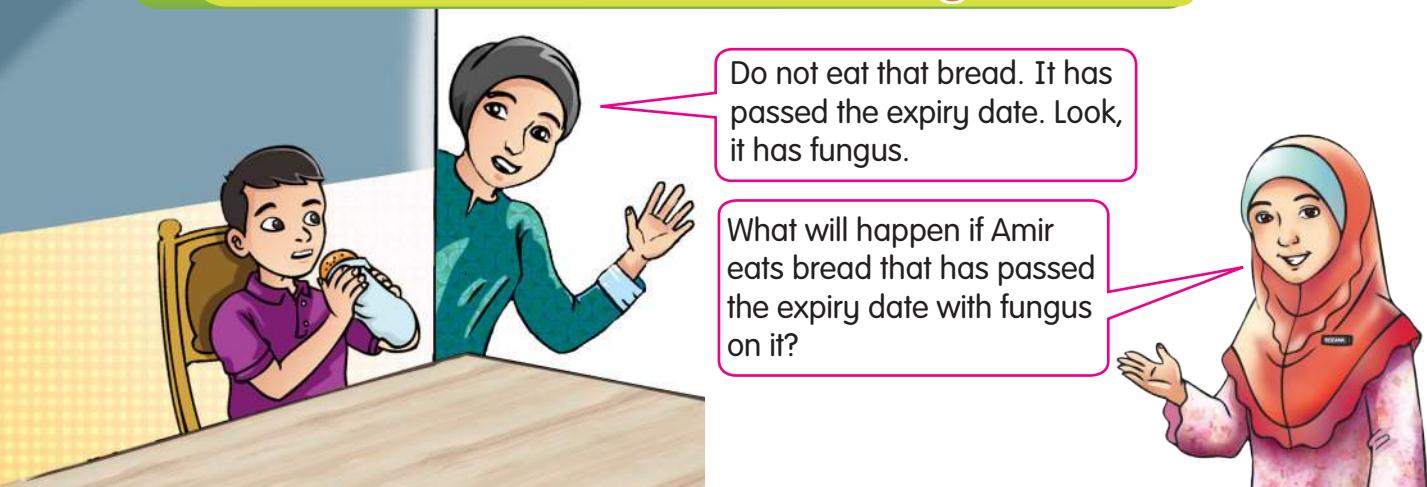
### Questions

- State the factors that cause fungi to grow on guavas.
- What are the methods that can be used to prevent guavas from getting rotten?

### Conclusion

What is the conclusion?

# Harmful Effects of Microorganisms



Besides spoiling the food, some microorganisms have harmful effects on humans.



conjunctivitis



tuberculosis



tinea



malaria



Microorganisms cause contagious diseases including conjunctivitis, tuberculosis, tinea, and malaria.

Think  
for a Moment



What are the diseases caused by viruses? Why are these diseases difficult to cure?

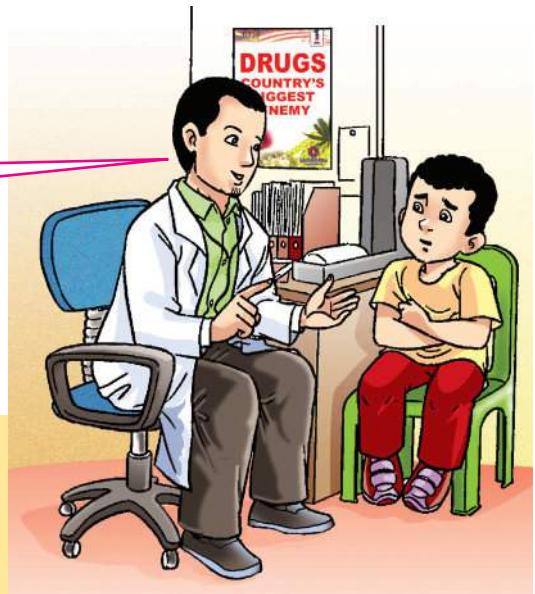
Microorganisms spoil food and cause a change in the texture, shape, smell, and taste.



Bacteria present in the mouth convert sugar and starch from food into acid that causes tooth decay.

Diarrhea, vomiting, and headache are symptoms of food poisoning.

Bacteria such as *Salmonella* found in spoilt food will multiply and produce toxins in the human intestine causing food poisoning.



What are the harmful effects of microorganisms to humans? How do these harmful effects happen?

Think for a Moment

How can we avoid the harmful effects of microorganisms?

# Uses of Microorganisms

Microorganisms such as fungi, protozoa, algae, and bacteria provide benefits to other living things.

How do microorganisms provide benefits to other living things?



## Food manufacturing



cheese



yoghurt



tempeh



tapai



bread

Bacteria are used in making cheese and yoghurt.

Yeast is used in making bread, tempeh, and *tapai*.

## Production of antibiotics and vaccines



antibiotics



vaccines

The consumption of antibiotics and vaccines strengthen the immune system. Antibiotics and vaccines are used to prevent the growth of disease-causing microorganisms.

#TEACHER

The human body has a natural defence system known as the immune system. This system allows the human body to fight against microorganisms that enter the body and prevents the body from being easily infected by diseases.

## Decomposition of organic materials



Microorganisms will decompose chicken, cow or goat faeces. When these materials are mixed with sawdust, they would decay and form organic fertilisers.



Bacteria are used to treat sewage and destroy toxic wastes found in sewage treatment plants.

Aside from the harmful effects, there are microorganisms that provide benefits to other living things. These beneficial microorganisms are used in food manufacturing, production of antibiotics and vaccines, decomposition and decay of organic materials, making fertilisers, and sewage treatment for the well-being of humans.

Explain the importance of microorganisms in your daily life.



Predict what happens if dead living things do not decay.



*Lactobacillus* is a good bacterium used in making yoghurt. *Lactobacillus* also lives in the human intestine to break down carbohydrates so that food is easily digested and to prevent diarrhea.





## Let's Test

# Fresh Yoghurt

I can sell this yoghurt during Canteen Day.



## Aim

To make yoghurt using microorganisms.

## Apparatus and Materials

Pots, glass jar, small towel, 200 ml of fresh milk, water, bowl, and 20 g of cultured yoghurt

## Steps



Boil the glass jar and spoon for 5 minutes.



Heat the fresh milk for 5 minutes using a small flame.



Pour the milk into the glass jar and place it in a bowl of water until the milk is lukewarm.



Put in the cultured yoghurt and stir slowly until it is fully dissolved.



Put the lid on the glass jar and wrap the glass jar using a small towel to maintain the temperature. Leave it for 6 to 8 hours.



- 6 When the yoghurt thickens, put it in the refrigerator.
- 7 Serve the yoghurt with fruits, cereals or nuts.
- 8 Report the results of your activities to the class and share the results of this investigation in your blog.

## Questions

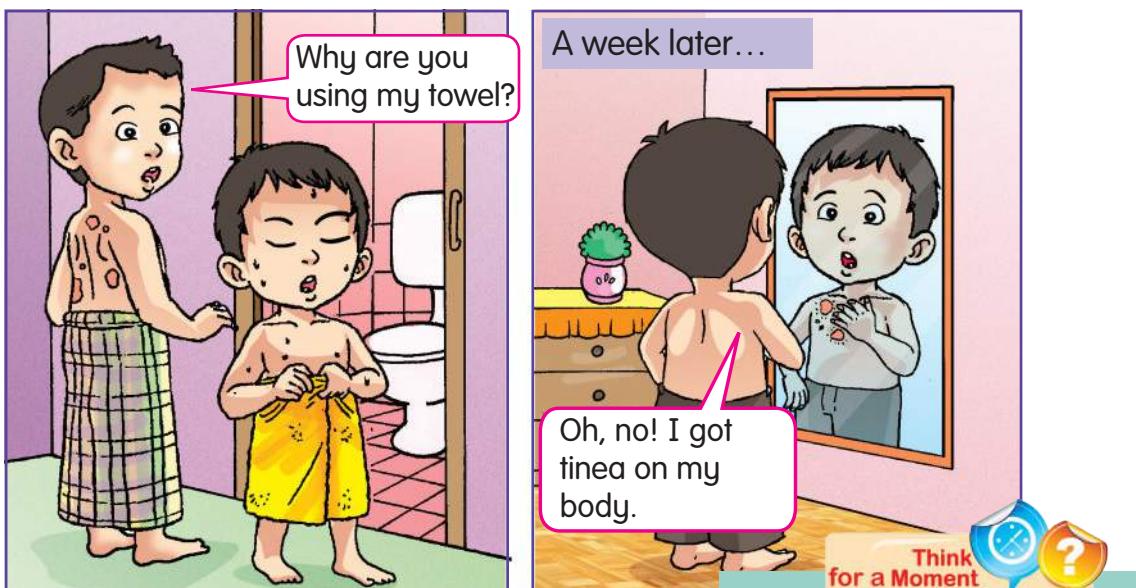
1. How do microorganisms convert milk into yoghurt?
2. Why were the glass jar and spoon boiled for 5 minutes?
3. Describe the use of microorganisms in making yoghurt.

## Live Healthily, Live Well

Healthy daily routines can protect us from contagious diseases caused by the spread of microorganisms. Hence, we need to know the steps to prevent contagious diseases.

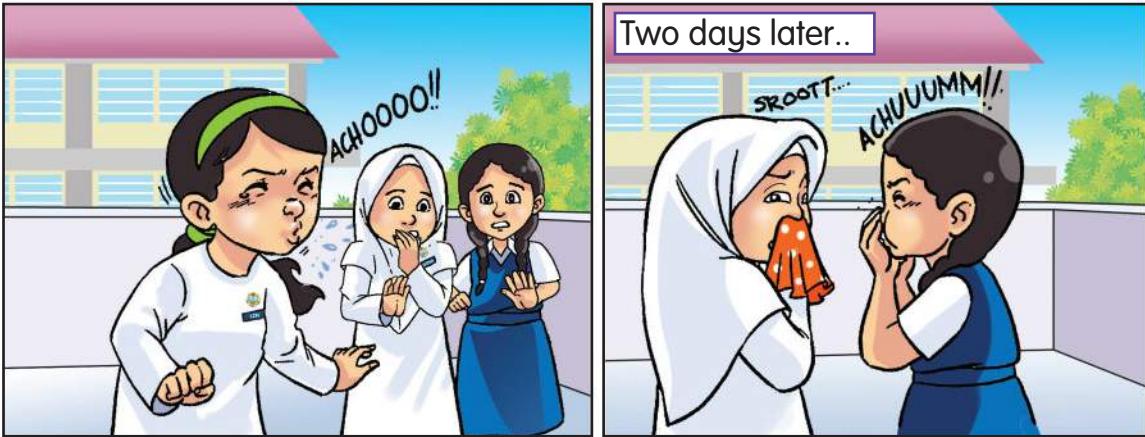


What does Shafiq need to do to avoid having a stomach ache?



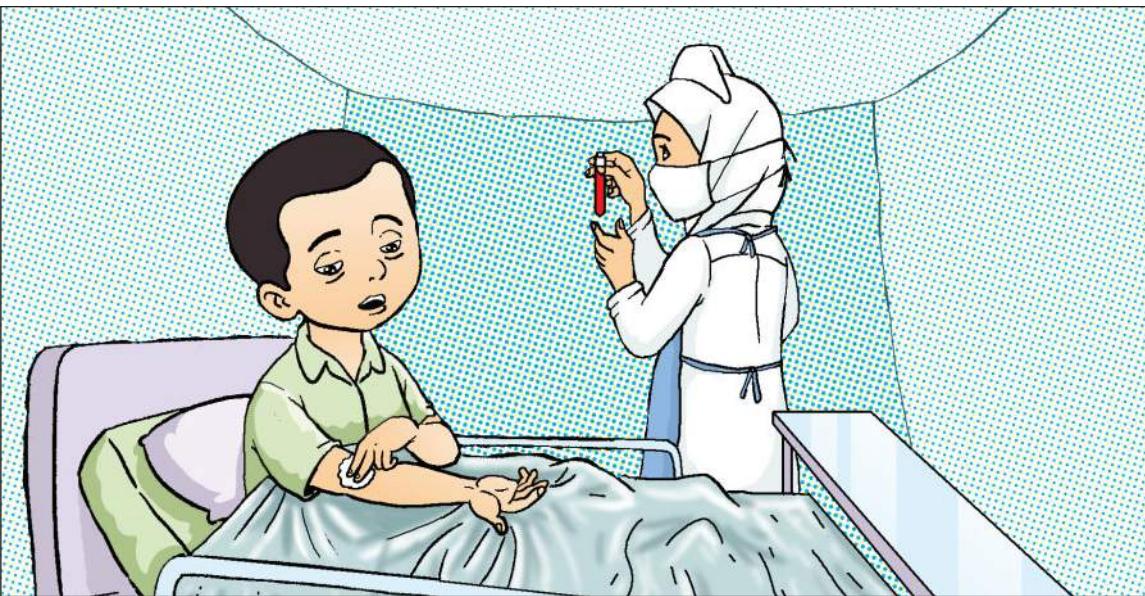
Why can't we share towels with other people?  
What steps need to be taken to prevent us from being infected with tinea?

What are other personal items that we cannot share with other people?



What will happen to Dina and Rani? Why?

Why do we need to cover our mouth when sneezing or coughing?



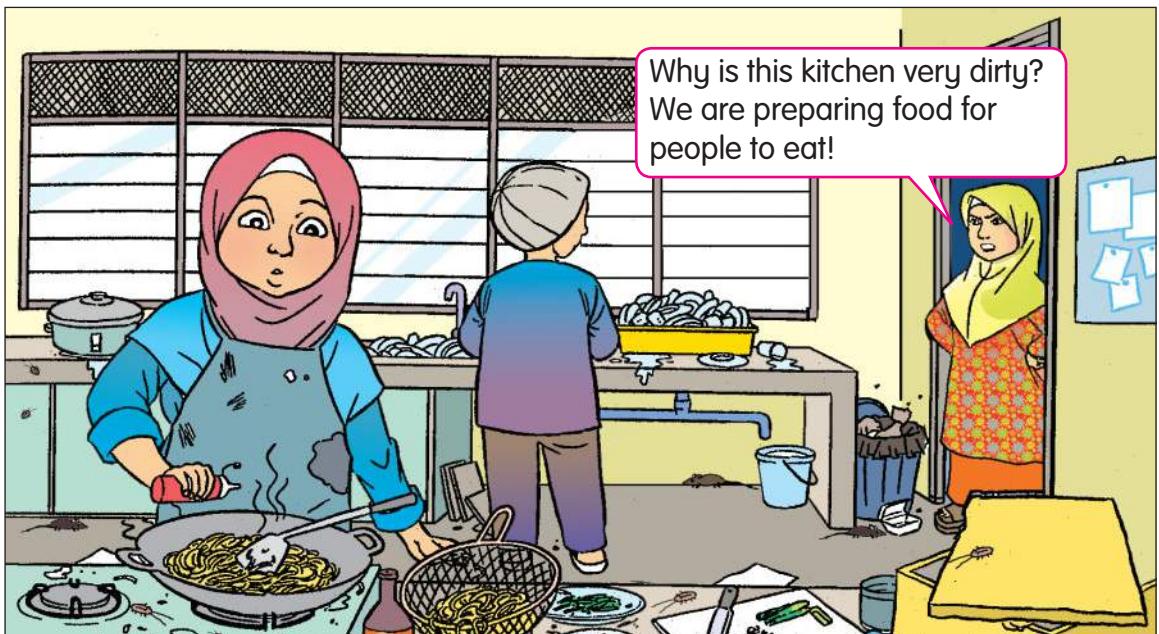
How can being quarantined control the spread of contagious diseases?



What is the disease transmitted by the *Aedes* mosquito? How can we prevent ourselves from the disease carried by this mosquito?



Sweat on the body does not smell. Bacteria on the body break down sweat causing body odour.



How can unhygienic food preparation causes us to be infected by contagious diseases?



Why do we need to boil the water?



### TASK

1. Surf the Internet to gather information on the causes, symptoms, and steps to prevent contagious diseases.
2. Use the MS PowerPoint or other suitable software to make a report creatively and innovatively from the information gathered.
3. Share your report in your blog.

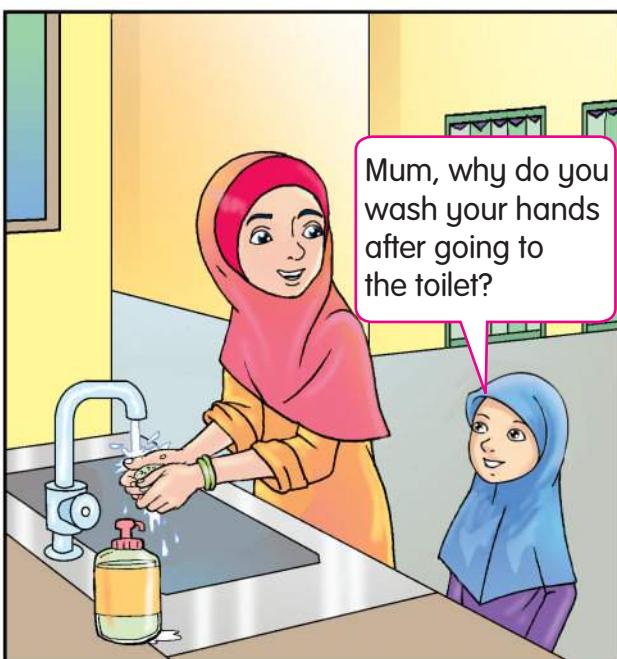
# Healthy Daily Routines

How do you practise a routine to prevent contagious diseases?

Help your friend practise a healthy daily routine to prevent contagious diseases.



What are other daily routines that can be practised to ensure good health and prevent infection of diseases? Let us observe the situations below.

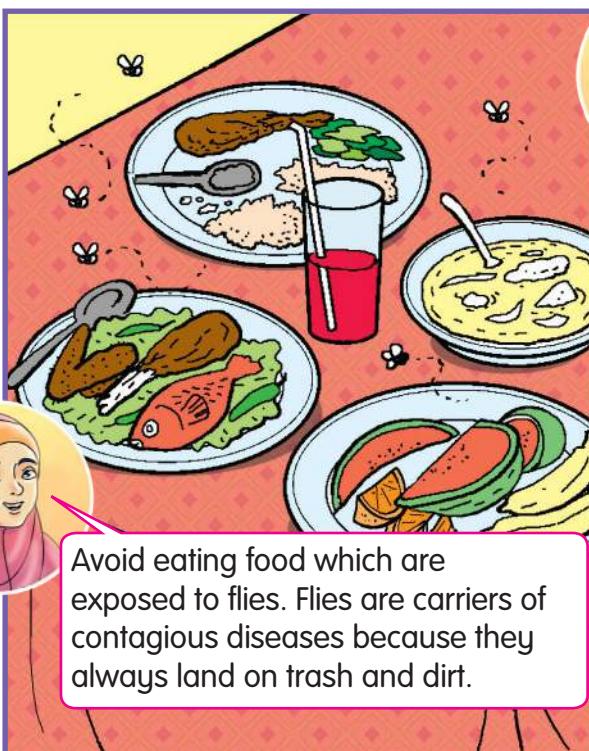


Mum, why do you wash your hands after going to the toilet?

Germs spread easily in dirty places. We must wash our hands to keep them clean and prevent ourselves from infectious diseases.



What are other important daily routines that we need to practise?



Avoid eating food which are exposed to flies. Flies are carriers of contagious diseases because they always land on trash and dirt.



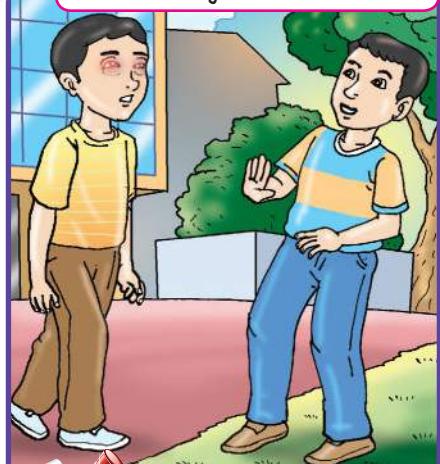
We must cover the food. Do not leave them exposed.



Showering using soap or an antiseptic soap cleans the body and gets rid of germs. These germs can cause itchiness and skin diseases.



Try not to be in close contact with friends who are infected with contagious diseases such as conjunctivitis.



Hands can also be cleaned using sanitisers which are often placed in hospitals and clinics.



All of these routines must be practised in our daily life. These daily routines keep us healthy and prevent us from contracting contagious diseases.



### TASK

1. Do this activity in small groups.
2. Collect information from the Internet, books, and other sources on practices which can protect us from contagious diseases.
3. Present the findings using MS PowerPoint in front of the class.
4. Email it to your teacher and classmates.



## Let's Remember

# MICROORGANISMS

### TYPES



fungi



protozoa



algae



bacteria



virus

**Carry out life processes**

grow

move

breathe

### Used in



food manufacturing



production of antibiotics and vaccines



decomposition of organic materials



production of organic fertilisers

### Causes



contagious diseases



tooth decay



food spoilage



food poisoning

### Steps to prevent contagious diseases

- Wash hands before eating
- Do not share personal items with other people
- Quarantine patients with contagious diseases
- Prepare hygienic food
- Boil water for drinking

### Daily routines to prevent contracting contagious diseases

- Wash hands
- Avoid food which is exposed to flies
- Cover food
- Use soap or antiseptic soap when having a shower
- Cover nose and mouth
- Try to stay away from patients who are infected with contagious diseases

Answer all of the following questions in the Science exercise book.

1. Which of the following fungi are best seen using a microscope?

- |               |              |
|---------------|--------------|
| I. Fungus     | II. Mucor    |
| III. Yeast    | IV. Mushroom |
| A. I and II   | B. I and III |
| C. II and III | D. II and IV |

2. Choose the correct answers.

Look at the picture. Which of the following statements are true about the black spots on the bread?



- The black spots grow.
- The black spots spoil the food.
- The black spots produce their own food.
- The black spots can also be found on plants.

3. Which microorganisms are used in the production of food?

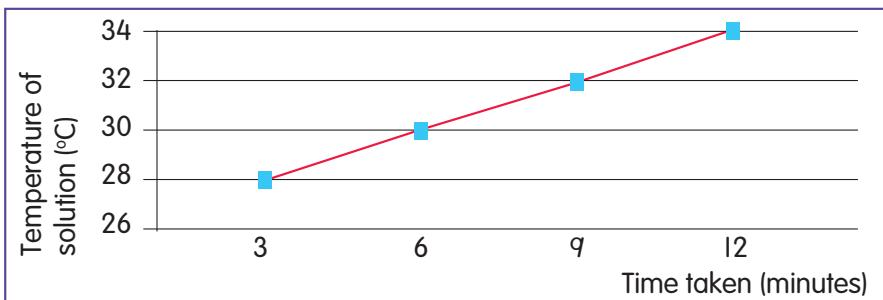
- |               |              |               |                        |
|---------------|--------------|---------------|------------------------|
| I. Yeast      | II. Virus    | III. Bacteria | IV. <i>Penicillium</i> |
| A. I and II   | B. I and III |               |                        |
| C. II and III | D. II and IV |               |                        |

4. Rani found that a bread mixed with yeast rises. After the mixture was baked, she found air holes in the bread. Why did this situation happen?

5. Lim is infected with conjunctivitis. What should he do?

6. Lim, Dina, and Amir ate food bought at a nearby stall on their way home from school. That night, Lim and Dina had food poisoning and were rushed to the hospital. Amir, however, did not experience food poisoning like his friends. Why?

7. The graph below is a temperature reading of yeast and sugar solution from an investigation by Amir, Lim, and Dina to show that yeast breathes and releases gas.



- a) What observations can be made on the temperature readings of yeast and sugar solution in this investigation?
  - b) Based on the observations in (a), provide a suitable inference.
  - c) What is the relationship between the two variables in this investigation?
8. Tuberculosis is a disease caused by bacterial infection. Symptoms of tuberculosis include persistent cough for more than two weeks, phlegm with blood, fever and sweating in the afternoon and evening, fatigue, weight loss, and loss of appetite.
- Data collected by the Ministry of Health Malaysia for four years are as follows:

Year	2008	2009	2010	2011
Number of cases (people)	17 506	18 102	19 337	14 791

- a) What is the cause of tuberculosis?
- b) In which year the number of cases recorded is the highest?
- c) How can we prevent ourselves from getting infected with this contagious disease?
- d) What is the trend in the number of tuberculosis cases for the past four consecutive years?
- e) Transfer the data on the number of tuberculosis cases for the four consecutive years in the form of a bar chart.



## Let's Try

# Hunting for Bacteria

### Aim

To identify places with a lot of bacteria.

### Apparatus and Materials

5 petri dishes with lids, ziplock bags, cotton buds, marker pen, disposable gloves, 100 ml of hot water, and 100 g of powdered jelly

### Steps

1. Mix the powdered jelly with hot water. Stir until the powder dissolves.
2. Pour the liquid jelly into the five petri dishes, cover, and let them cool.
3. Wear gloves and swipe the cotton buds in four different locations. Examples of the locations are drain, wall, pots, trees, and others. Put the cotton buds in the ziplock bags and label them.
4. Swipe each cotton bud onto the surface of the jelly in the petri dishes.
5. Cover the petri dishes, label, and store at room temperature.
6. Leave one petri dish without any smear. This petri dish is the control in this experiment.
7. Record your observations every day for one week.
8. Report your observations to the class.



### #TIP

Soak the petri dishes in hot water for 5 minutes to kill microorganisms.



Wash your hands thoroughly after conducting the activity.

### Question

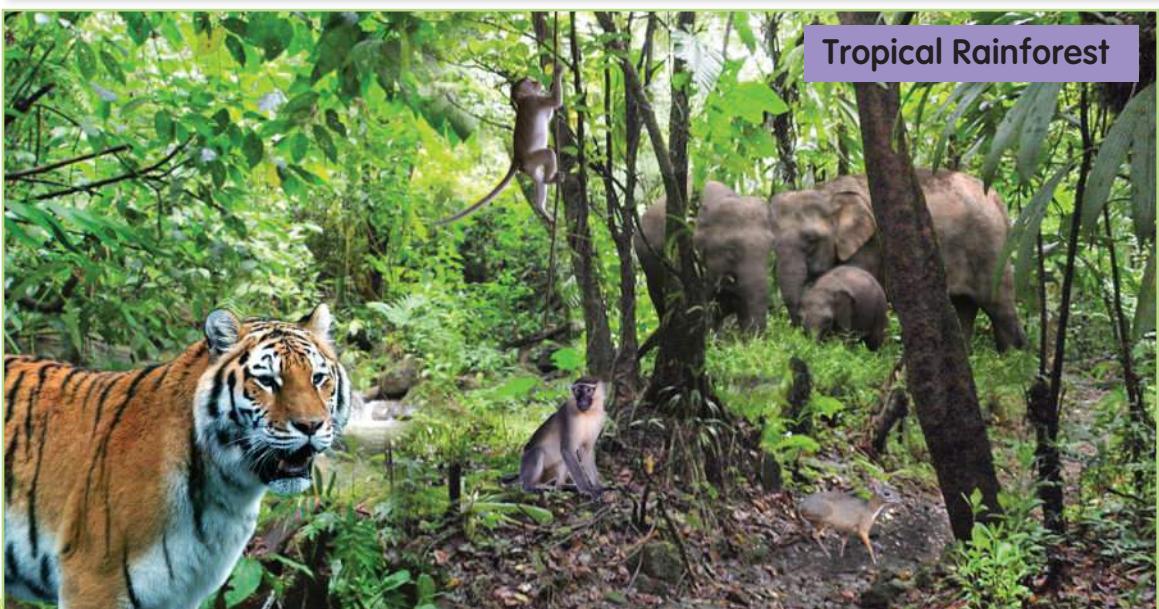
Which jelly contains the biggest growth of microorganisms? Why?



### #TEACHER

- Teacher may prepare the jelly before the activity.
- Teacher may also use other suitable glass or plastic containers with covers.

# INTERACTIONS AMONG LIVING THINGS



Animals and plants living in the same habitat interact with each other. Observe the living things found in each of the habitat shown above. What is the relationship among living things in both of these habitats?

# Interactions Among Animals

In a habitat, usually there are many animals of the same or different species. These animals will interact with each other to meet their basic needs for survival.

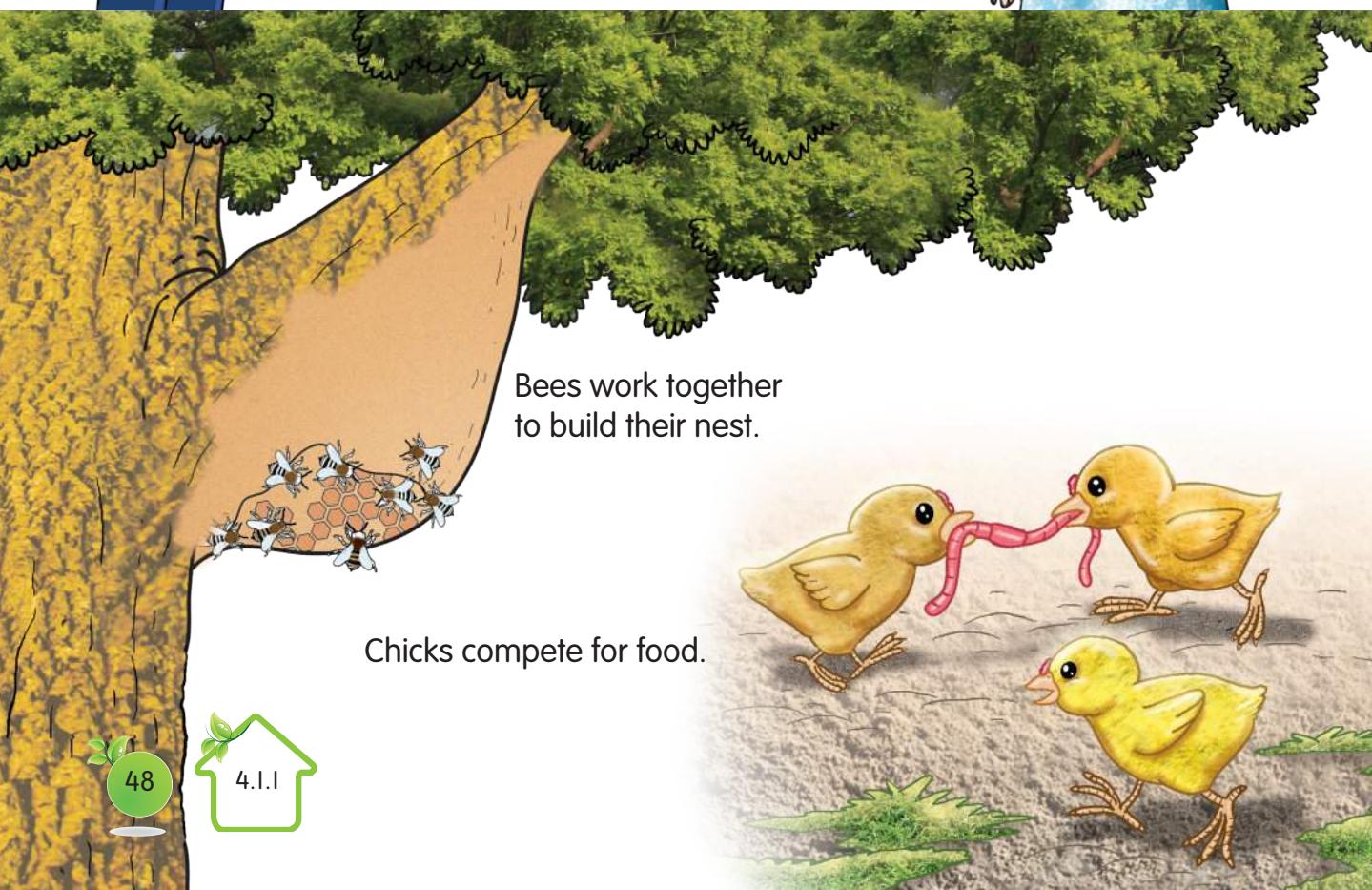


What is the meaning of interaction?

**Interaction** is an active relationship among living things that are dependent upon each other. The interaction between the same species is known as intraspecies interaction while the interaction between different species is known as interspecies interaction.



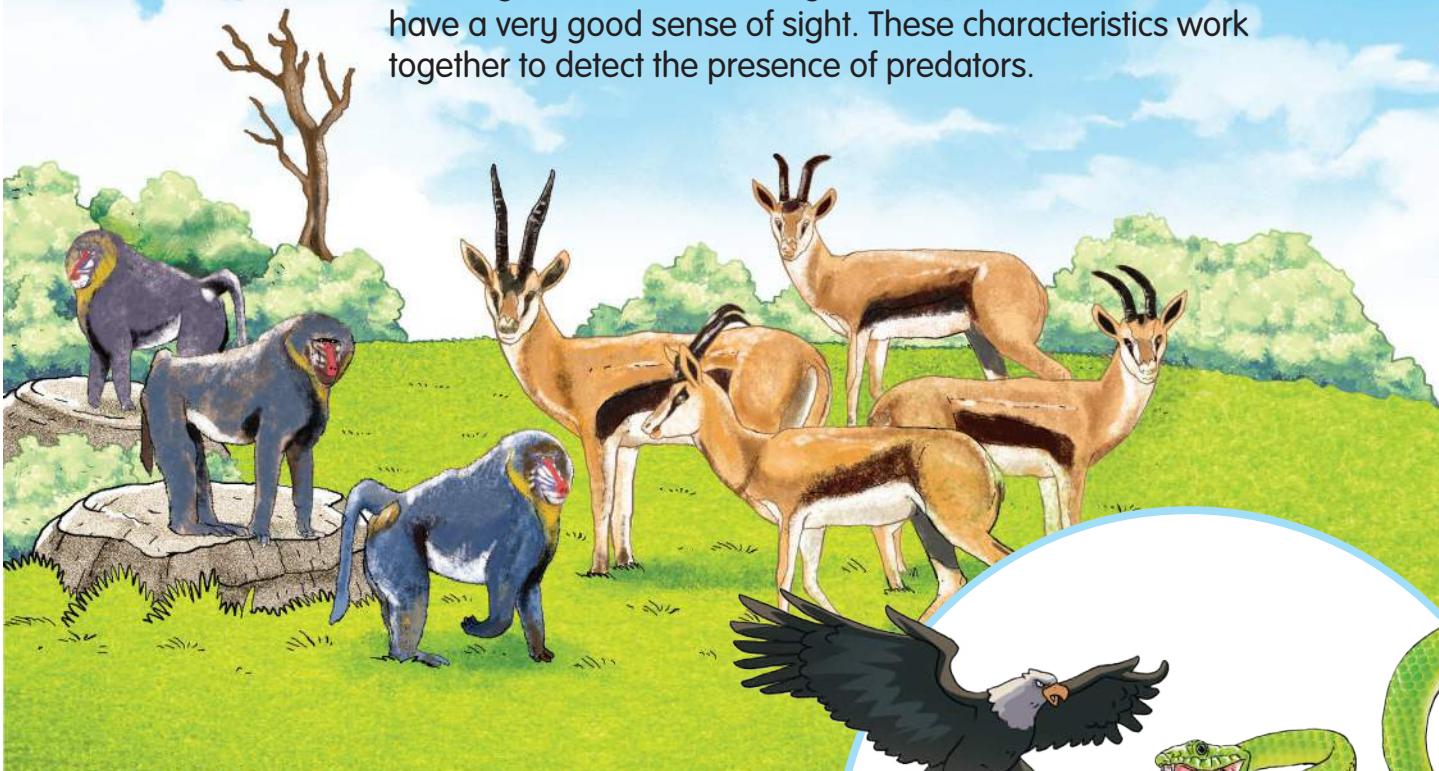
Intraspecies and interspecies interactions may occur either in the form of **cooperation** or **competition**.



Bees work together to build their nest.

Chicks compete for food.

Antelopes and baboons live in the same habitat. Antelopes have a good sense of hearing and smell. Baboons, however, have a very good sense of sight. These characteristics work together to detect the presence of predators.



On the other hand, eagles and snakes compete for limited food.



Look at the picture. What interaction is occurring? Give another example of an intraspecies and interspecies interactions between animals.



# Animals Living in Groups

Some animals live together among their own species. These animals live in groups and search for food together in the same habitat.



Bees live in groups  
and stay in the same hive.

Termites live in a large colony.



A mustering of storks  
look for food.





A flight of swallows fly to the nests.



Fish swim in groups.



Goats live and move in groups.

Read the poem below.

Many animals live in groups,  
Small groups and large groups,  
Living together, looking for food,  
So that life is easy and good.

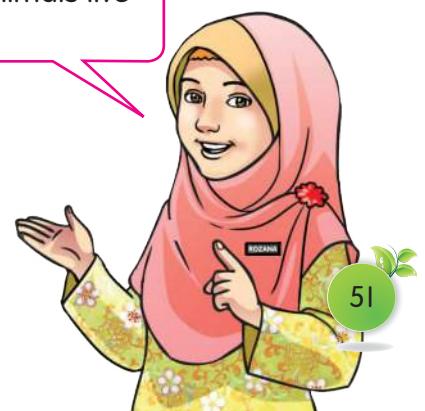
Lions live in small groups.



Deers live in large groups.



What other animals live in groups?



# Animals Living in Solitary

Animals that live in solitary are animals that live without other members of their species. These animals do everything alone. Animals that live in solitary have enough space to rest and look for food in their habitats.





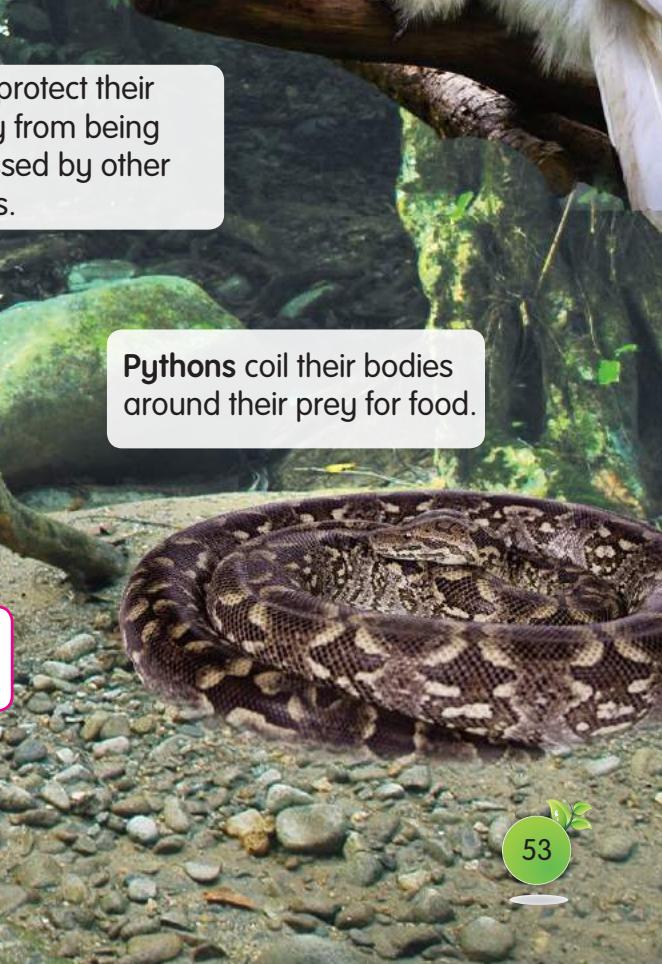
Spiders trap their prey in their web as food.



Hornbills are herbivores that eat fruits.



Tigers protect their territory from being trespassed by other animals.



Pythons coil their bodies around their prey for food.

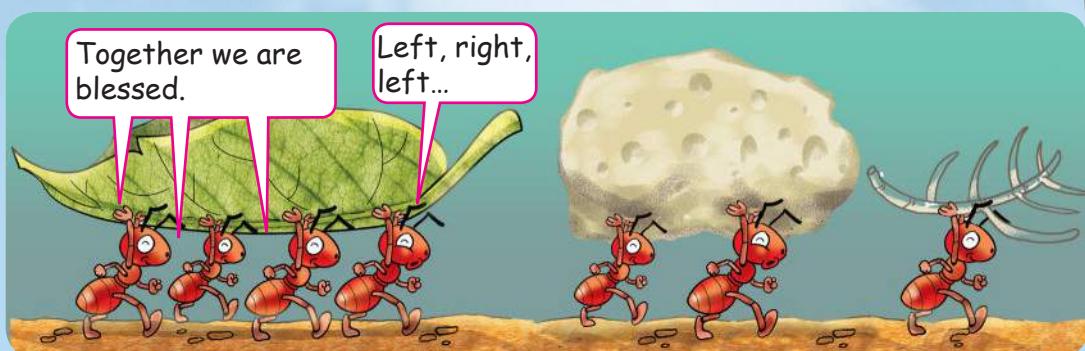


What other animals live in solitary?

# Advantages and Disadvantages of Animals Living in Groups

Why do some animals live in groups?

## Work together to build nests and find food



Ants work together to build nests and find food.



A pack of wolves find food by hunting their prey in groups. Why do wolves need to hunt in groups?



A school of piranhas can attack and eat their victims to the bones in less than one minute.





Hunting in groups allows hyenas to defeat larger prey.

## ● Ensure safety of group members

Animals that live in groups are able to **ensure the safety** of their species from being attacked by predators.

Anchovies swim in large groups to confuse their predators.



Zebras live in groups to camouflage themselves from predators.



Lions are colour-blind. This condition does not allow them to differentiate between stripes on a zebra and tall grasses.



Animals that live in groups usually consist of a parent and their young. These animals **protect** their young.



When a group of lions hunt, the lioness in the same group will take care of their young.

Animals that live in groups will control their territory from being invaded by other animals.

Lions will protect their territory and water resources within their territory from other animal groups. Lions will mark their territory by urinating at certain places in the territory.



I look after all the female sea lions.

Male sea lions will control their territory to get a group of female sea lions for mating purposes.



Animals that live in groups will work together to **build nests, find food, maintain safety, protect their young, and control their territory**. How do these animals work together to achieve these advantages?



What will happen if one of the animals living in groups is too dominant in the group?

Animals that live in groups also have a number of disadvantages.

What is the effect on the species of animals that live in groups if this situation is not controlled?

The outbreak of a disease caused by virus transmitted through air can easily spread to other animals living in groups.



Is this the bird flu outbreak?



How can this situation have an effect on the species of animals that live in groups?

Animals that live in groups are easily detected by predators. Thus, weak animals in the groups will find it difficult to escape from the predators.

Animals that live in groups are easily infected by an outbreak of diseases and are easily detected by predators. Weak animals in a group will find it difficult to save themselves from predators.

# Advantages and Disadvantages of Animals Living in Solitary



Owls live alone to avoid competition with each other or with other animals when hunting for food. Owls hunt actively at night.

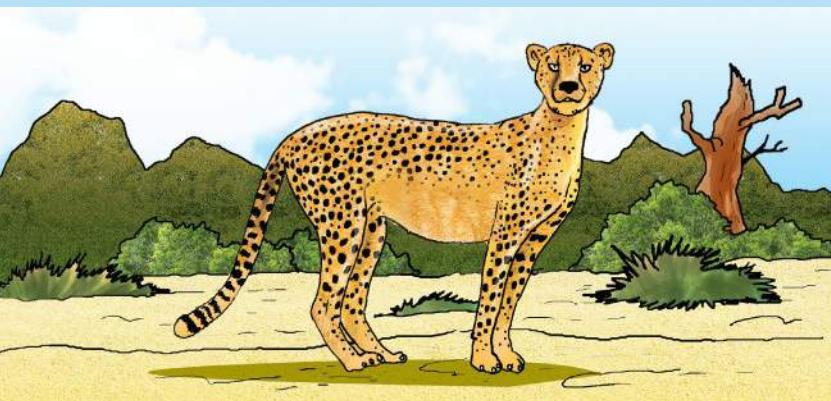
Why do some animals live in solitary?



To fulfill the need for food, I have to eat a lot of bamboo shoots and leaves.



Limited food resources cause pandas to live in solitary to avoid competition for food.



Leopards require a large area to find food or mates. They will attack other animals invading their territory.

Animals that live in solitary can overcome the problem of limited food resources and reduce the competition in finding mates.

Animals that live in solitary will also face problems.



Animals that live in solitary will have difficulty finding a partner during mating season.

I have walked so far. I still haven't met my partner yet.



Animals that live in solitary find it difficult to defend themselves from enemies and have difficulty finding partners during mating season. What are other weaknesses of animals that live in solitary?



How do these animals live? What are the advantages of the ways these animals live?





## Let's Test

# Animals Mini Album

### Aim

To identify animals that live in groups and animals that live in solitary.

### Apparatus and Materials

Scissors, drawing paper, coloured papers, old magazines, old newspapers, computer, Internet, ribbon, and glue

### Steps

1. Carry out this activity in groups.
2. Choose an animal habitat.
3. Find pictures of animals in the habitat of your choice from a variety of sources such as old magazines, newspapers or the Internet.
4. Discuss in your group about:
  - a) Habitat that you have chosen.
  - b) Ways the animals live.
  - c) Advantages and disadvantages of animals living in groups and in solitary.
5. Make a mini album based on your creativity.
6. Present your mini album to the class.
7. Display your mini album at the display corner of your class.

### Example of a mini album:

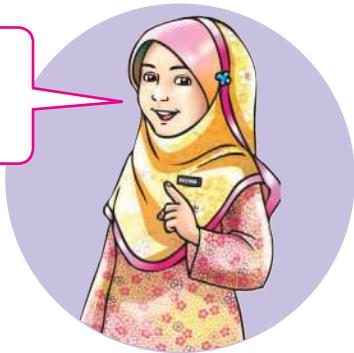


Which of the following animals live in groups?

- Zebra
- Eagle
- Scavenger birds
- Leopard

## Factors of Competition Among Intraspecies and Interspecies Animals

How does intraspecies competition between animals occur?



Barnacles compete for the **area** on the surface of damp rocks.



Vultures are scavengers that compete for food.



Two squirrels are competing for limited **shelter**.

The deers are competing for limited **water** resources in their habitat.



The male peacock opens up its beautiful and attractive feathers to attract the female peacock. Male peacocks compete to get **partners** to mate.

Intraspecies competition among animals occurs when the basic needs of animals: **food, water, shelter or territory, and mates** are limited.

Think  
for a Moment

What would happen to the animals when they are defeated in a competition?

How can interspecies competition between animals occur?

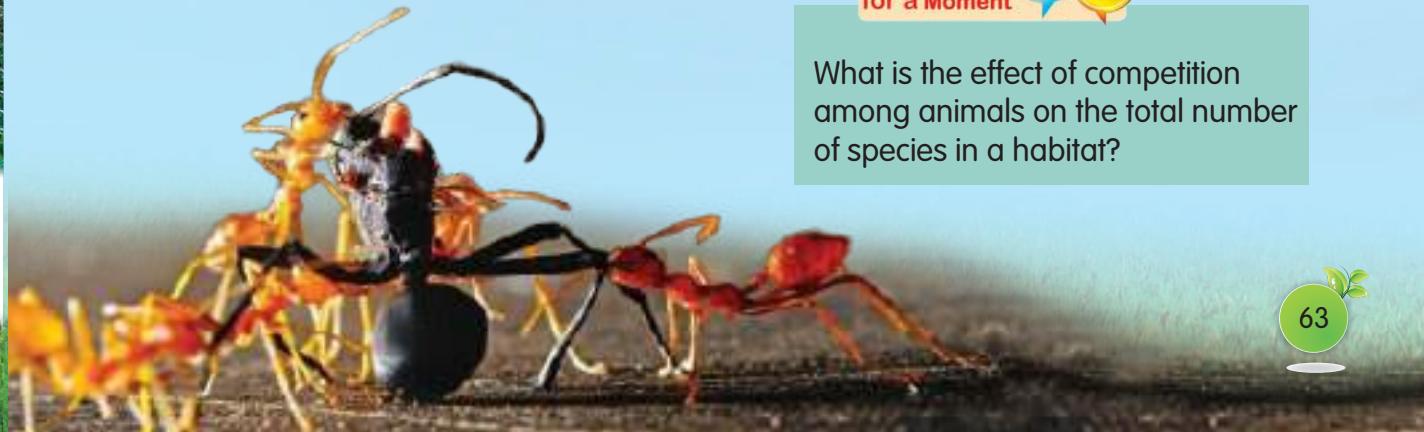


A group of zebras and giraffes are drinking from a limited source of **water**.



Lions and hyenas compete for limited **food**.

Ants from different species and colonies compete to defend their **territory**.



Interspecies competition among animals occurs when the basic needs: **food**, **water**, and **shelter** or **territory** are limited. Animals will compete to get the basic needs to stay alive.



What is the effect of competition among animals on the total number of species in a habitat?

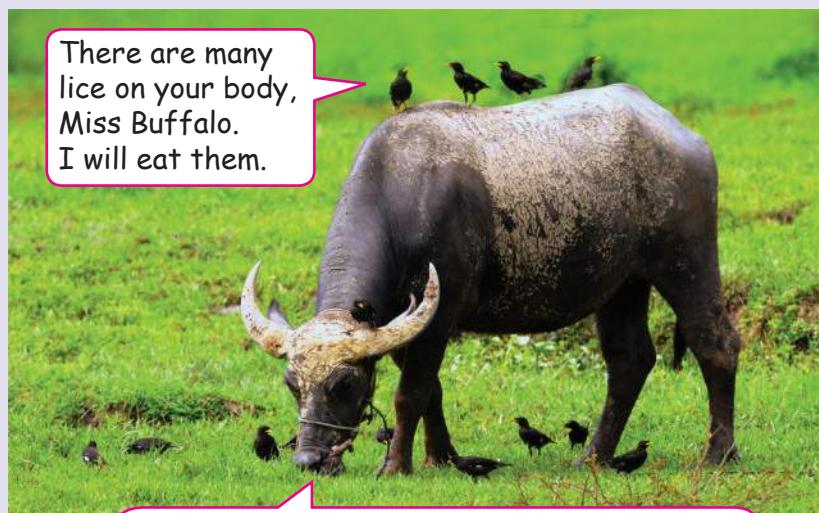
# Symbiosis Among Animals

The situations below show several types of interaction between different animals living in a habitat. **Symbiosis** is the relationship between two or more animals that live closely together. It can occur in three situations namely mutualism, commensalism, and parasitism.

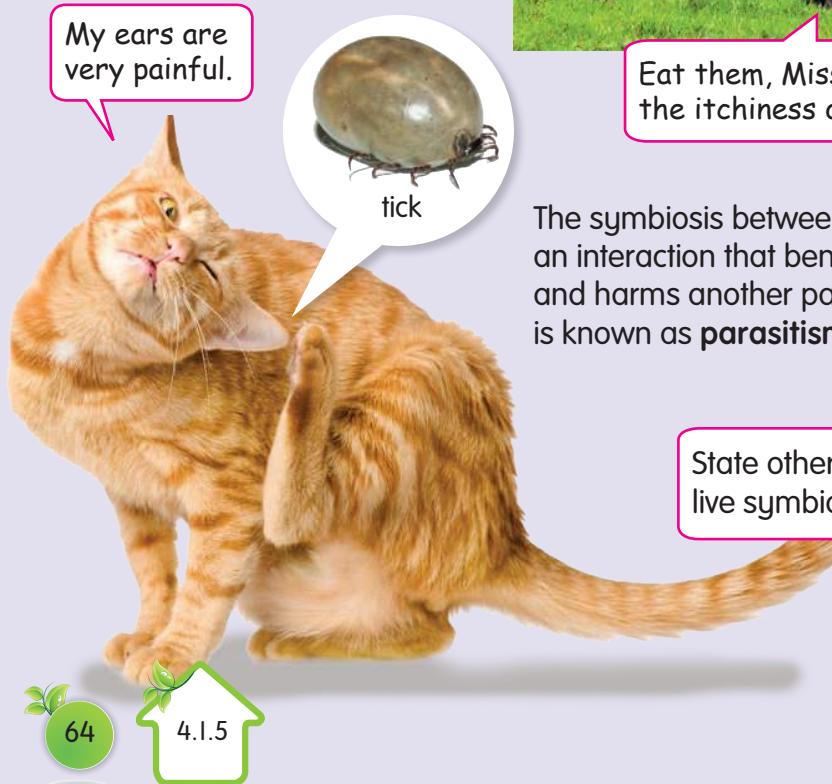
How does the symbiosis between animals affect other animals?



The symbiosis between buffaloes and tickbirds is an interaction that brings benefits to both the animals. This interaction is called **mutualism**. What are the benefits obtained by the buffalo and tickbirds from the interaction?



Eat them, Miss Bird. Thank you for reducing the itchiness on my back.



The symbiosis between cats and ticks is an interaction that benefits only one party and harms another party. This symbiosis is known as **parasitism**.

State other animals that live symbiotically.



The symbiosis between sharks and remora fish is an interaction between two different species of fish. This interaction is only beneficial to one species but the other species does not get any benefit or any bad effect. This symbiosis is known as **commensalism**.



I have a lot of food today. Thank you, Mister Shark.

Eat as much as you can. You don't disturb me at all.

Sea anemones attach themselves on the shell of a hermit crab and provide it with extra protection. When the hermit crab moves, the sea anemones get a free ride. This cooperation is beneficial to both parties. What type of interaction is this?



How are the interactions between animals important to keep the balance in nature?

I'm happy. I don't need to pay for transport and house rent. Food is easily found.

Thank you sea anemone for sticking on this shell. I feel safe.





What are the advantages gained by both animals?



The symbiosis between animals exists in the form of **mutualism**, **commensalism**, and **parasitism**. These interactions are necessary to ensure the survival of a species and its population.

Give examples of other animals that interact through mutualism, commensalism, and parasitism.



### Let's Test

## Animals Interaction Video

#### Aim

To gather information and communicate to describe the interactions among intraspecies and interspecies animals.

#### Apparatus and Materials

Computer and Internet

#### Steps

1. Collect information to describe types of interactions among animals.
2. Download suitable pictures or videos to support the information collected.
3. Prepare a slide presentation about interactions among animals using MS PowerPoint.
4. Present the outcomes of the task and upload them in your blog.

### Questions

1. State the types of interactions among animals.
2. What are the effects on animals if interactions do not happen among the animals in a habitat?

## Factors of Competition Among Plants

In a forest habitat, interactions occur among plants. This interaction occurs to ensure that plants receive their basic needs for survival. Plants that grow in a crowded area will have to compete for water, sunlight, space, and nutrients.

How do plants adapt to get their basic needs?

Plants grow taller to compete for sunlight. The roots on the other hand, grow deeper into the ground to get water.



### HOTS

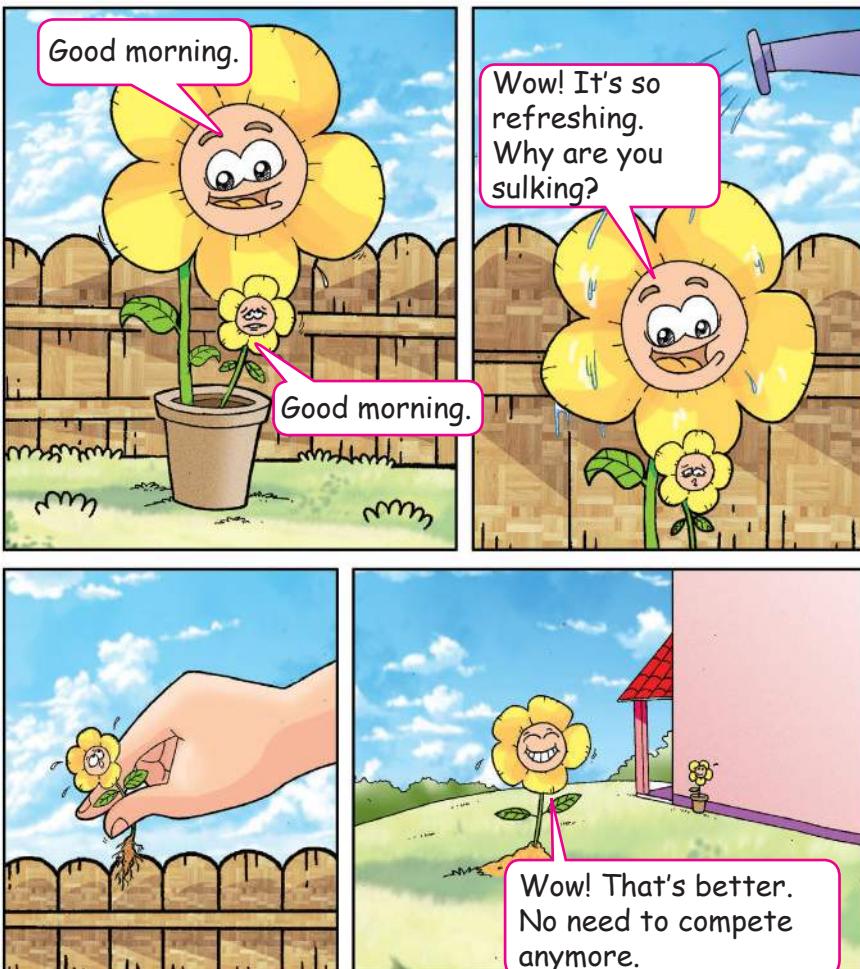
How do the interactions among plants affect other living things?

#### Think for a Moment

Do plants also face interspecies and intraspecies competitions like animals?

How do plants compete for space and nutrients?

Let us look at the situation below.



The plants above compete for nutrients and space causing a difference in the size of the plants in the same pot.



Note the difference between the two pictures. Why is there a difference in the growth of the trees?



tropical rainforest



oil palm plantation

Let us carry out an investigation to determine the factors causing competition among plants.





# Competition Among Plants

## Activity 1

### Aim

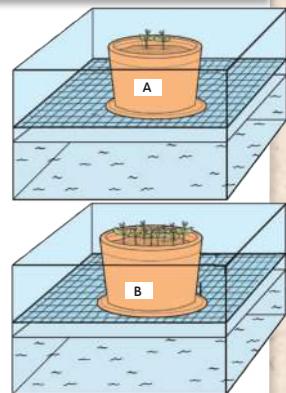
To investigate water as a factor that causes competition among plants.

### Apparatus and Materials

2 pieces of plastic containers, 2 small aquariums, 2 pieces of wire mesh, 2 small pots, garden soil, chilli seeds, and water

### Steps

1. Plant the chilli seeds in the plastic container.
2. Let the seedlings grow for one week.
3. After one week, select chilli seedlings of the same size.
4. Plant two seedlings in Pot A and 10 seedlings in Pot B.
5. Arrange the apparatus and materials as shown.
6. Observe the growth of the chilli roots coming out from the bottom of the chilli pots after two weeks.



### Questions

1. What can you observe about the roots of the chilli seedlings?
2. Provide an inference on the growth of the chilli seedlings' roots.
3. Which factor caused competition between the chilli seedlings?

## Activity 2

### Aim

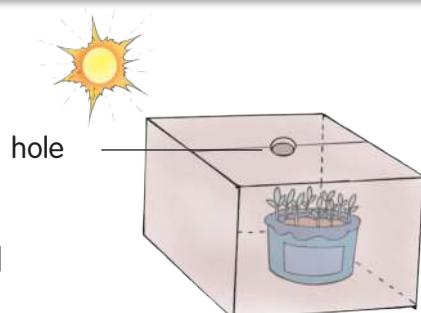
To investigate light as a factor that causes competition among plants.

### Apparatus and Materials

Pot, garden soil, chilli seeds, box, and water

### Steps

1. Plant 10 chilli seeds in a pot filled with garden soil.
2. Let the chilli seedlings grow for a week.
3. Make a small hole on top of the box.
4. Cover the chilli seedlings with the box.
5. Water the chilli seedlings using a tube placed into the hole every day.
6. Observe the chilli seedlings after two weeks.



### Questions

1. What observation can you make on the shoots of the chilli seedlings?
2. Provide an inference on the growth of the chilli seedlings' roots.
3. What can you conclude from this activity?

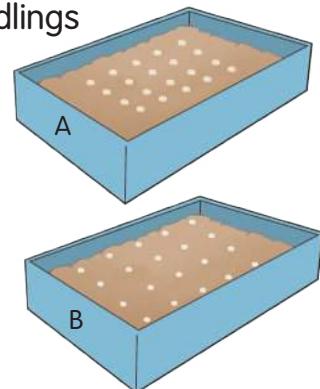
## Activity 3

**Aim** To investigate space as a factor which causes competition among plants.

**Apparatus and Materials** 2 plastic containers, garden soil, chilli seeds, and water

### Steps

1. Plant 20 chilli seeds at a distance of about 5 mm apart in plastic container A filled with garden soil.
2. Plant 20 chilli seeds at a distance of about 5 cm in container B.
3. Pour equal amount of water every day. Let the seedlings grow for 3 weeks.
4. Observe the growth rate of the chilli seedlings.



### Questions

1. What can you observe about the growth rate of the chilli seedlings?
2. Make an inference based on your observations.

## Activity 4

**Aim** To investigate nutrients as a factor that causes competition among plants.

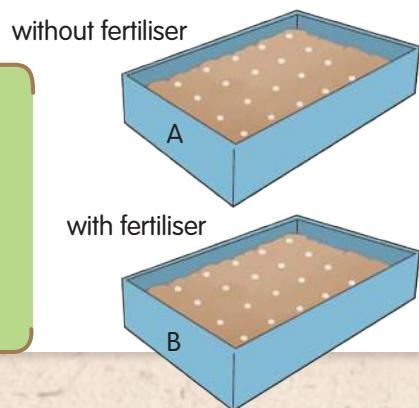
**Apparatus and Materials** 2 plastic containers, garden soil, fertiliser, chilli seeds, and water

### Steps

1. Plant 10 chilli seeds in two containers A and B at a distance of 5 cm.
2. Leave the chilli seeds to grow for one week.
3. Water the chilli seeds every day with the same amount of water.
4. Sprinkle fertilisers evenly around the chilli seedlings in container B.
5. Observe the growth of the chilli seedlings in containers A and B after two weeks.

### Questions

1. What can you observe about the growth of the chilli seedlings?
2. Make an inference based on your observations.
3. What are the factors that caused the difference in growth between the chilli seedlings?



## Types of Interaction Among Plants

Plants modify their growth patterns to get the basic needs. These plants also form an interaction with other plants. This interaction is known as symbiosis. The **symbiosis** between plants is divided into commensalism and parasitism.

What is the type of interaction that happens in plants?



Staghorn ferns attach themselves on oil palm trees which are higher to get the supply of water and sunlight to ensure that they stay alive. This condition is not harmful to the host tree. This interaction is known as **commensalism**.



These wild orchids grow on tree trunks. What type of interaction is this? How does this interaction happen?



How does the interaction between plants have a positive effect on the process of photosynthesis?



What is the interaction between these living things?





The loranthus plant grows on the branches of a mango tree which is the host tree. It gets nutrients and water from the host. In the long term, parts of the host tree will die. The relationship between these plants is called **parasitism**.

Huh...loranthus growing on my branches! My branch will rot.

Interactions among plants occur to ensure that the basic needs: water, sunlight, and nutrients are obtained to stay alive.



### Let's Test

## Plant Interaction Chart

### Aim

To prepare a chart with information on the interactions among plants in a habitat.

### Apparatus and Materials

Computer, Internet, printer, scissors, manila card, glue, and stationery

### Steps

1. Collect examples of interactions between plants in a habitat of your choice from the website.
2. Download and save the related pictures.
3. Print out the pictures.
4. Based on your creativity, design an interesting chart using the pictures you have chosen.
5. Share the results of your work with your friends.

### Question

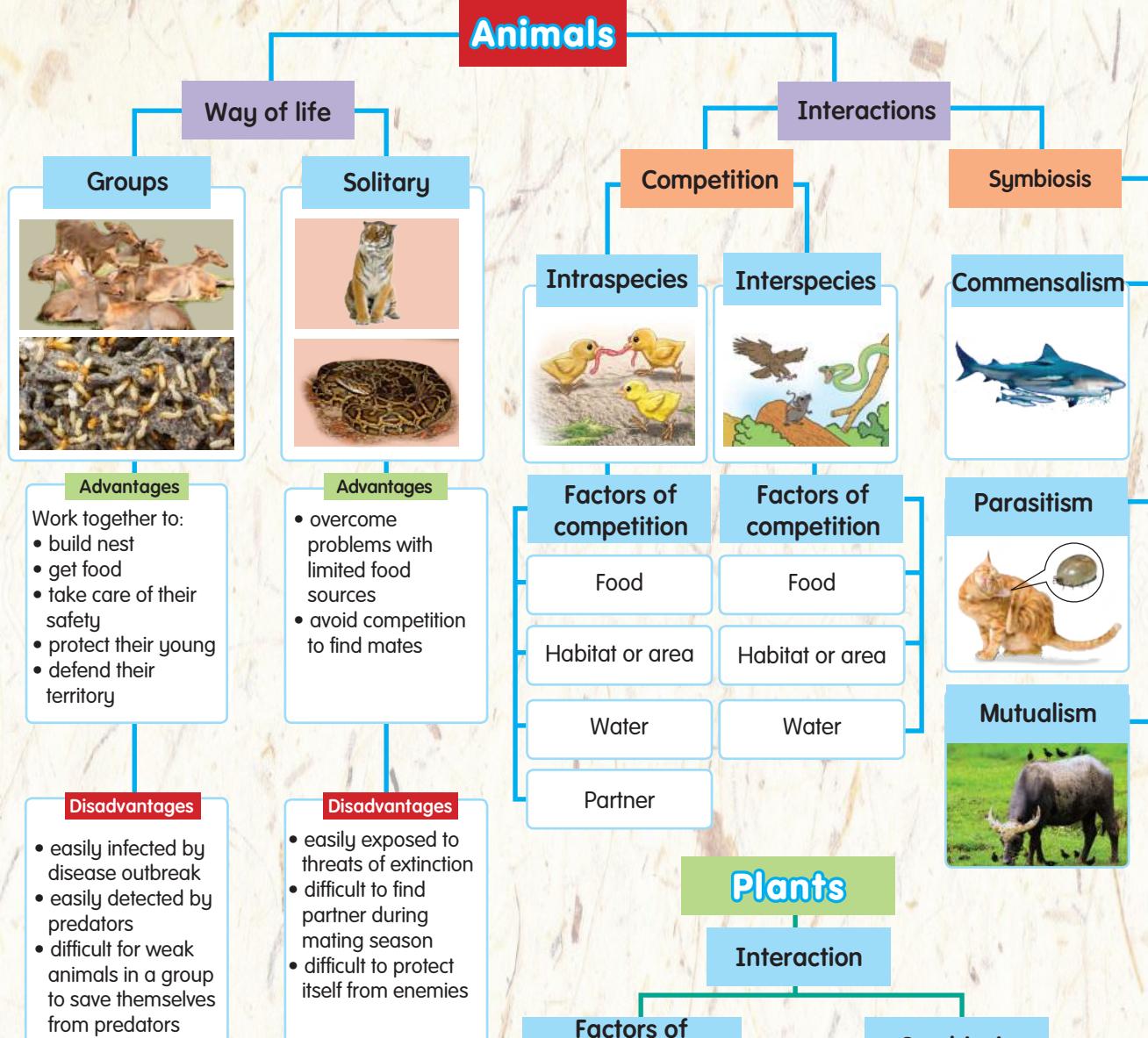
What are the effects of the interactions among plants and other living things in a habitat that you have identified? Explain.



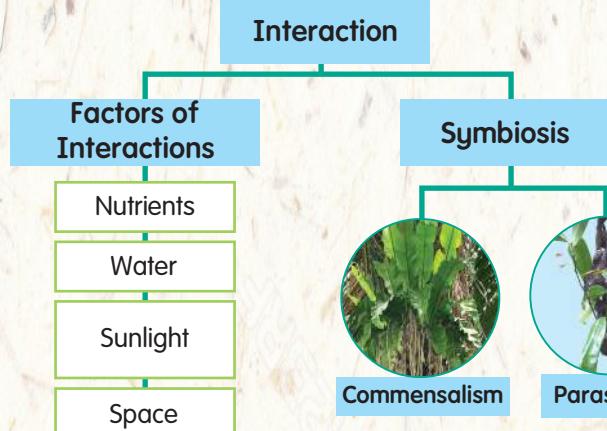
## Let's Remember

# INTERACTIONS AMONG LIVING THINGS

## Animals



## Plants





Answer all of the following questions in the Science exercise books.

- I. Which classification of animals is **true** based on the way they live?

**In groups**

- A. hornbill, squirrel
- B. goat, stork
- C. hyena, lion
- D. zebra, python

**In solitary**

- woodpecker, pangolin
- deer, pangolin
- python, chameleons
- spider, squirrel

2. What is the meaning of competition among animals?

- A. The relationship that occurs among animals to get the same basic needs.
- B. The relationship that occurs among animals to get the limited basic needs.
- C. The relationship that occurs in intraspecies and interspecies in getting the basic needs.
- D. The relationship that occurs in intraspecies and interspecies in getting the limited basic needs.

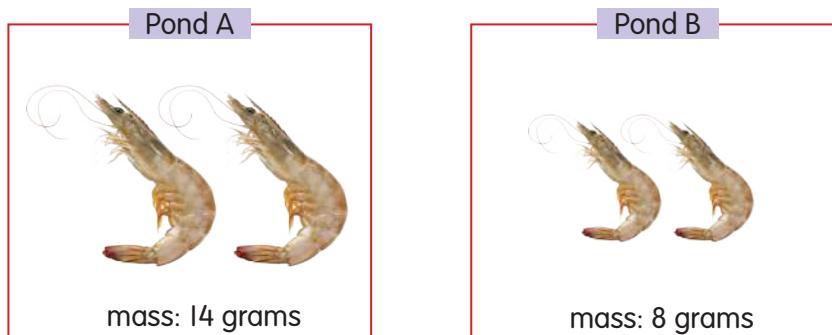
3. Staghorn ferns grow on other trees to survive. However, the host tree still thrives. What is the type of interaction between these plants?



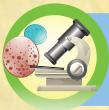
4. Banana plants reproduce via banana pups. This situation causes the parent plant and seedlings to grow close to each other. What are the factors of competition between the banana plants and the seedlings?



5. The following information shows the steps in investigating the factors of competition among plants.
- Arrange the following steps in the correct order.  
P Put 5 corn seeds in container X and 15 corn seeds in container Y.  
Q Pour the same volume of water in both containers daily.  
R After two weeks, compare the growth of the corn seedlings.  
S Prepare two planting containers of the same size and fill the containers with equal amount of soil. Label the containers X and Y.
  - What are the factors of competition between the plants identified from the steps above?
6. An investigation was conducted by a group of Science Club members on two prawns from two different prawn culture ponds. The pictures below show the observations and data they collected.



- Based on the information above, give two suitable inferences on the differences observed.
- By selecting one of the inferences you gave in (a), provide another observation to support that inference.
- What should the prawn breeder from Pond B do to increase the mass of the prawns in his pond?



## Let's Try

# Terrarium Project

### Aim

To build a terrarium and understand the competition that takes place in a habitat.

### Apparatus and Materials

Computer, Internet, and tools to build a terrarium

### Steps

1. Carry out this activity in pairs.
2. Use the Internet to search for information on ways to build a terrarium.
3. Choose a method to build a terrarium and save it.
4. Discuss with your partner on how to do this project.
5. Prepare the apparatus and equipment given in the information you have collected.
6. Use the information as a guide to build your terrarium.
7. Make observations by taking photos for a period of one, two, and three months.
8. Compare your observations and write a report together with your friend and teacher.



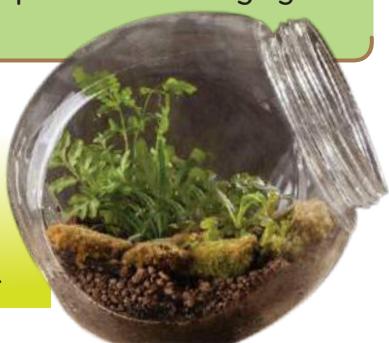
Wash your hands with soap after carrying out this project.

### Questions

1. What are the competitions that take place in your terrarium?
2. What are the suitable plants that you used as specimens in carrying out your project? Give your reasons.



Terrarium is a mini garden built in a transparent container.



### #TEACHER

Building a terrarium is an interesting and challenging activity. Teachers can organise this activity as a competition at school level and sell the terrarium.



# PRESERVATION AND CONSERVATION

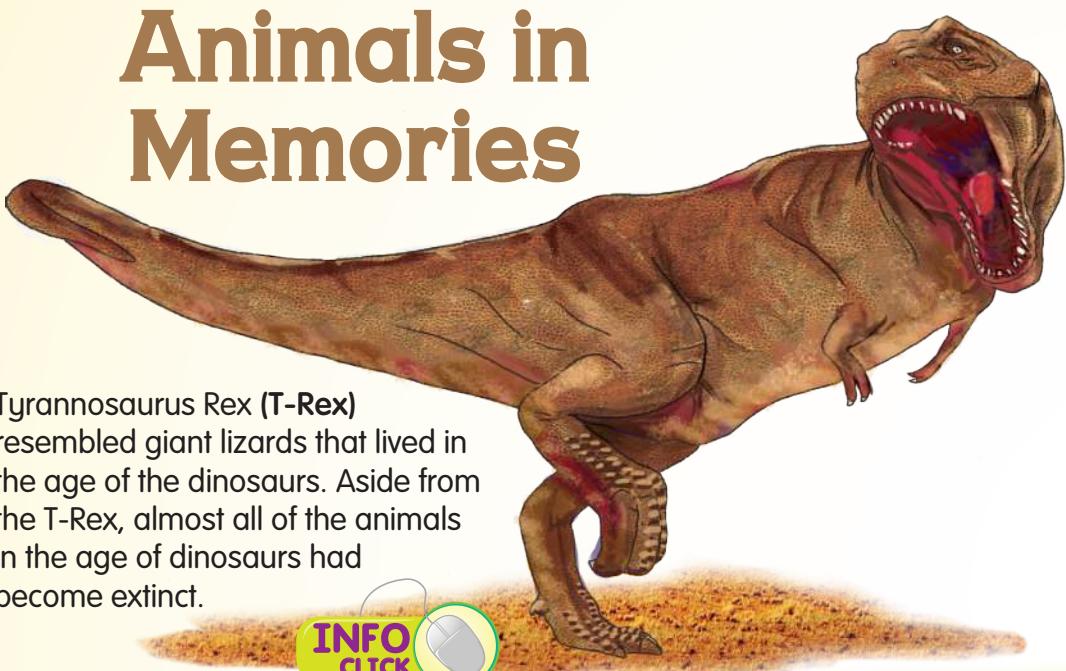


Why do these animals no longer exist? What caused these animals to become extinct?

## Animal Extinction

Animal extinction means the disappearance of animals from the Earth. We only know of their existence through the discovery of fossils, history, and research.

# Animals in Memories



Tyrannosaurus Rex (T-Rex) resembled giant lizards that lived in the age of the dinosaurs. Aside from the T-Rex, almost all of the animals in the age of dinosaurs had become extinct.

### INFO CLICK

The most rational hypothesis for the extinction of dinosaurs on Earth was the impact of comets or meteors that hit the Earth. The devastating impact caused the dinosaurs to be wiped out.

Source: [www.geocities.ws](http://www.geocities.ws)



Dodo bird was a tame bird from the island of Mauritius. These birds could not fly. These animals went extinct because sailors who stopped there hunted the birds. Meanwhile, rats and cats ate the eggs.

### INFO CLICK

These animals that originated from Asia had gone extinct.



Taiwan's clouded leopard



China's river dolphin



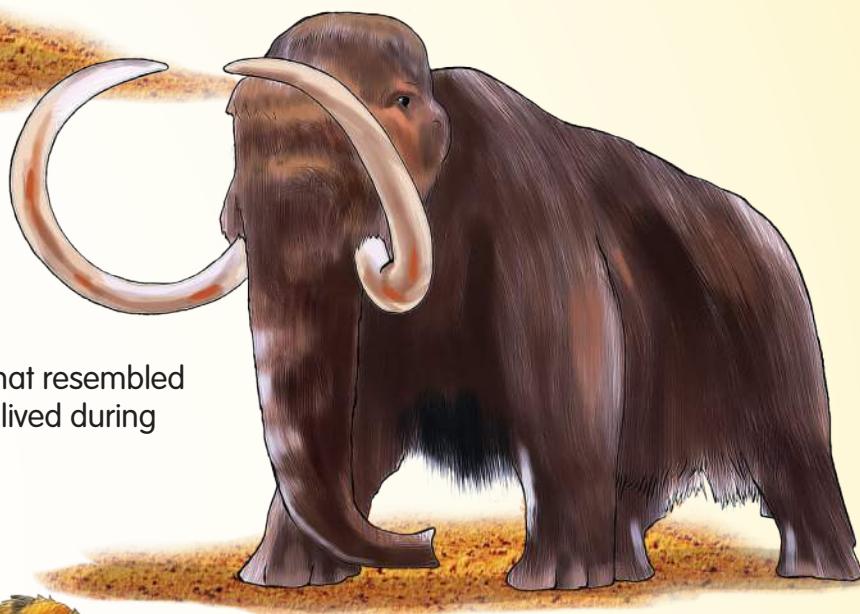
Japanese sea lion



Javan tiger



**Quagga** had a body that partially resembled a horse and a zebra. Humans hunted these animals for their meat and skin.



Give other examples of extinct animals.



### TASK

1. Search the website for information on other extinct animals.
2. Make a creative blog presentation consisting of information on extinct animals that you have gathered.



## Threatened with Extinction

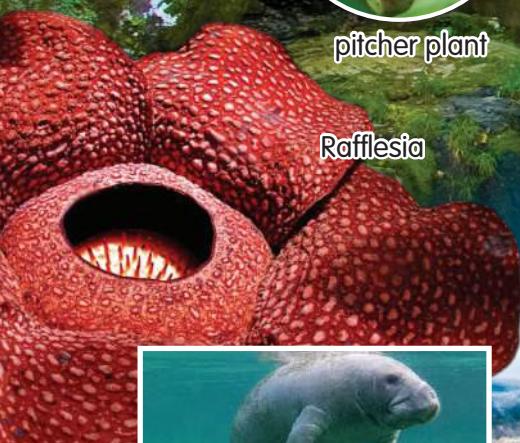
More animal and plant species are decreasing in numbers from year to year. Over time, these living things can become extinct. These living things are said to be under the threat of extinction or endangered.



dove orchid



pitcher plant



Rafflesia



slipper orchid



kacip fatimah



The following are animals and plants that are threatened with extinction.

rhinoceros



Dugongs which mainly graze on sea grasses in the shallow waters are threatened by waterfront development.



Marine life such as turtles often die trapped in fishing nets and trawls.



Plants such as *tongkat ali* is exploited to produce ingredients for traditional medicines.



The panda is increasingly endangered because its bamboo forest habitat is diminishing.



The habitat for mangrove trees is reclaimed for developing ecotourism.

Make a list of animals and plants that you know are endangered. Draw a mind map on the Malaysian animals and plants that are endangered in your Science exercise book.



# Activities That Threaten Animals and Plants



What are the factors that cause animals and plants to be threatened with extinction?

Human activities are the main factors that threaten animals and plants. These activities include illegal logging, hunting, deforestation, and pollution.



forest fires



rubbish dumping

Unplanned deforestation for logging, development, and construction of roads leads to the destruction of wildlife habitats.



Meat, skin, fur, ivory, horn, and fat of the animals are hunted illegally and used for clothing, food, jewellery or traditional medicines. Rampant poaching causes wild animals to be threatened with extinction.

Apart from human activities, animals and plants are also threatened by natural disasters.



Natural disasters such as flood, earthquake, and hurricane also destroy the habitats of animals and plants. Natural disasters cause many animals to die because they are unable to escape.



oil spill

Oil spill, rubbish, and toxic wastes dumped into the environment threaten the lives of animals and plants.



tornado



earthquake



flood



## Let's Test

# Endangered Animals and Plants Blog

### Aim

To design a digital presentation on endangered animals and plants and upload it on a blog.

### Apparatus and Materials

Computer, Internet, a blog account, and MS PowerPoint software

### Steps

1. Conduct this activity in groups.
2. Use the Internet to gather information on other endangered animals and plants such as:
  - name of the animal
  - habitat
  - current population that are still alive
3. Based on the information that you have collected, explain the factors that threatened these animals and plants and classify the threats into the following categories:
  - human activities
  - natural disasters
  - pollution
4. Using the MS PowerPoint software, create a presentation related to the plants and animals that are threatened with extinction.
5. Upload your MS PowerPoint presentation into the VLE platform to be shared with friends.

### Questions

1. State the meaning of extinction and threatened with extinction.
2. Based on the information you have gathered, suggest ways to overcome the threats faced by these animals and plants.

### INFO CLICK

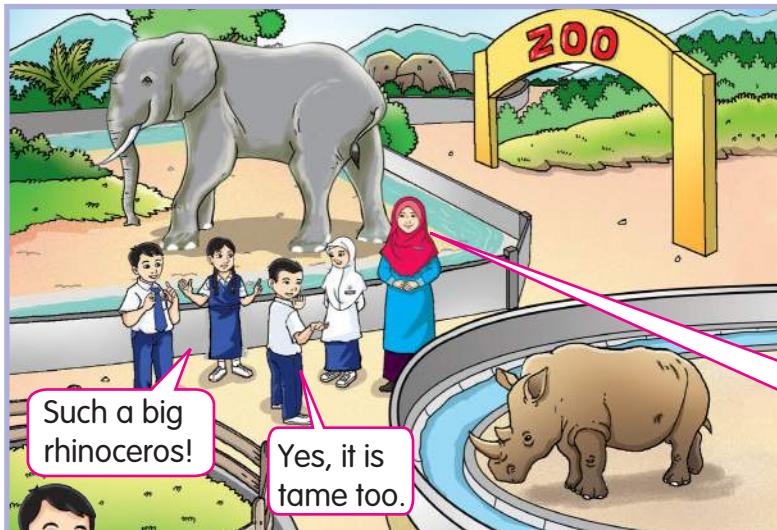


The World Wide Fund for Nature, WWF is an international non-governmental organisation that supports and carries out preservation and conservation efforts as well as research on flora and fauna. This organisation has branches around the world including Malaysia.

### INFO CLICK

By visiting this site, <http://www.nga.gov/content/ngaweb/education/kids/kids-jungle.html>, you can build your virtual forest using selected animals and plants.

# Preservation and Conservation of Animals and Plants



The efforts on preservation and conservation are required to save the animals and plants from extinction.

This rhinoceros is taken care of by the zoo as a way to protect it from being threatened with extinction.



State the meaning of preservation and conservation.

Can you describe ways to preserve and conserve animals and plants?



## Preservation of animals and plants





The following are preservation activities.



Educate the community to protect animals and plants from the threats of extinction.



Avoid buying products made from the body parts of endangered animal species.



Gazette protected animals and plants species.



Organise campaigns against illegal logging and poaching.



Gazette an area of the forest as forest reserves.



Cutting down only selected trees to prevent the extinction of plants.

## PRESERVATION AND CONSERVATION



**Enforce laws and regulations** to those who kill, hunt, and smuggle endangered animals.



Gazette marine parks to protect animal and plant habitats in the ocean.

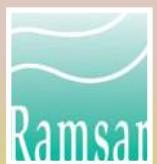


Ramsar Site Pulau Kukup, Johor.

Some mangrove areas are declared as **Ramsar sites** to protect the flora and fauna in these areas.



The Convention on Wetlands or The Ramsar Convention provides a framework for the conservation and wise use of wetlands and their resources.



The **rehabilitation centre** for orang-utan was created to conserve orang-utan. This rehabilitation centre is an example of conservation. Do you know what is meant by conservation?



### TASK

1. Search the website for information on endangered living things in Malaysia.
2. Produce a creative presentation in a blog containing information about endangered living things.

# Conservation of Animals and Plants



Conservation is the practice of protecting animal and plant species and their habitats to ensure that they will be around for future generations.



Let's look at the conservation activities in Malaysia.



Turtle conservation centres ensure that turtles have a high chance of survival to live in their natural habitat.



Before conservation



Conservation activities



After conservation



Replanting trees in logging areas replaces habitats that have been destroyed.



## TASK

Use the Internet or various media sources to look for information on other endangered animals and plants, and the factors that threaten these plants and animals with extinction. Suggest suitable preservation and conservation methods. Explain the role of humans in preserving and conserving animals and plants. Use MS PowerPoint software and present your findings to the class.



## Let's Remember

# PRESERVATION AND CONSERVATION

## Endangered animals



## Rhinoceros

## Endangered plants



dove  
orchid



pitcher  
plant



Rafflesia

# ENDANGERED ANIMALS AND PLANTS

# Threat Factors

## Human Activities

- illegal logging
  - illegal hunting
  - exploration of land for agriculture, development, industrialisation, and tourism
  - road construction
  - water, air, and land pollution

# Natural Disasters

- flood
  - earthquake
  - hurricane

## Pollution

- water
    - oil spills
    - disposal of toxic and waste materials
  - air
    - smoke from factories and forest fires
  - soil
    - disposal of toxic and waste materials

## Ways to Overcome

# Preservation and Conservation

- educate society on protecting animals and plants from threats of extinction
  - organise campaigns against illegal logging and poaching
  - avoid buying products made from body parts of endangered species
  - gazette forest reserves

- gazette animal and plant species that are protected
  - cutting down trees selectively
  - enforce laws and regulations on illegal hunting and smuggling
  - gazette marine parks
  - gazette mangrove areas (Ramsar)
  - set up rehabilitation centres for animals
  - replant forest trees



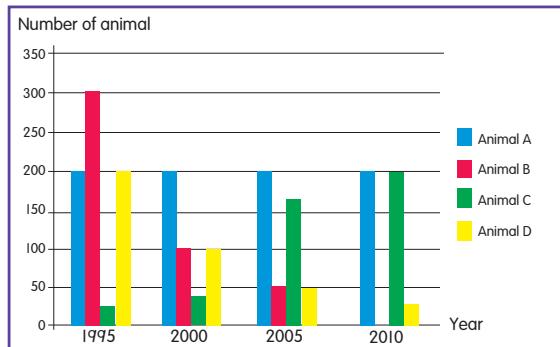
## Answer all of the following questions in the Science exercise book.

- I. Choose the activities that support preservation and conservation.

- a) The residence of a successful entrepreneur is decorated with luxurious decoratives such as carved ivory.
- b) A group of fishermen helped a turtle that was trapped in a drift net on the beach and the turtle was released into the sea.
- c) A hunter is very proud of the deer antler decoration in the living room of his house.
- d) The villagers telephoned the Wildlife Department after their crops were destroyed by wild elephants.

2. The graph shows the number of animals A, B, C and D that was recorded from 1995 to 2010.

Based on the graph, state whether the status of the animals A, B, C and D are:



Extinct

Endangered

In preservation

In conservation

3. A group of pupils gathered information on the number of animals for a particular animal species in a forest area. The table shows the information they obtained.

Time (year)	1975	1980	1985	1990	1995	2000	2005	2010	2015
Number of animals	800	400	100	100	100	150	210	300	400

- a) What can you observe from the information above?
- b) State an **inference** to explain the changes in the number of animals from 1995–2015.
- c) State the change in **pattern** on the number of animals in the forest.

- d) Suggest efforts that can be taken by the government to bring the number of animals back to its original number.
- e) What will happen if the efforts mentioned in (d) fail?
- f) What conclusion can be made from the information given in the table?
4. The pictures below show a number of activities to save animals and plants from further threats of extinction.



H



I



J



K



L

Match the activities in the pictures according to the suitable category.

**Preservation**

- A. H and I
- B. J and K
- C. H and J
- D. J, K and L

**Conservation**

- J, K and L
- H, I and L
- I, K and L
- H and I

5. The pictures below show animals and plants that are threatened with extinction.



- a) Explain the factors that cause the above animals and plants to be threatened with extinction.
- b) Suggest ways to overcome the threats of extinction on the above animals and plants.



## Let's Try

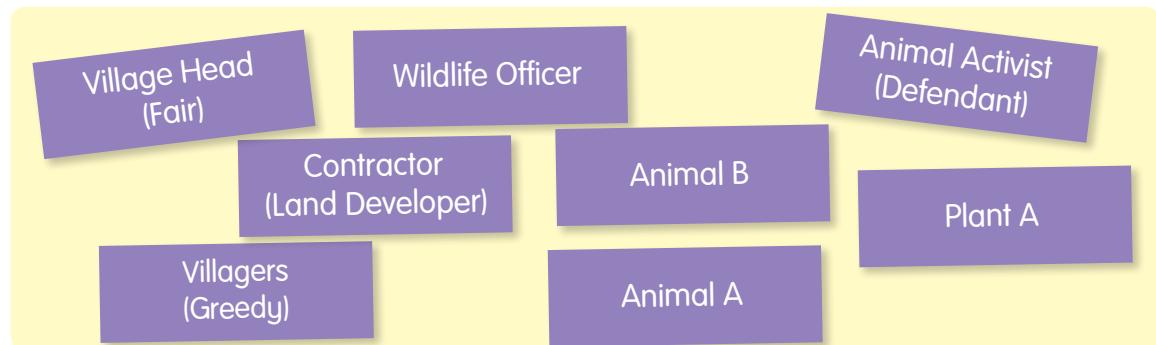
# Voices of Nature

**Aim** To explain the importance of preservation and conservation of the environment by acting out the drama "The Jungle Dwellers' Environment".

**Apparatus and Materials** Marker pen and card

### Steps

1. Conduct this activity in groups.
2. Create eight character cards as shown in the examples below.



3. Discuss, design, and write a suitable dialogue for each character on the back of each card. The dialogues produced must contain the following words.

Endangered   Extinct   Species   Preserve   Conserve   Habitat  
Hunted   Development   Logging   Law

4. Act out the drama based on the following situation:

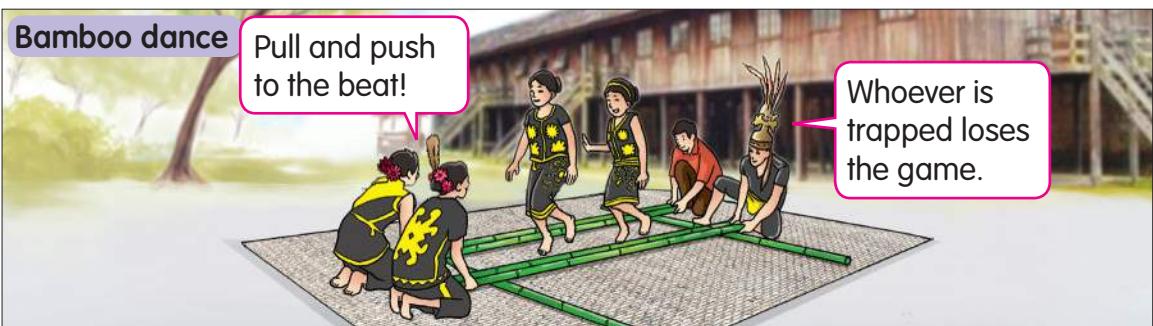
Damai Village is a tourist attraction because it is located on the highlands and beside a forest reserve. A construction company plans to build a rest house for tourism in the village area.

### Question

If the plan to build a rest house continues, what appropriate preservation and conservation steps need to be taken to ensure that the plants and animals are not threatened?



# FORCE



Have you ever played the traditional games above?  
How do the objects in the games are made to move?

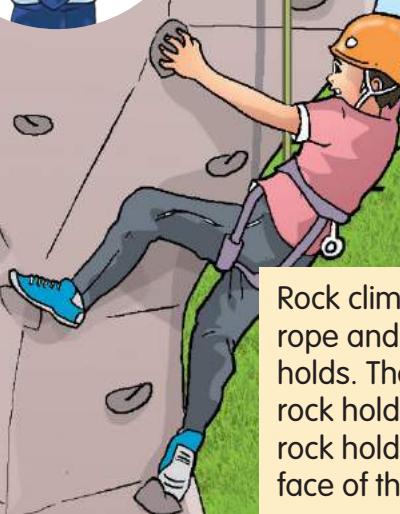
# What is Force?

A **force** is a pull or a push that acts upon an object. A pull is an action that moves an object nearer to us. On the other hand, a push is an action that moves objects away from us.



What does the climber need to do to reach the peak?

A variety of daily activities involve force. Observe the activities in the pictures below. Which activity involves a pull or a push?



Rock climbing involves pulling the rope and pushing onto the rock holds. The climber's hand pulls the rock hold while his leg pushes the rock hold to gradually climb up the face of the wall.

How can this boy move his scooter?

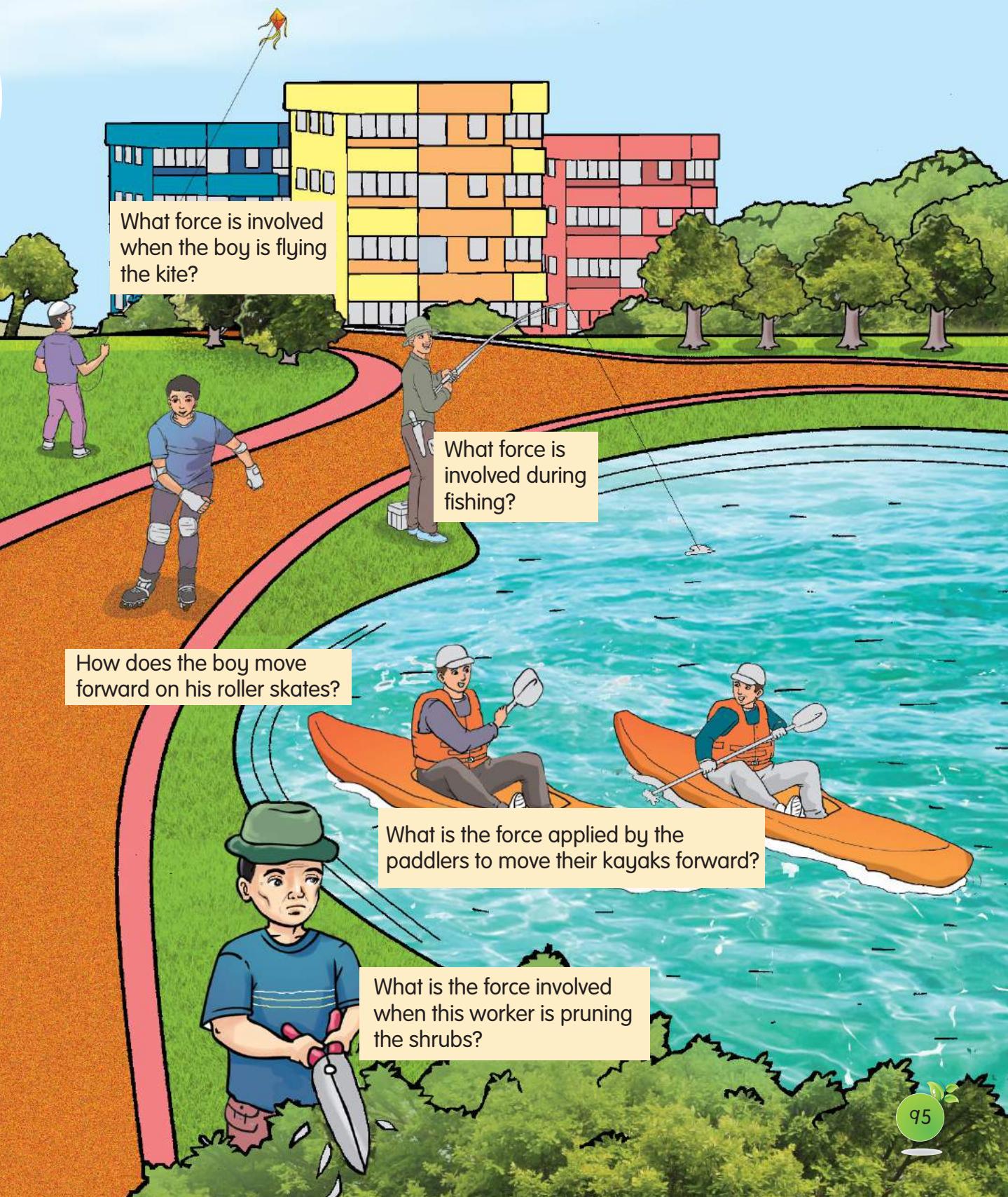


What force is involved when the mother moves the baby stroller forward?



Think for a Moment

What force is involved when you start to move, stop, and turn during cycling?





# Feel the Effects of Forces

**Aim** To state the definition of force.

**Apparatus and Materials** Balloon, basin, and water

## Activity 1

### Steps



- I. Blow and tie the balloon.



2. Fill the basin with water.



3. Push the balloon into the water using your hands.

**Apparatus and Material**

Spring

## Activity 2

### Steps



- I. Hold both ends of the spring.



2. Pull both ends of the spring.

### Questions

1. What is the meaning of force?
2. What are the forces involved in Activity 1 and Activity 2?
3. What do you feel when the balloon is pushed into the water?

**INFO CLICK**



The gravitational force of attraction between the Sun and the Earth causes the Earth to constantly revolve around the Sun.

# Effects of Forces

You will feel the effect of force when your hand is pushed by a friend. Observe the effects of the following forces.

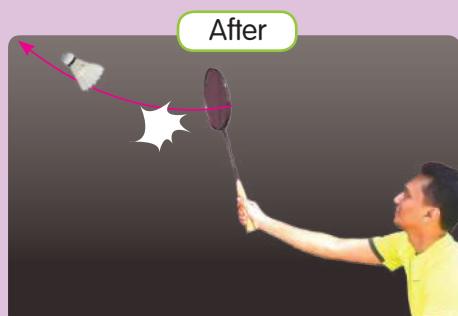
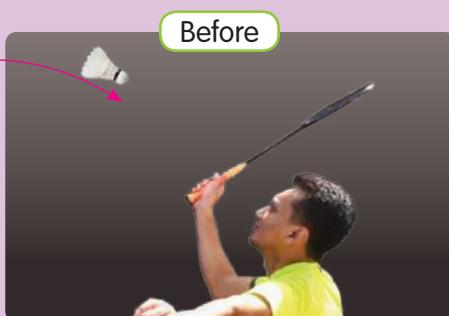
A force cannot be seen but we can feel and see its effects.



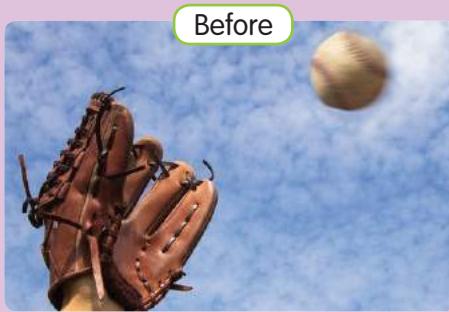
A force can change the shape of an object.



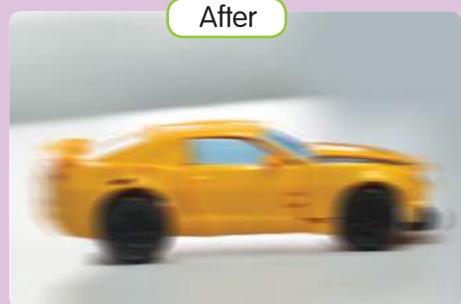
A force can change the direction of motion of an object.



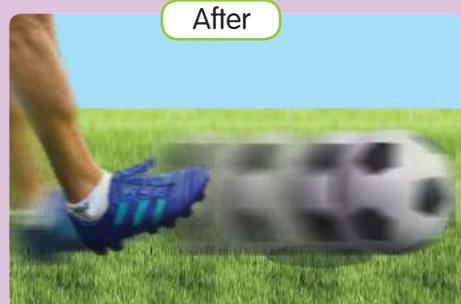
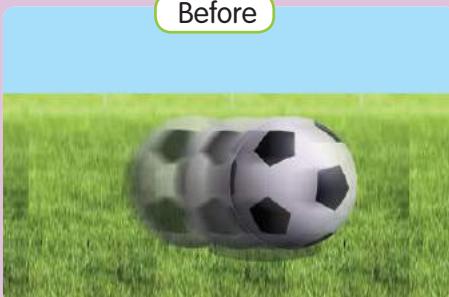
A force can stop a moving object.



A force can move a stationary object.



A force can change the speed of an object.



### Let's Test

## Observing the Effects of Forces

### Aim

To observe the effects of forces when a balloon is released.

### Apparatus and Material

Balloon

### Steps

I

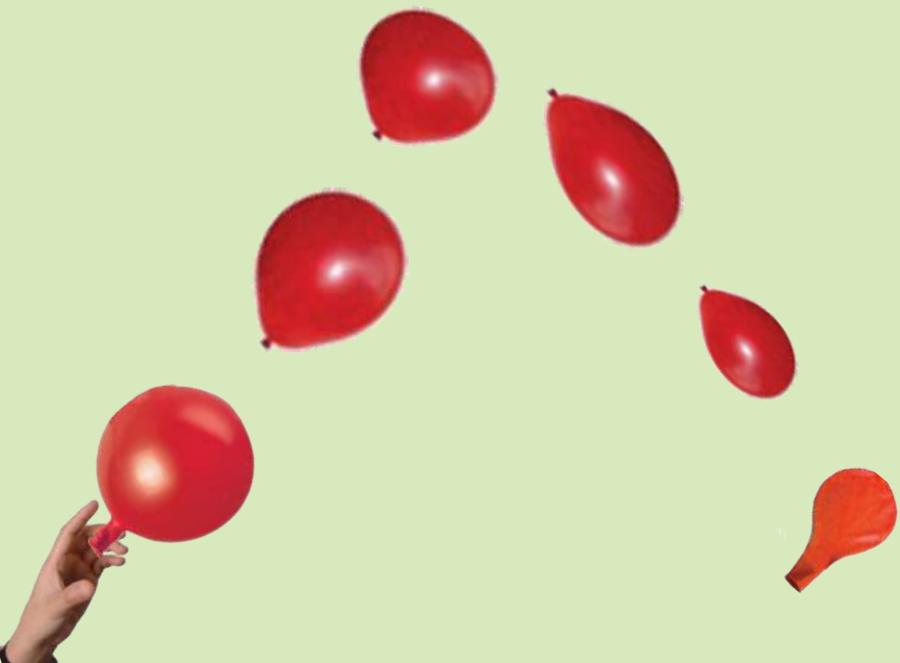


What are the effects of forces that you observed in this activity?

Blow a balloon and hold the neck of the balloon using your fingers to avoid air being released.



2



Release the balloon and observe its movement.

### Questions

- Explain five effects of forces that can be identified in this activity.
- Sketch your observations on the condition of the balloon in the table as shown below:

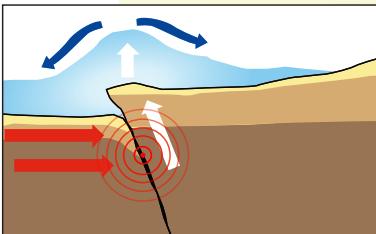
Effect of force	Condition of balloon

### QUIZ

Choose the correct statement about force.

- An object that is moving will keep on moving until it is stopped by a force.
- All moving objects will finally stop.

### INFO CLICK



The movement of the Earth's ocean floor creates a push causing a strong wave to move to the land area. The strong force from the waves pushes various objects on the land and destroys it.

# Frictional Force



The carrom striker moves because of the push applied by flicking the finger. However, the carrom striker stopped because of the frictional force between the carrom striker and the surface of the carrom board.

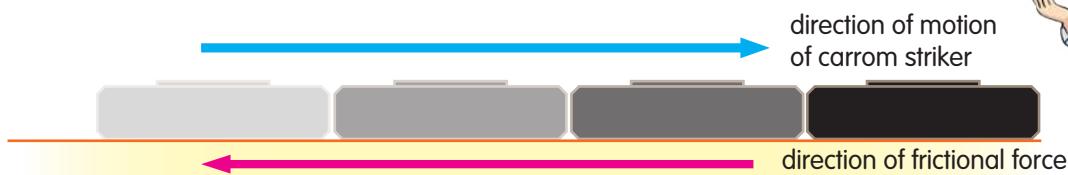


A **frictional force** is the force generated when two surfaces are in contact.



Observe the movement of the carrom striker again. Do you know the direction of the frictional force?

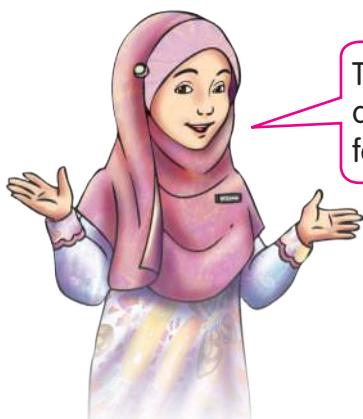
The direction of the frictional force is opposite to the movement of the carrom striker.



A frictional force often opposes the direction of a moving object.

A frictional force can also cause a moving object to slow down and finally stop.

No wonder this carrom striker slowed down and finally stopped.



Try to give examples of daily activities that involve frictional force.



### Q U I Z

Choose the correct statements on frictional force.

- A frictional force occurs when two surfaces are in contact.
- A frictional force moves parallel with the direction of motion of an object.
- A frictional force often opposes the direction of motion of an object.
- A frictional force causes a moving object to slow down and finally stop.



Identify the two surfaces that are in contact which cause frictional force in the following situations.



# Factors That Affect Frictional Force



What are the factors that affect a frictional force?

A frictional force is influenced by factors such as the type of surface and mass of the object.

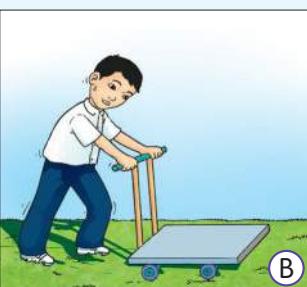


## Experiment 1 Type of Surface

### Problem statement



cement floor



grass

How do the type of surfaces affect frictional force?



If the mass of the trolleys is the same, which trolley is easier to push?



**Aim** To investigate how types of surfaces affect frictional force.

Apparatus and materials needed are toy car, rubber band, plastic sheet, a piece of cardboard, a piece of carpet, and measuring tape.

Let us investigate using a toy car moving on different types of surfaces.



Construct your hypothesis based on the problem statement. Identify the manipulated variable, responding variable, and constant variables in this experiment.



In this investigation:

1. Plan the steps to carry out this experiment using the given apparatus and materials.
2. Conduct the experiment.
3. Record the results in a suitable table.
4. Make conclusions based on the experiment.
5. Write a report of the experiment.



**Questions**

- What can you observe from the distance travelled by the toy car on the different types of surfaces?
- On which surface did the toy car record the longest distance? What is your inference?
- Predict the distance travelled by the toy car if it moves on a tarred road.
- What is the relationship between the type of surface and the distance travelled by the toy car?



What will happen to the objects on Earth if frictional force does not exist?

## Experiment 2 Mass of Object

**Problem Statement** How does the mass of an object affect frictional force?

Why is it difficult to move this cupboard? The other cupboard can be pushed easily!



Let's test using three toy lorries with different mass or load.



We observe which toy lorry travels the longest distance.

Plan and conduct the experiment.

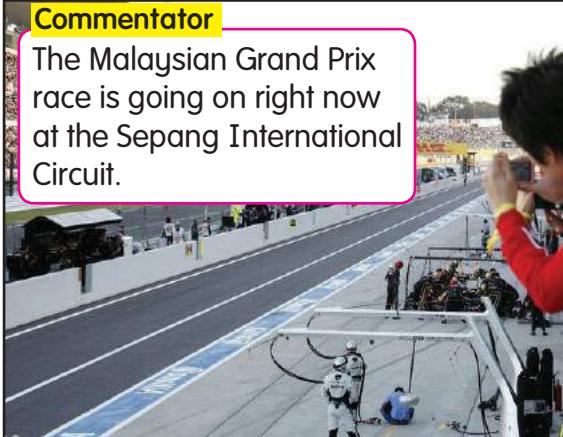
**Questions**

- What can you observe from the distance travelled by the toy lorries?
- Which toy lorry recorded the longest distance? State your inference.
- What is the relationship between the mass and the distance travelled by the toy lorries? Is your hypothesis accepted?

# Effects of Frictional Force

## Commentator

The Malaysian Grand Prix race is going on right now at the Sepang International Circuit.



## Commentator

Due to the rain, all the racers are heading to the pit stop to change tyres.



Why did the racers often go to the pit stop to change tyres? How does frictional force affect the race?



How can the design of these tyres overcome the problems caused by frictional force?





Our hands feel hot because frictional force occurs and produces heat.

What are the **advantages** of frictional force?



The frictional force between the surface of the hand and the object allows us to hold the object with a firm grip.



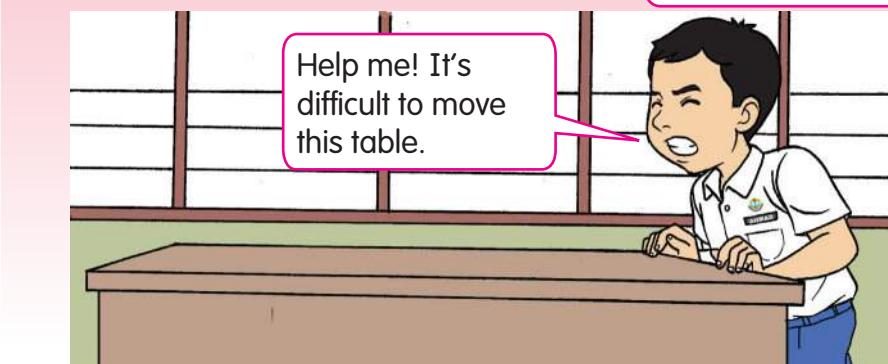
The frictional force between the soles of the shoes and the floor surface allows us to walk without slipping.



Frictional force can make an object remains static.

There are situations whereby frictional force causes problems in our daily life.

Do you know the **disadvantages** of frictional force?

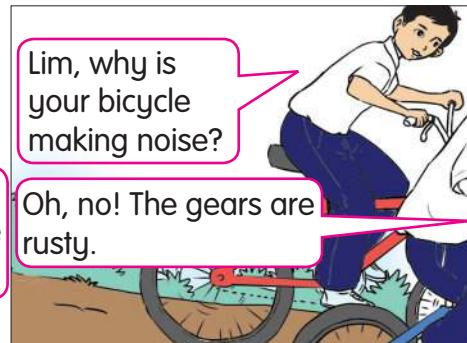


It is difficult to move the table because of frictional force.

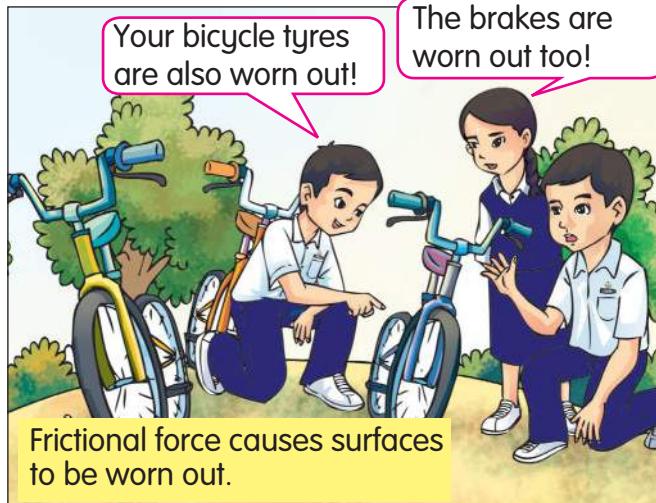
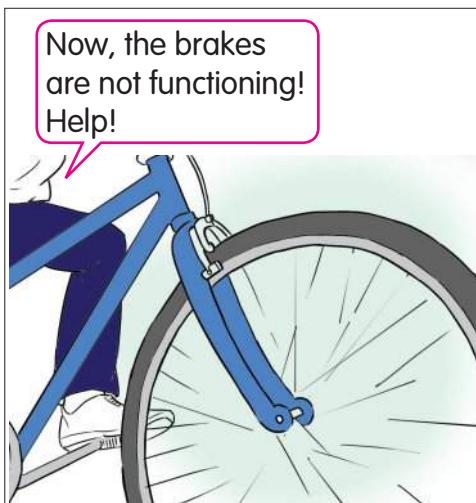




Based on the situations below, state the disadvantages of frictional force.



Frictional force produces unwanted noise.



Let's look at the disadvantages of frictional force in our daily life. What are the effects of frictional force in the following situations?



Frictional force produces noise in an iron cutter machine.



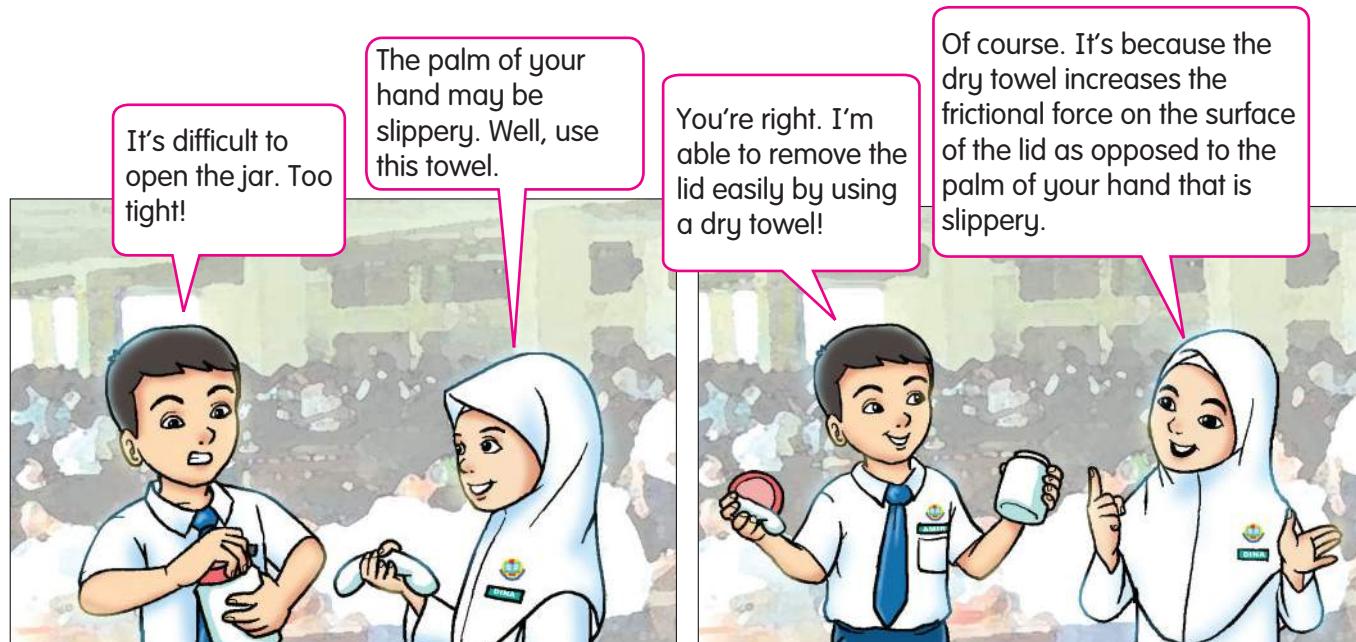
Frictional force causes the soles of shoes to wear out.



Frictional force causes the golf ball to stop.

# Increasing and Decreasing Frictional Force

There are several circumstances that require more frictional force to help us do work. By increasing frictional force, the work can be carried out more efficiently and easily.



## HOTS



How is sound produced when a violin is played?



Why do pistons produce heat?



Why do trains take a long time to stop after the brakes are applied?



Why does a glass filled with cold water move on its own when placed on a table surface made of glass?



How can we increase the frictional force in our daily activities?



Anti-slip mats are used to increase the frictional force between the wet floor and the mat.



Patterned and rough shoes soles can prevent us from slipping while walking or running.



The mouse pad increases the frictional force between the computer mouse and the mouse pad. Therefore, the movement of the computer mouse is easily controlled.



Patterns on the surface of gloves increase the frictional force and make it easier to grip objects.



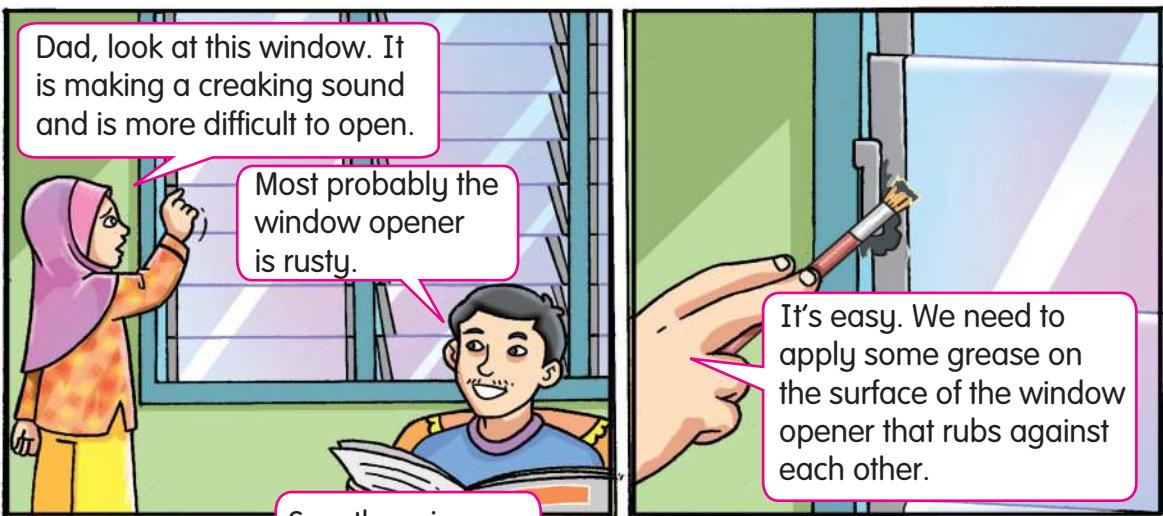
Weightlifters use magnesium carbonate chalk powder to lift the metal barbell. This chalk powder is used to increase the frictional force and grip to prevent the metal barbell from slipping.



How does the design of a safety helmet help cyclists move faster?



In other circumstances, the frictional force produced creates problems and needs to be overcome or reduced.



The use of rollers and wheels reduce the frictional force and make objects move easily.



The use of lubricants in motor vehicles reduces the excessive frictional force in the engine compartment.





The use of boric acid powder makes the carrom seeds move easily.



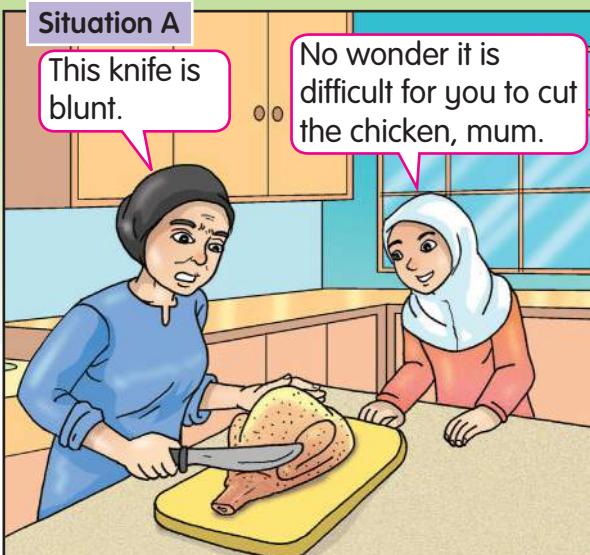
Wax is applied to the tracks of drawers so that it can be opened and closed easily.

### Problem Solving

#### Situation A

This knife is blunt.

No wonder it is difficult for you to cut the chicken, mum.



#### Situation B

Ouch! It's painful.



What are the effects of frictional force that you can identify in both situations?

How can you help if you are in the situations above? Should the frictional force be increased or decreased? Why? Suggest ways to increase or decrease the frictional force.





## Let's Remember

Pull



# FORCE

Push



## Effects of a Force

changes the shape of an object

changes the direction of motion of an object

changes the speed of an object

stops a moving object

moves a stationary object

### Advantages of frictional force

- produces heat
- slows down a moving object and stops it
- holds an object
- makes an object stay static
- sharpens tools

### Disadvantages of frictional force

- produces unwanted noise
- makes movement difficult
- causes the soles of shoes and tyres of vehicles to be worn out

## Frictional Force

### Ways to increase frictional force

- use patterned soles and surfaces
- make the surface rougher
- use anti-slip mats
- use magnesium carbonate chalk powder

### Affecting factors

- type of surface
- mass of object

### Ways to reduce frictional force

- use lubricants
- use grease
- use rollers and ball bearings
- use wax
- use boric acid powder



## Answer all of the following questions in the Science exercise book.

1. Explain the effects of force on the objects in the following activities.
  - a) Noor hits a stationary ball with a hockey stick.
  - b) Kugan catches a ball thrown at him.
  - c) Rose hits the shuttlecock moving towards her.
  - d) Raju is kneading *roti canai* dough.
2. State the types of force involved in the following activities.

Activity	Force
a) Putting on socks	↙
b) Squeezing toothpaste	↙
c) Cutting wood using a handsaw	↙
d) Playing the piano	↙
e) Pumping tyre using a hand pump	↙

3. The table below shows the results of an investigation. Ball X and Ball Y were released on an inclined plane. The time taken by the two balls to reach the end of the track was recorded.

Ball	Time taken to reach the end of the track (s)
X	4
Y	8

- a) Give two inferences on the difference in the time taken to reach the end of the track between the two balls.
- b) Based on your answers in (a), make a suitable hypothesis.
4. Ahmad pushed three different metal balls of different masses with the same amount of force. The distance travelled by the three metal balls are as follows.

The 300 g metal ball travelled 150 cm.

The 200 g metal ball travelled 200 cm.

The 100 g metal ball travelled 350 cm.

- a) Which metal ball experiences the biggest frictional force?  
 b) Give reasons to support your answer in (a).  
 c) Transfer the data in the form of a bar chart.
5. The picture shows a boy pulling a box. How can he move the box more easily?
- Using wooden rollers.
  - Create a pattern on the surface of the box.
  - Ensure the surface of the box is clean.
  - Put a cloth under the box and pull it using the cloth.



- A. I and II     B. II and III  
 C. II and IV   D. I and IV
6. A group of pupils carried out an investigation on a toy car that moves on different types of surfaces. They found that the distance travelled by the toy car is as follows:

Type of surface	Distance travelled by toy car (cm)
X	50
Y	40
Z	30

- a) Write an observation of this investigation.  
 b) Give an inference based on your observation in (a).  
 c) What is the aim of this investigation?  
 d) If surface X is a plastic sheet and surface Y is a piece of sandpaper, predict surface Z.

The mass of a vehicle affects the amount of frictional force experienced by it.

- e) State a relationship between the two variables gathered based on the statement above.



## Let's Try

# Model of a Simple Hovercraft

### Aim

To reduce frictional force by applying an air cushion.

### Apparatus and Materials

Balloon, used compact disc, pop-top cap, and hot glue gun

### Steps



Open the pop-top cap and apply hot glue on the bottom of the cap.



Stick the bottom of the pop-top cap over the hole of the compact disc. Leave it to dry.



Blow the balloon. Twist the mouth of the balloon and stretch it over the pop-top cap.



Place the model of your simple hovercraft on the table and pull the pop-top cap.

5 Report your observations in front of the class.

### Question

How does the air inside the balloon help move your simple hovercraft easily?



**HOTS**

Why is the shape of the ice skating shoes different from the ice climbing boots?



**INFO CLICK**

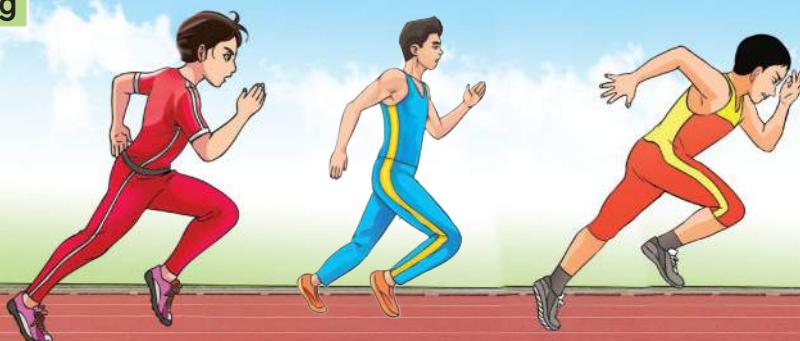
Hovercraft is a vehicle that moves using a layer of air cushion that helps to reduce frictional force. Thus, enabling it to move on the surface of land and water.





# SPEED

Running



Swimming



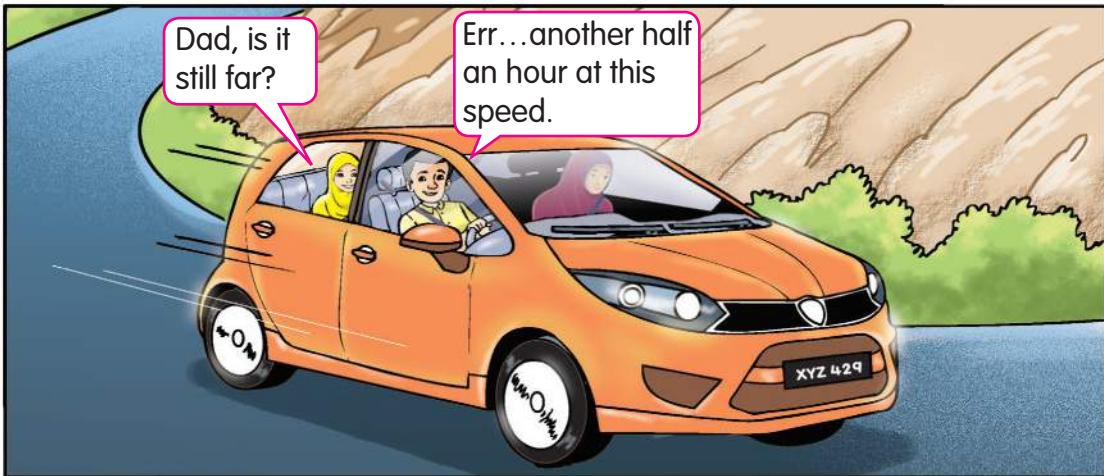
Bicycle Racing



A motion that is fast or slow determines how soon or later an object reaches its destination. Observe the pictures above. What should the athletes do to win the race in the sports events?

# What is Speed?

All moving objects have speed. Different objects move with different speeds. What is the meaning of speed?



A slow moving car has less speed. Is that correct, mom?

Yes, a slow moving car will take a longer time to reach its destination.

Hey, dad's car is faster.

Half an hour later...

Why did they arrive here later? Is it because they were moving slower?

Oh, I understand! Speed is the measurement of how fast or slow an object travels from one place to another.



**Think  
for a Moment**

What will happen if the car driven by Dina's dad travels at the same speed as the bicycles? Why?

**INFO  
CLICK**

Light too has speed because light travels from one place to another in a very short time. The speed of light is 300 000 000 m/s in a vacuum.



# Your Speed

## Aim

To investigate the speed in various types of motion.

## Apparatus and Materials

Stopwatch, measuring tape, marker pen, and adhesive tape

## Steps

1. Conduct this activity in pairs on the field.
2. Stick adhesive tape on the starting line, measure 20 m away from it and stick the tape to mark the finishing line.
3. Ask your friend to travel along the track using different motions such as walk, brisk walk, and run.
4. Record the time taken for your friend to travel from the starting to the finishing line as shown in the table below.

Types of motion	Distance (m)	Time (s)
Walk	20	30
Brisk walk	20	20
Run	20	10



5. Use MS Excel to draw a bar chart.
6. Discuss the results of your investigation.

## Questions

1. Which type of motion enabled your friend to reach the finishing line first? Why?
2. What is the meaning of speed based on this activity?

## QUIZ

The picture shows the race between Sang Kancil and Sang Kura-Kura. Which of the following statements are correct?



- Sang Kancil travels faster than Sang Kura-Kura.
- Sang Kura-Kura travels slower than Sang Kancil.
- Sang Kancil will reach the finishing line earlier than Sang Kura-Kura.
- Sang Kura-Kura will reach the finishing line earlier than Sang Kancil.

# Units for Speed

Speed involves the measurement of distance and time covered by a travelling object. The unit for speed is a combination of both distance and time. The following are a few examples of units of speed.

## centimetre per second (cm/s)



1 second



→ 1.3 cm/s

This snail moves slowly because snails can only travel 1.3 centimetres in one second. Therefore, the unit for its speed is cm/s.

## metre per second (m/s)



1 second



→ 5 m/s

A squirrel can travel 5 metres in one second. The unit for its speed is m/s.

## kilometre per hour (km/h)



1 hour



→ 76 km/h

A horse can travel as far as 76 km in one hour. The unit for its speed is km/h.



Why is the unit of speed in km/h not suitable in measuring the speed of a pupil who is walking?

## #TEACHER

The information above is obtained from [www.infoplease.com](http://www.infoplease.com).



The units for speed are centimetre per second (cm/s), metre per second (m/s), and kilometre per hour (km/h). Look at the pictures below. What are the units of speed used?



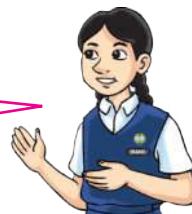
Tortoises are one of the slowest animals in the world. A tortoise can travel 7.6 centimetres in 1 second. What is the unit of its speed?



The fastest man in the world can run the 100-metre race in 9.58 seconds. What is the suitable unit of speed to use?



F1 cars can race with a speed of 360 kilometres in 1 hour. What is the unit of speed used?



### Let's Test

## Speedometer with Different Units

#### Aim

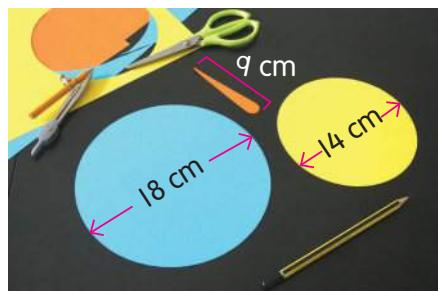
To design a speedometer or speed meter with different units.

#### Apparatus and Materials

Scissors, compass, protractor, ruler, pen, pencil, glue, manila card (3 different colours), straw, and adhesive tape

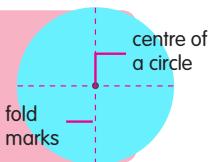
#### Steps

- 1 Conduct this activity individually.
- 2 Draw and cut out two circles with diameters of 14 cm and 18 cm respectively, on two manila cards.
- 3 Draw and cut out the third manila card into a 9 cm shaped needle as shown.



#### #TIPS

The centre of a circle can be determined by folding the circle.

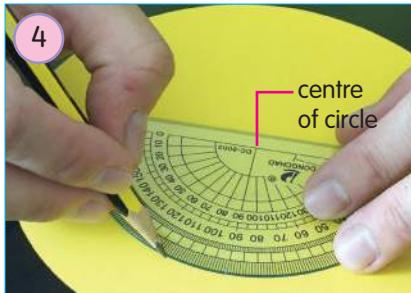


#### INFO CLICK

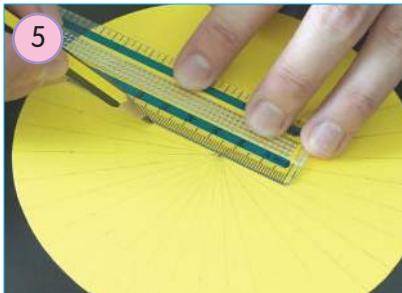
The standard unit for measuring speed in the metric system is metre per second and is normally written as m/s.



The information above is obtained from [www.infoplease.com](http://www.infoplease.com), [www.sciencekids.co.nz](http://www.sciencekids.co.nz), and Wikipedia.



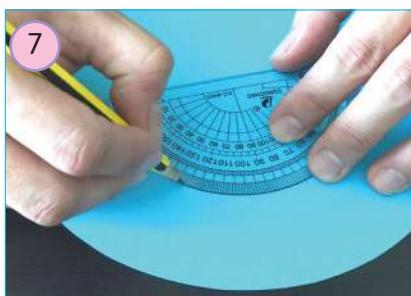
Place the protractor at the centre of the 14 cm-diameter circle. Starting with angle  $0^\circ$ , mark a point for each angle of  $10^\circ$  until  $250^\circ$ .



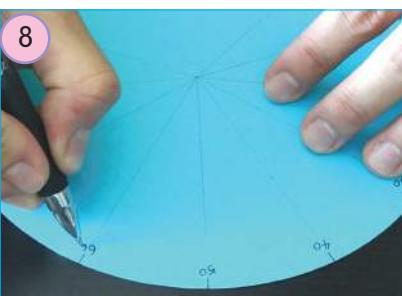
Draw a straight line to connect the centre of the circle to all the points.



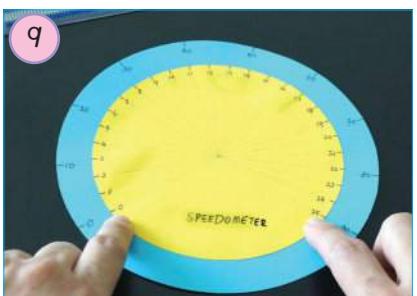
Use a pen and label numbers 0 to 25.



Repeat steps 4 to 5 with the 18 cm-diameter circle. This time, starting with angle  $0^\circ$ , mark a point for each angle of  $27.7^\circ$  until  $250^\circ$ .



Label the numbers 0 to 90.



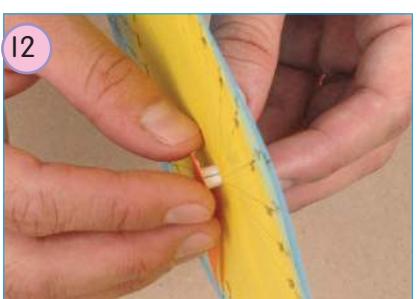
Align the scales at number 0 and glue the two circles at both centres.



Write the unit for speed on each circle of the speedometer. Divide the scale into 5 equal parts.



Cut the end of a straw to the shape as shown in the picture. Stick the needle at the end of the straw. Make a hole to fit the straw at the centre of the circle.

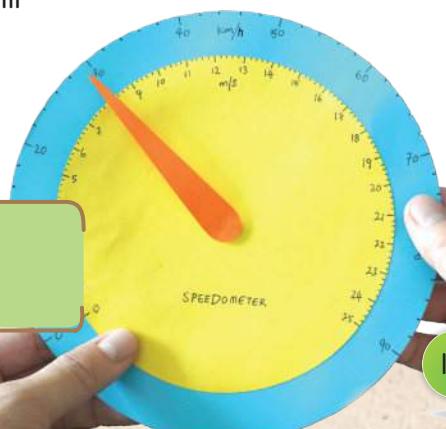


Fix the needle to the centre of the speedometer as shown in the picture above.

- 13 Use the speedometer that you have made to indicate speed using different units.

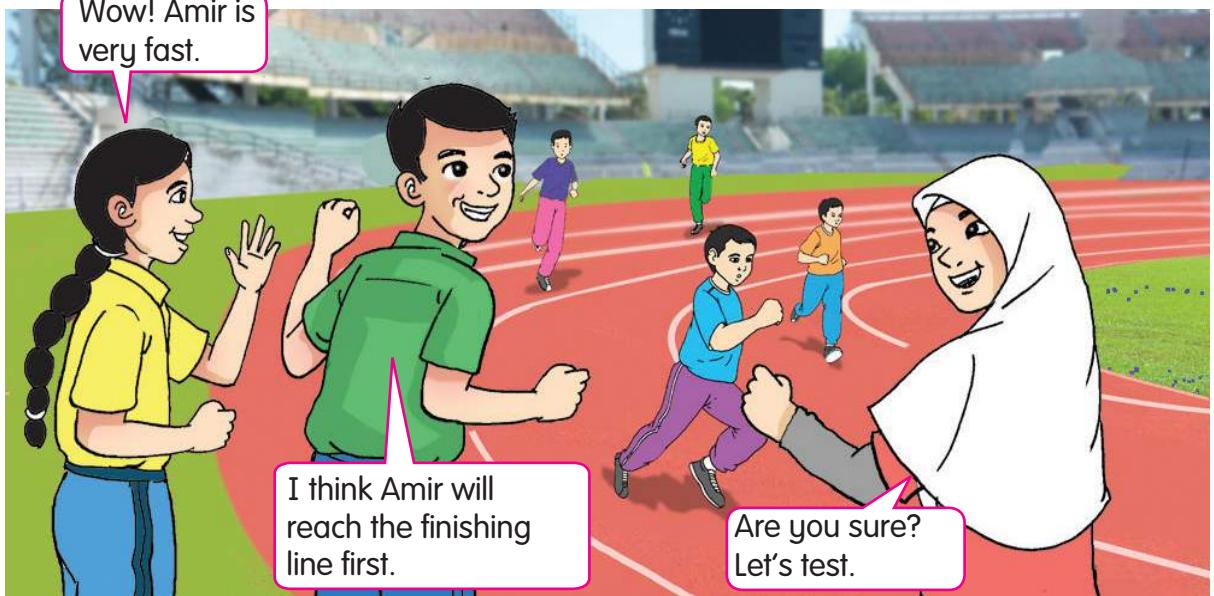
### Question

Using your speedometer, what is the speed of 45 km/h in m/s?



# Relationship between Speed, Distance, and Time

During the school's sports day, Amir overtook other pupils in the sprint race.



Let us investigate the relationship between speed, distance, and time. What are the factors that influence the speed of a moving object?

Four students are discussing a science investigation:

- The student in the yellow shirt says: Apparatus and materials needed in this investigation are toy car, measuring tape or ruler, stopwatch, and a long rubber band.
- The student in the green shirt asks: What are the variables involved in this investigation?
- The student in the blue shirt says: State the hypothesis to be tested first.
- The student in the blue shirt continues: The hypothesis is the speed of an object increases if the object travels farther within a set time.



# Relationship between Speed and Distance

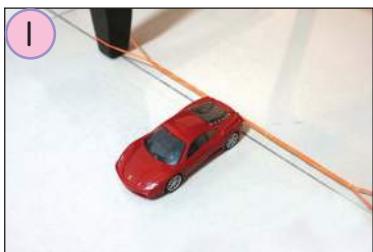
## Aim

To investigate the relationship between speed and distance

## Apparatus and Materials

Toy car, stopwatch, metre ruler, and rubber bands

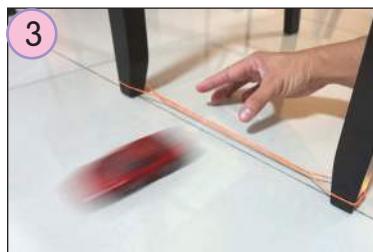
## Steps



Stretch and twist the long rubber band and loop the ends to the legs of a chair. Place the toy car in front of the rubber band.



Pull the toy car with the rubber band 5 cm backwards.



Release the toy car.



Stop the car after 3 seconds.



Measure the distance travelled by the toy car.

Why was the rubber band pulled 10 cm in step 6?



6 Repeat steps 1 to 4 by pulling the rubber band 10 cm backwards.

7 Record the distance travelled by the toy car in the table as shown below.

Distance of rubber band stretched backwards (cm)	Distance travelled by the car (cm)
5	
10	

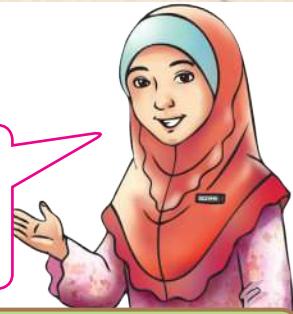


#TEACHER

- Join small rubber bands to form a long rubber band.
- The toy car will travel faster when it is pulled farther backwards using a rubber band.



Write a report for this investigation.



Based on the information obtained in this investigation, what is the relationship between speed and the distance travelled within the set time?

### Questions

1. What are your observations after the toy car was pulled and released at different distances of the rubber band stretched backwards?
2. Make inferences based on the observations.
3. What is the relationship between the manipulated variable and the responding variable in this investigation?
4. Predict the distance travelled by the toy car if 6 cm and 15 cm distances are used in your investigation.

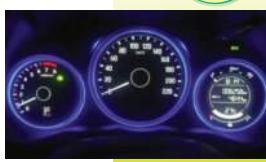
### QUIZ

1. Which of the following shows the shortest distance travelled within the same duration of time?
  - 80 km/h
  - 120 km/h
  - 95 km/h
2. The table below shows the time taken by three types of toy cars P, Q and R to travel 3 metres.

Car	P	Q	R
Time taken (s)	5	6	3

Toy car        travels slower than toy car        but faster than toy car       .

### INFO CLICK



Every vehicle that moves on the road has a speedometer mounted on the front panel of the driver's seat. A speed meter or speedometer is important to indicate the speed of a vehicle in km/h.



Do stationary objects have speed? Why?

What other factors affect the time taken by a moving object to travel? How does speed affect the time taken for an object to travel a fixed distance? Let us do the next activity.



## Let's Test

# Relationship between Speed and Time

### Problem statement

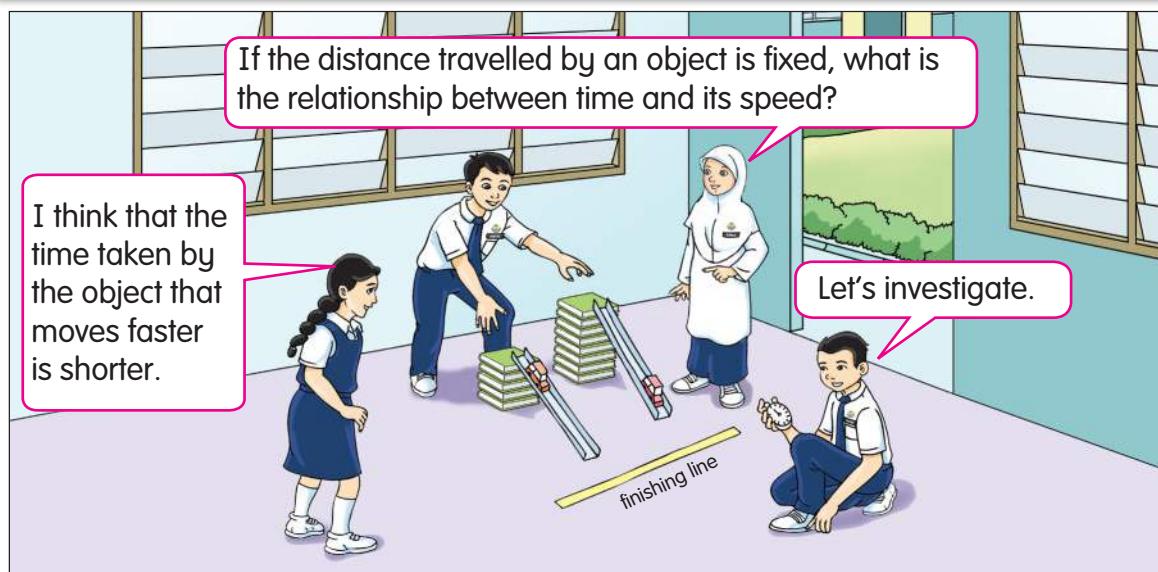
How does speed affect the time taken for an object to travel?

### Aim

To investigate the relationship between speed and time.

### Apparatus and Materials

Toy car, one metre long board, books, stopwatch, and adhesive tape



Conduct an investigation to study the relationship between the speed of an object and the time taken to reach a fixed distance. Plan and conduct the investigation to test your hypothesis. Write a report on the results of the investigation.

### Questions

- What should you do to obtain a shorter travel time for the same distance?
- What is the relationship between speed and travel time of an object?
- State the conclusion of your experiment.



Observe the needle of the speedometer of your father's car while driving. Does the needle of the speedometer always show the same reading? Why?



### #TEACHER

Toy cars will move faster when they are released on a steeper ramp.

# Calculating Speed

The speed of an object is the distance travelled by the object within a unit of time. Observe the two situations in the pictures below.

Situation A



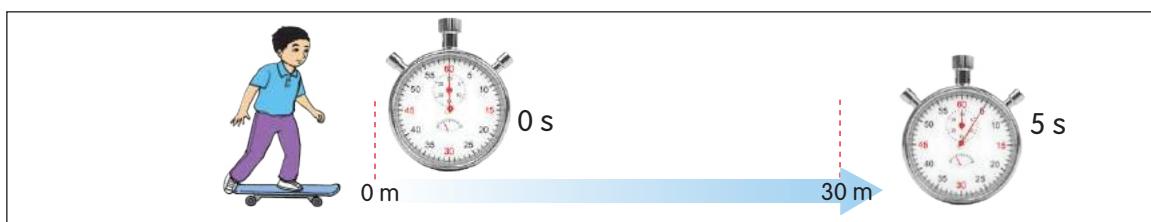
What is the speed in each of the situation?



Situation B



Situations A and B show that the distance travelled increases as time increases. Both pupils travelled 5 meters every second. Therefore, their speed is the same, that is 5 m/s.



How can speed be calculated?

Let us calculate the speed of the motion of the pupil above.

In the situation above, the distance travelled within 5 seconds is 30 metres. What is the distance travelled in 1 second?

The distance travelled in 1 second

$$= \frac{30 \text{ metres}}{5 \text{ seconds}}$$

$$= 6 \text{ metres per seconds}$$

Therefore, the speed for the movement of the pupil is 6 m/s.



The measure of 50 cm is longer than 30 cm. Compare 50 cm/s and 30 cm/s. Which speed is higher? Why?

Speed has a relationship with the distance travelled by an object and the time taken for it to travel. Therefore, speed can be calculated by dividing the distance travelled with the time taken. Speed can be calculated using the formula below.

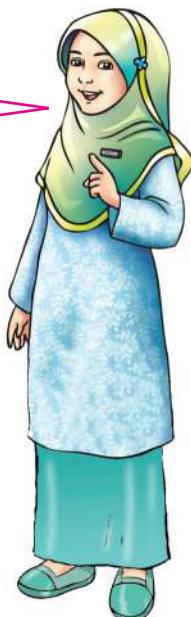
$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

Observe the following situation.



This train took 2 hours to travel 200 km. What is its speed?

$$\begin{aligned}\text{Speed} &= \frac{\text{Distance}}{\text{Time}} \\ &= \frac{200 \text{ km}}{2 \text{ hours}} \\ &= 100 \text{ km/h}\end{aligned}$$



In a relay race, Amir ran 100 metres in 50 seconds. What is his speed?

Q U I Z

1. A motorcycle took 1 minute to travel 600 metres. What is the speed in m/s?
2. A tortoise travels with a speed of 25 cm/s. How far can the tortoise travel in 4 seconds?

INFO  
CLICK

The speed of light is faster than the speed of sound. Therefore, during lightning, you will see strikes of light before the sound of thunder is heard. The speed of sound is 344 m/s in dry air at the temperature of 20°C.



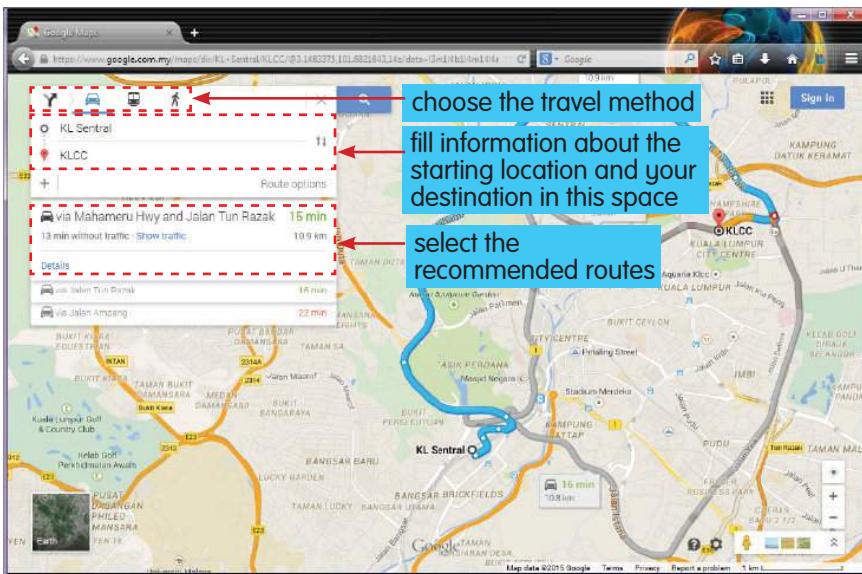
# Google Maps

**Aim** To determine speed using Google Maps application.

**Apparatus and Materials** Computer and Internet

## Steps

1. Conduct this activity individually.
2. Surf Google Maps at [www.google.com.my/maps](http://www.google.com.my/maps).
3. Find out:
  - the distance and driving travel time
  - the distance and walking travel timefrom your house to the nearest town centre.
4. The steps to use Google Maps are shown below.



5. Calculate the speed for each journey using the formula you have learnt.
6. Record the distance, time, and speed for each journey in the table as shown.
7. Compare the speed obtained from Google Maps with the speed calculated using the formula.

Journey	Distance	Time	Speed
Car	/	/	/
Walking	/	/	/

## Question

How useful is the above activity in our daily life?



## Let's Remember

# SPEED

### Definition

Measurement of how fast or slow an object moves from one place to another.

### Unit

centimetre per second (cm/s)  
metre per second (m/s)  
kilometre per hour (km/h)

### SPEED

### Formula

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

### Distance Factor

Travels farther within the same period of time.



10 m

10 s



20 m

10 s

### Time Factor

Takes a shorter time to travel along the same distance.



20 s



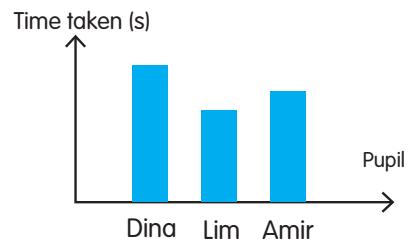
10 s

20 m

**Answer all of the following questions in your Science exercise book.**

- I. The bar chart compares the time taken by three different pupils to finish a 100-metre race. What conclusion can you make?

- A. Dina moves the fastest.
- B. Amir moves slower than Dina but faster than Lim.
- C. Lim moves faster than Dina and Amir.
- D. Amir moves faster than Lim but slower than Dina.



2. The table shows the distance travelled by four types of vehicles P, Q, R and S in two hours.

Vehicle	P	Q	R	S
Distance Travelled (km)	170	190	150	200

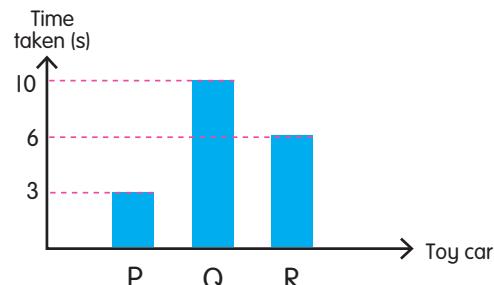
Which of the following is correct?

- A. Q moves faster than S.
  - B. R moves faster than P.
  - C. Q moves faster than P and R.
  - D. P moves slower than R and S.
3. The table shows the distance travelled and the time taken by three vehicles.

Vehicle	Distance (km)	Time (hour)
X	120	2
Y	300	3
Z	450	5

- a) The vehicle with the fastest speed is \_\_\_\_\_.
- b) Vehicle X has a speed of \_\_\_\_\_.
- c) Vehicle \_\_\_\_\_ travels slower than vehicle Y but faster than vehicle \_\_\_\_\_.

4. At 8.30 a.m., Dina's father left the house and reached his office at 9.00 a.m. If Dina's father was driving at a speed of 60 km/h, what is the distance between his house and the office?
5. If Amir's toy car travels at a speed of 3 m/s, how far can the car travel in 5 seconds?
6. Rani's school bus takes half an hour to reach the school that is situated 20 kilometres away from her house.
  - a) Use the formula to calculate the speed of the school bus.
  - b) If the speed of the school bus is increased 40 km/h more than the speed in (a), what is the time needed for the bus to reach the school?
7. In an investigation, toy car P was released down a 3-metre inclined plane. The investigation was repeated using toy cars Q and R of different masses. The time needed for the three toy cars to reach the end of the inclined plane is recorded.



- a) Based on the results in the bar chart above, state two constant variables.
- b) What is your observation from this investigation?
- c) State one inference to explain your answer in (b).
- d) In this investigation, state the
  - i. manipulated variable
  - ii. responding variable
- e) Which toy car is the slowest? What is its speed?
- f) Predict the time taken by toy car P if the height of the inclined plane is increased.



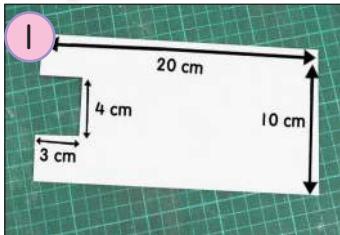
## Let's Try

# My Car Model is Very Fast

**Aim** To design model of a car that can travel fast.

**Apparatus and Materials** Scissors, ruler, pencil, 4 compact discs, cardboard, satay sticks, straw from small packet drinks, paper clips, rubber bands, and adhesive tape

## Steps



Cut out the cardboard as the base for the car model according to the shape and measurement shown above.



Cut and glue the straw on the cardboard as shown in the picture above.



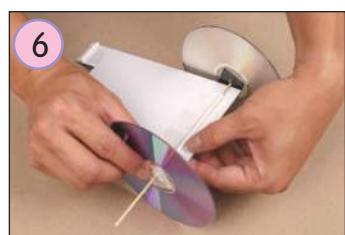
Cover the holes of the compact discs with cardboard and adhesive tape.



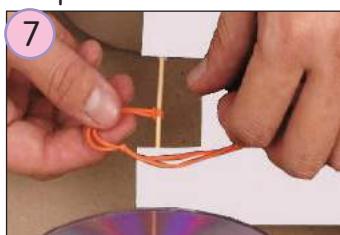
Poke the satay stick into the middle section of the compact disc.



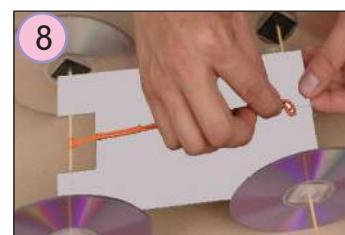
Insert the remaining satay stick into the straw.



Attach another compact disc to the other end of the satay stick as the car wheels.



Tie the long rubber band to the satay stick as shown in the picture.



Pull and stick the rubber band to the other end of the base of the car using a paper clip.

Turn the car wheels that is tied to the rubber band and release it on a smooth surface to move your car model.

Present the car model you designed and compete in a race against the other groups.

## Question

How can you improve your car model so that it can move faster?



- Recycled materials such as bottle caps and tissue rolls can be used to build car models.
- Tie rubber band together to make it longer.

## 8

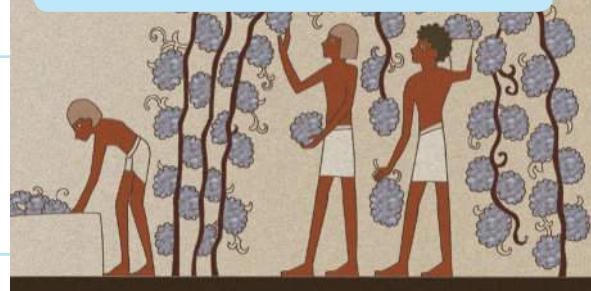
# FOOD PRESERVATION

**500,000 BC**



Cooking food using fire is the earliest preservation method in human civilisation.

**12,000 BC**

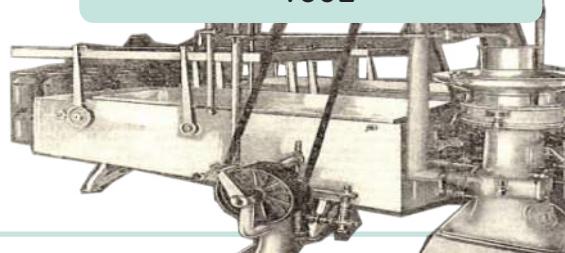


**1400 AD**



Humans rubbed salt into food to avoid wastage and shortage of food.

**1862**



**Present Day**

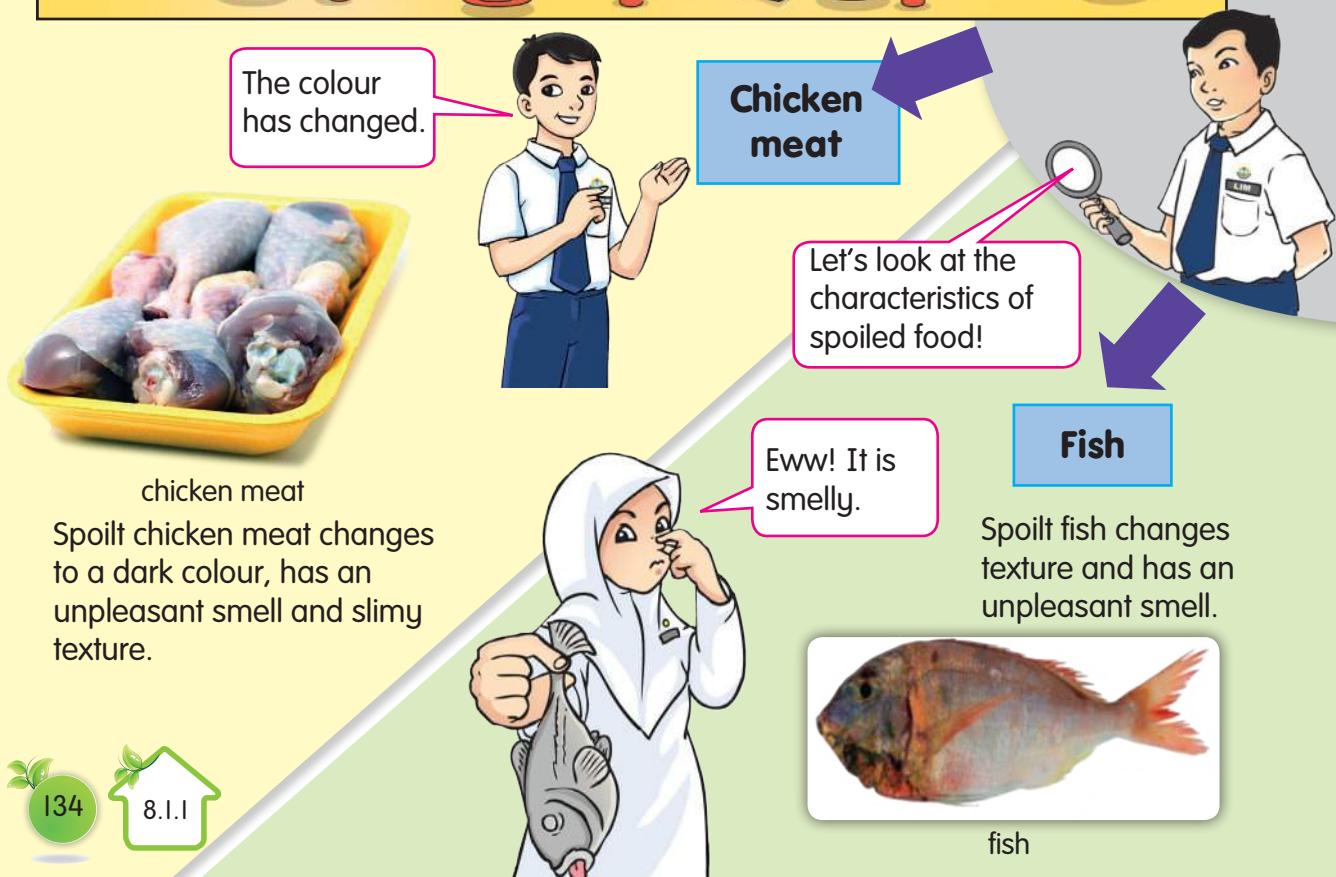
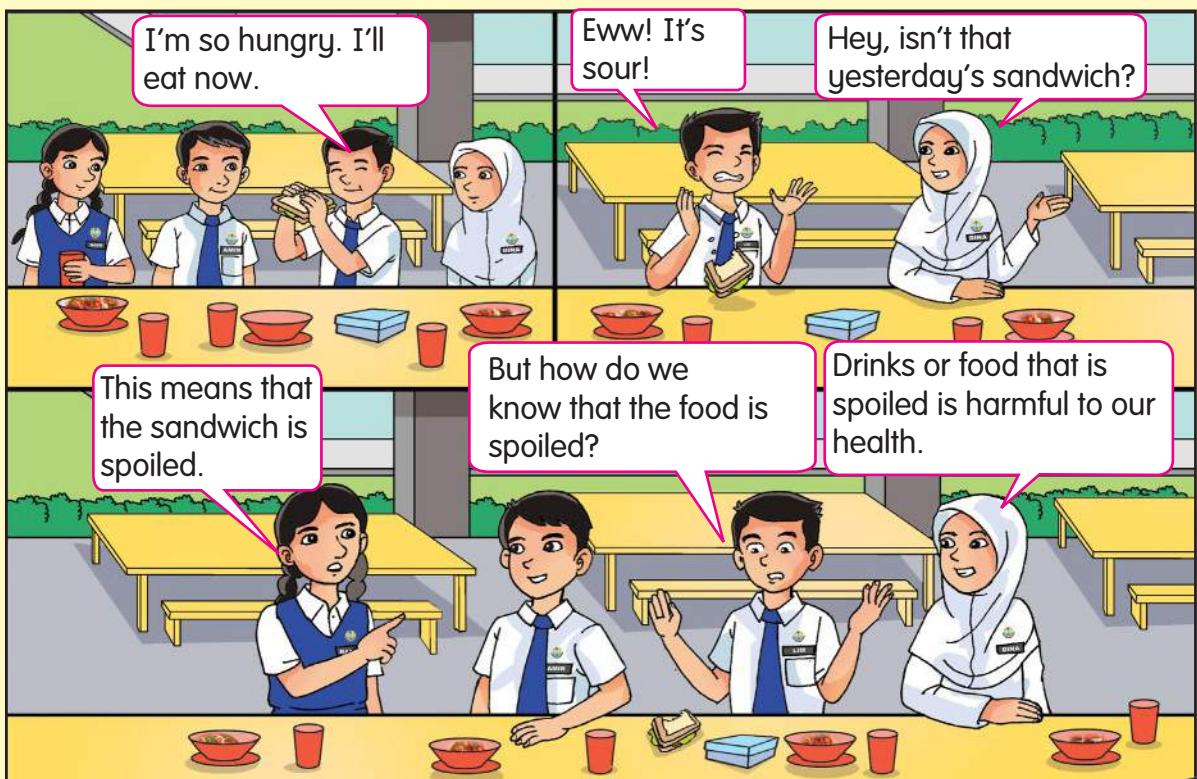


Louis Pasteur discovered a method to destroy bacteria by heating and cooling liquids.

Presently, the use of chemical preservatives allows food to last for a longer period of time.

Since ancient times, humans have been preserving food using various methods. State the importance of food preservation.

# Food Spoilage





This rice is mouldy.



### Rice, bread, and cake

The rice becomes soft, slimy with dark spots and smells sour.  
The bread, *baulu*, and cake contain dark spots.



bread

*baulu*

There is a growth of fungi on the bread.



watermelon

Spoilt fruits change texture, colour, and become mouldy.



apple



banana



cabbage

Spoilt vegetables change to a yellowish colour and wilt.

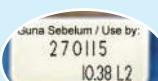


vegetables

### Milk



Spoilt milk is frothy.



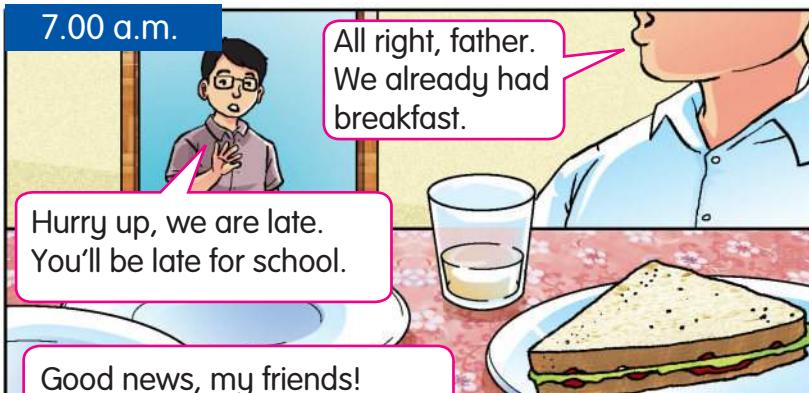
Spoilt milk changes texture, becomes frothy, tastes sour, and has an unpleasant smell.

Can you explain the characteristics of spoilage on other examples of food?

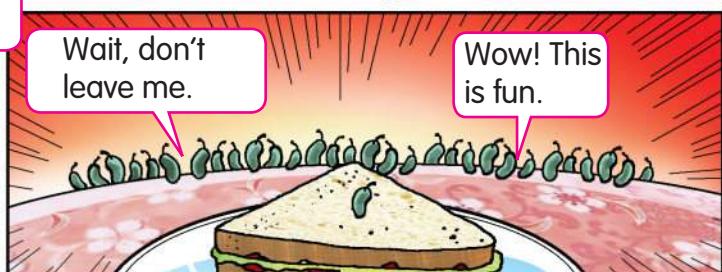


# Causes of Food Spoilage

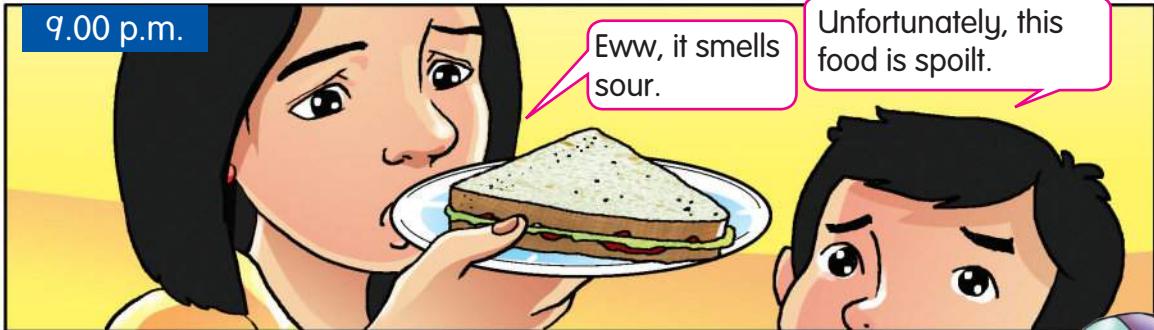
7.00 a.m.



Good news, my friends!  
Looks like there is food for us.



9.00 p.m.



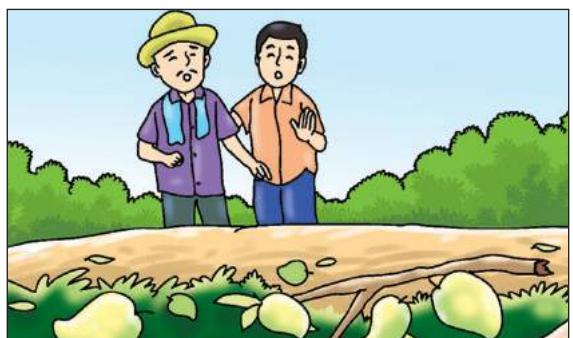
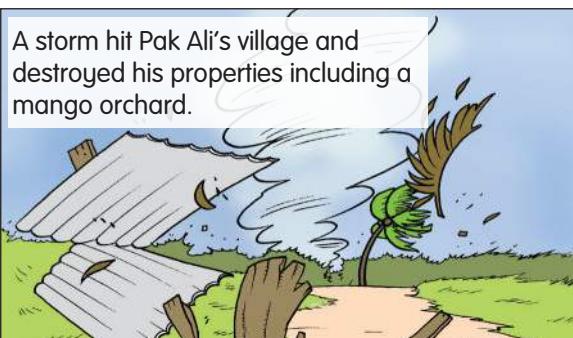
Why do exposed food become spoilt?



Food becomes spoilt as a result of the actions by microorganisms.

# Food Preservation

A storm hit Pak Ali's village and destroyed his properties including a mango orchard.



Such a pity. These mangoes didn't ripe in time. These young mangoes will be wasted.

Don't worry, Pak Ali. We can still save them.

How do we do it?



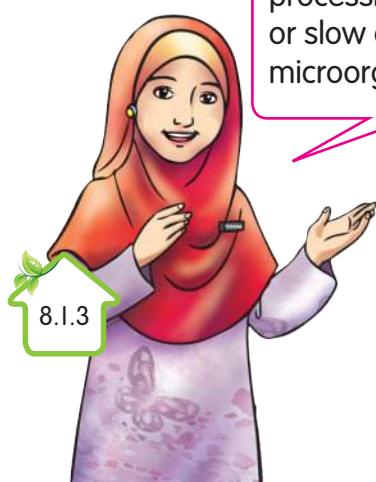
Based on the situation above, how can Pak Ali ensure that his mangoes will not be spoilt?

We can help Pak Ali by carrying out food preservation processes on his mangoes.

What is the purpose of food preservation?

Food preservation is a method of processing food that can prevent or slow down the life processes of microorganisms.

So, the preserved food will last longer.



8.1.3



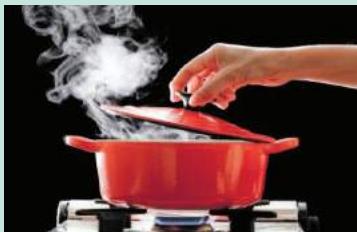
# Food Preservation Methods

There are various methods of food preservation that can be used to ensure that food lasts longer.



## Boiling

Boiling is the process of heating food at high temperature.



Boiling makes the *rendang* lasts longer.

The high temperature kills most of the microorganisms.



## Pickling

Pickling is the process of brining food in a sugar or salt solution. This method is commonly used to preserve fruits and vegetables.



A bottle of pickled chilly.

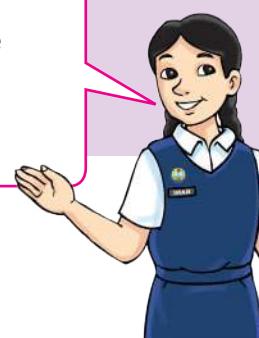


Pouring the sugar or salt solution onto the fruits.



Different types of pickled fruits.

The acidity or high sugar concentration makes the condition unsuitable for microorganisms to grow and reproduce.



## Vacuum packing

The process of removing air from a container or food packaging.

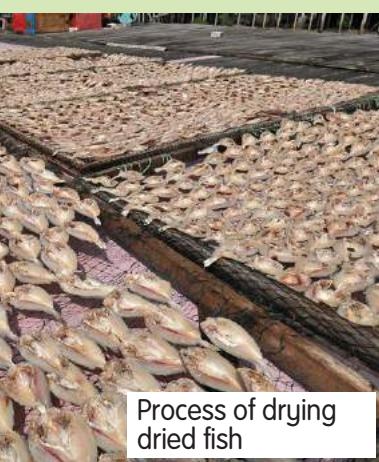


carrots



sausages

Without air, the bacteria cannot grow and reproduce.



Process of drying dried fish

## Drying

Drying is the method of removing or getting rid of most of the water from food. Food can be dried under the sun or in an oven.



dried fish



tamarind peel



dried vermicelli



mushroom



corn pack



The absence of water causes microorganisms to die or become inactive.

## Freezing and cooling

Freezing is the process of keeping food at the freezing point ( $0^{\circ}\text{C}$ ) or lower.

Cooling is the process of keeping food in a surrounding temperature below  $18^{\circ}\text{C}$ .



Lower temperatures cause microorganisms to become less active. They also grow and reproduce at a slower rate.

Think  
for a Moment



Cheese manufacturing is one method of preserving fresh milk. What are the controlling factors that make cheese last longer?



## Salting

Salting uses salt to remove moisture from food. This method has been used for a long time. It is used in salting fish, eggs, and vegetables.



salted eggs



salted fish

## Waxing

Waxing is the process of coating fruits and vegetables such as apples, oranges, lemons, and tomatoes with liquid wax to prevent the growth of microorganisms on their surfaces. This method also helps to retain the freshness of fruits.



## Canning and bottling

Canning and bottling involve the process of boiling food to kill microorganisms. The food is then left to cool and put in an airtight container.

## Pasteurisation



milking cows

## Smoking

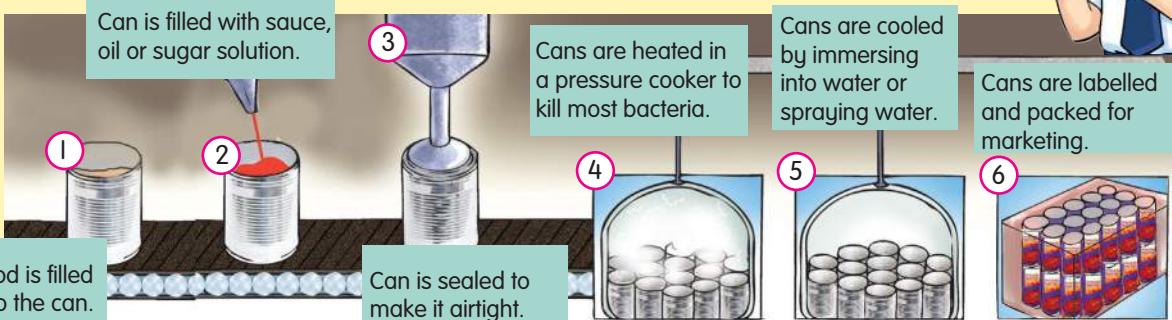
Smoking is the method of drying food with smoke for a long period of time. This method inhibits the growth of microorganisms.



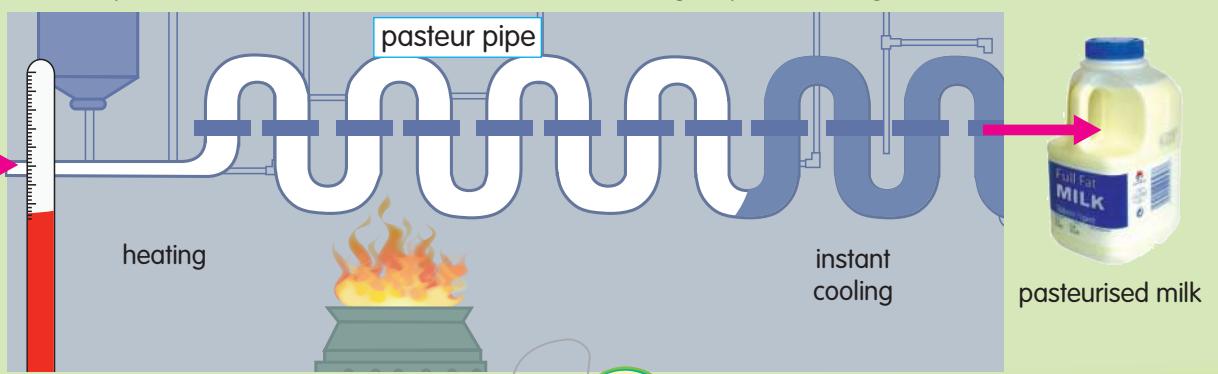
smoked meat



Heating at boiling temperature kills most bacteria that are active without affecting much the taste and nutritional value of the food.



Pasteurisation is the process of heating food to a certain temperature for some time and followed by rapid cooling.



smoked fish



smoked banana

### INFO CLICK



Louis Pasteur was the scientist who discovered that the method of heating followed by rapid cooling kills most bacteria. The method known as pasteurisation is named after him.



### TASK

Using your creativity, create a new type of preserved food innovatively using a preservation method that you have learnt.



# Pineapple Entrepreneur Project

**Aim** To make pineapple jam using a preservation method.

**Apparatus and Materials** Blender, gas stove, chopping board, knife, a pineapple, 250 g of sugar, cooking pot, spatula, and 2 cups of water

## Steps



Peel the pineapple and clean it. Cut into small pieces.



Blend the pineapple pieces until they become smooth.



Cook the blended pineapple with sugar in a cooking pot using a slow fire.



Stir the pineapple jam and turn off the fire when the jam looks thick.



Leave the jam to cool and put it in a container. Label your pineapple jam container.



## TASK

Carry out an activity on fruit preservation using the pickling method.

## Questions

- What is the preservation method used to make the pineapple jam? Name other suitable methods to preserve pineapples.
- What are the factors needed for microorganism's growth that are eliminated in this preservation method?



Elaborate the advantages of food preservation in terms of microorganisms' growth.



Food preservation methods are simple and can be done at home. Hence, many small businesses produce preserved foods and sell them using the social media.

## Importance of Food Preservation Technology



Canned food can solve food shortage problem during an emergency. For example, when flood hits an area.



Some food that are produced in one country can be enjoyed in other countries.



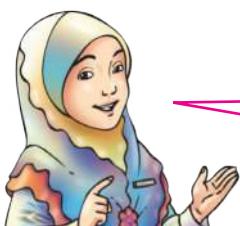
Food preservation technology makes it easy for food to be stored and transported for marketing elsewhere.



Seasonal fruits can be enjoyed throughout the year.



Preserved food can be stored longer and meet the demands for food supply throughout the year.



Based on the situation above, describe the importance of food preservation technology in order to meet the demands for food supply.



### TASK

Using the Internet, find information about food preservation technology and explain the factors that influence the growth of microorganisms in food. Print your findings and create a scrapbook on interesting food preservation methods.



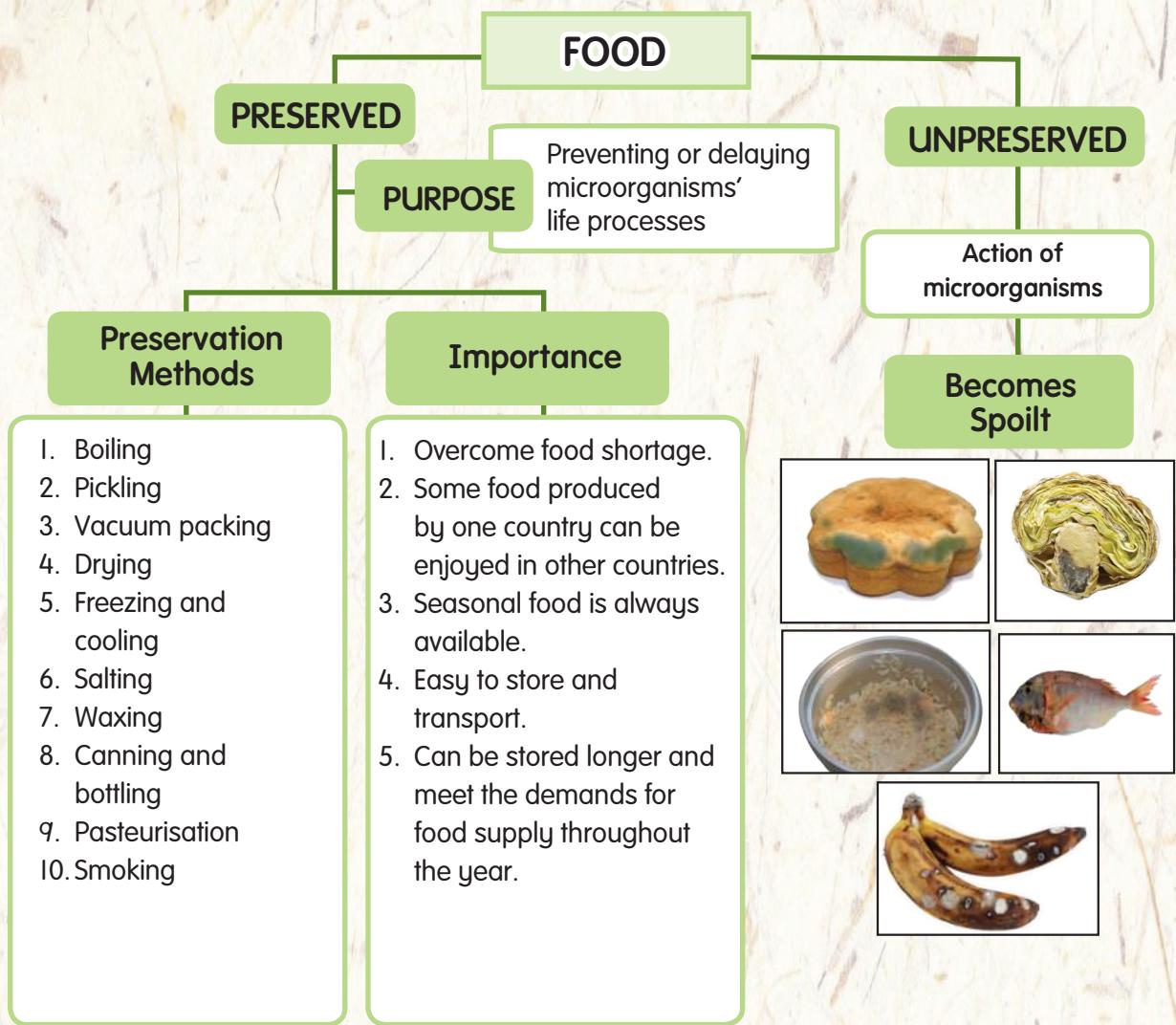
#TEACHER

Surf the Internet to find out information about food pickling.



## Let's Remember

# FOOD PRESERVATION



## CHARACTERISTICS OF SPOILT FOOD

Changes colour to black, becomes mouldy, and frothy

Unpleasant smell

Tastes sour

Slimy

Answer all of the following questions in the Science exercise book.

1. Which of the following are the characteristics of spoilt rice?
 

I. Pleasant smell	II. Slimy
III. Have black spots	IV. Powdery
A. I and II	B. II and III
C. II and IV	D. III and IV
2. The picture shows part of a curry puff.



If the curry puff is left exposed, which part will be spoilt first? Explain your answer by stating the characteristics of the spoilage.

3. The pictures show four different methods of preserving food.



For each of the food above, state the:

- a) Preservation method used.
- b) Factors that prevent the growth of microorganisms.

4. The picture shows food that is spoilt.

Which of the following are factors that caused the food to spoil?

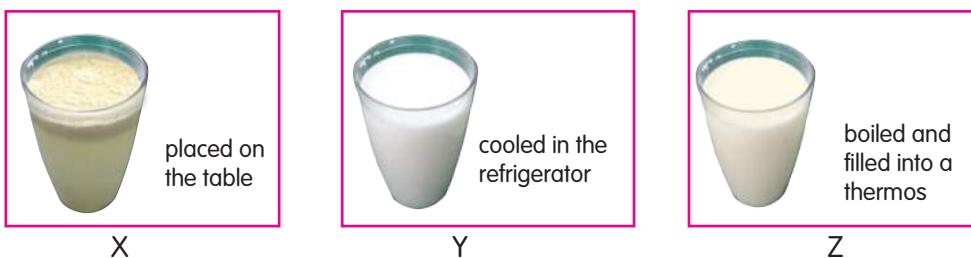
- I. Presence of sunlight
- II. Presence of water
- III. Temperature that is too low
- IV. Presence of air



- A. I and II  
 B. I and III  
 C. II and III  
 D. II and IV
5. The pictures show the condition of a tomato that was left at room temperature for 3 weeks.



- a) What is the purpose of this investigation?  
 b) What is the pattern in the change of the fungus growth on the tomato?  
 c) State the constant variable in this investigation.  
 d) What conclusion can be made from this investigation?  
 e) Suggest two ways to preserve tomatoes and to avoid the growth of fungus.
6. The pictures show a 100 ml of fresh milk stored in three different ways after 3 days.



- a) State the conditions of the milk.
- Milk X
  - Milk Y
  - Milk Z
- b) Based on your answer in (a), what inferences can be made?
- Milk X
  - Milk Y
  - Milk Z



## Let's Try

# Salted Egg Project



### Aim

To make salted eggs using the salting method.

**Apparatus and Materials** Jar, pot, stove, ladle, two duck eggs, Internet, 150 g of salt, and 500 ml of water

### #TIPS

Coarse salt is more suitable for salting.

### Steps



Clean the duck eggs and dry it.



Boil water with the salt until it has completely dissolved. Leave the salt solution to cool.



Put the eggs and salt solution into a jar. Make sure that the eggs are completely immersed.



Close the jar tightly. Leave it for 2 weeks.



After 2 weeks, the salted eggs can be boiled.

6

Surf the Internet to find other suitable methods for making salted eggs. Present the results to the class.

### Question

Name other suitable food that can be preserved using the same method.



### HOTS

Can duck eggs used in this preservation be replaced with chicken eggs? Why?



# WASTE MATERIALS

Classroom



Fast food restaurant



Picnic on the beach



Observe the pictures above. What lifestyle do they practise? Predict what will happen to the environment if this lifestyle is not practised.

# Knowing Waste Materials

Every day we throw leftover food, plastic bags, drinking cans, papers, and other types of materials. Do you know the meaning of waste materials?

Waste materials are materials that we no longer need and do not want to keep.



Waste materials can be categorised as follows:



**Plastic**  
Plastic waste consists of synthetic materials, food wrappers, bottles, and containers made of plastic.



**Metal**  
Waste materials such as scrap iron, aluminium, and milk cans are examples of metal wastes.



**Glass**  
Bottles, jars, and glass apparatus are examples of glass wastes.



**Paper**  
Materials such as old newspapers, magazines, and boxes are types of paper wastes.



State examples of waste materials based on the types of material.

**Food Waste**

Remains of bones, skin of fruit, rotten vegetables, and spoilt food are wastes that originate from our food.



Food waste and paper are organic wastes because they derive from animals and plants.

**Excretory Products and Faeces**

Wastes eliminated from humans and animals such as urine and faeces are waste materials that can be categorised as excretory products and faeces.

**INFO CLICK**

Be careful with toxic wastes! The following are the meanings of the symbols on the containers of toxic materials.



Highly Flammable



Contain toxic materials



Contain materials with harmful microorganisms



Contain concentrated solutions of strong acid or alkaline that can corrode skin and metals.

**Toxic Waste**

Toxic wastes are waste materials derived from chemical, industrial, and agricultural wastes. Aerosol canisters, pesticides, used batteries, and smoke from vehicles are classified as toxic wastes.



industrial waste materials



smoke from vehicles



smoke from factories



spray from pesticides

# Biodegradable or Not?

What will happen to waste materials after they are thrown for a long time in our environment?



Teacher, why do wastes from food and paper no longer exist in the soil?

Oh, it is because these waste materials are biodegradable.

Biodegradable?

Biodegradable wastes are waste materials that can be decayed by microorganisms.

**Biodegradable wastes** are decayed by microorganisms and are returned as nutrients to the soil. Biodegradable wastes consist of organic materials such as food wastes, papers, excretory products, and faeces.



glass, plastic, and metal

However, waste materials such as glass, plastic, and metal cannot be decayed by microorganisms. These wastes are called **non-biodegradable wastes**. Toxic wastes are also non-biodegradable wastes.

This means that non-biodegradable wastes can pollute our environment!





## Separate Wisely

### Aim

To classify biodegradable and non-biodegradable wastes in school surroundings.

### Apparatus and Materials

Marker pen, manila card, red and blue stickers, and waste materials

### Steps

- Conduct this activity in small groups.



Object	Material	Waste material	
		Biodegradable	Non-biodegradable

- Choose and collect a few items in your school surroundings.
- Use the coloured stickers and mark the items according to the following categories:
  - Biodegradable
  - Non-biodegradable
- Construct a table as shown above. Transfer the results of your observations into the table.
- Present your table to the class. Share the results of your observations with other friends.

### Questions

- Why is there a need to control the use of non-biodegradable materials?
- How can waste materials be classified?
- What conclusion can you make from this activity?



Predict what will happen if all materials are non-biodegradable.

### INFO CLICK

Do you know that waste materials can remain in the soil for hundreds of years?

	paper	2 – 3 weeks		banana skin	1 – 3 months		disposable diaper	10 – 20 years		can	200 – 400 years		plastic bottle and rubber	> 500 years
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q.1.3  
q.1.6



#TEACHER  
Surf the Internet to find out the time taken for waste materials to decay.

# Appreciate Our Earth

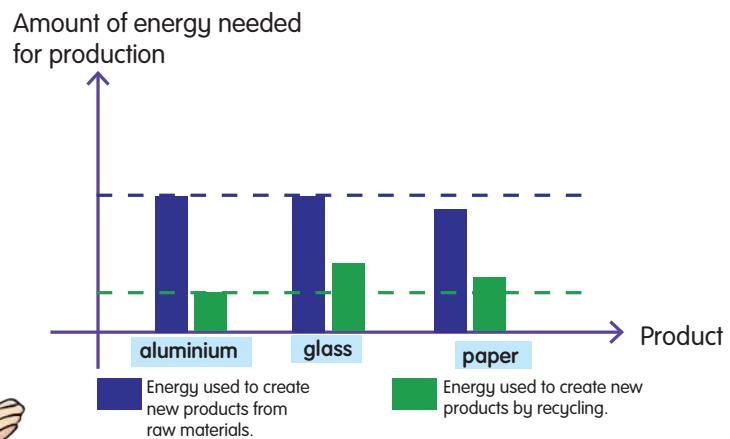
With advanced technology, humans tend to produce a variety of products that last longer, can withstand high temperature, and are easy to use. Plastic bags, synthetic fabrics, and computer items are among materials that are non-biodegradable and are increasingly produced around the world.

These materials do not decay when thrown away and remain in the environment for a long time. Therefore, we must use them wisely.

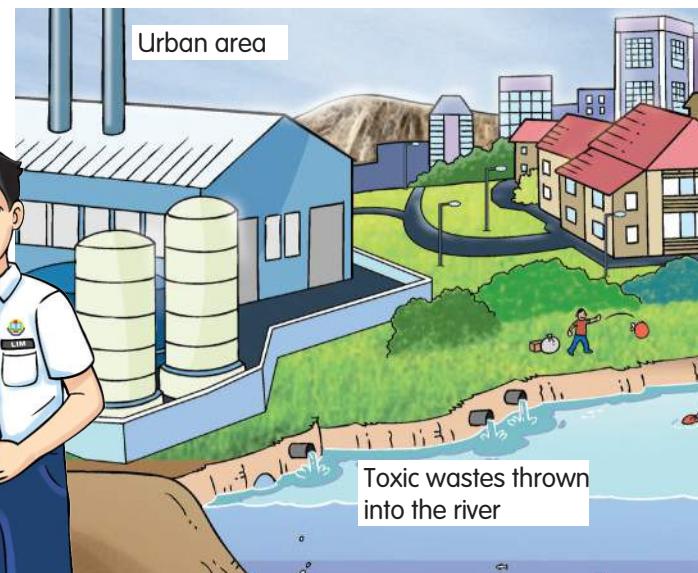
Why do we need to use non-biodegradable wastes wisely?

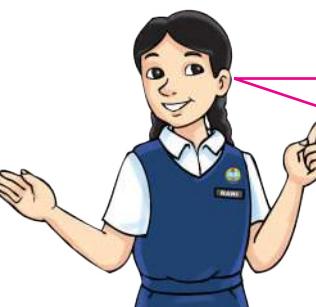


Based on the bar chart, how can we save energy in the production of non-biodegradable materials?



How can non-biodegradable wastes contribute to environmental pollution?

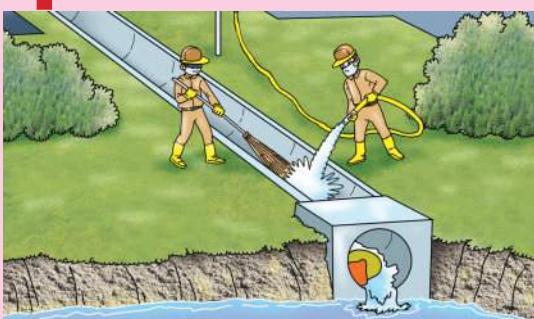




How can non-biodegradable wastes cause natural disasters?



flash flood



clogged drains



Aedes breeding ground



dengue fever



Toxic wastes are chemicals from factories that become wastes. These wastes cannot be decayed by microorganisms. These materials remain in the environment.



disease



fish eaten by humans



contaminated fish sold in the market

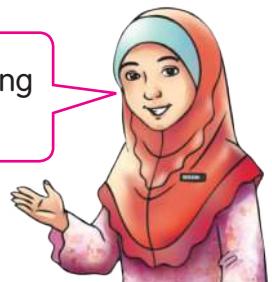
How can non-biodegradable wastes disposal affect our health?



# Waste Management Practices

Sustainable living is a practice that reduces the impact on the environment so that the beauty of nature can be enjoyed by future generations.

What is your role in managing waste materials properly?



Thank you for making it easy for us to manage these wastes.

You're welcome.



Waste materials should be put in a garbage bag and tied neatly.

Put the waste material according to its type, please!



Waste materials should be separated according to their types of material before being disposed.

Why is waste oil collected into a container, dad?

It is to control unplanned disposal of waste materials.



Use special containers to dispose chemical wastes and waste oil.

Food wastes can decay and be composted. The following is how to make a simple compost.



Put soil into a plastic container with holes.



Put food wastes and mix them with the soil. Pour water and leave it for 4 to 5 weeks.



Mix the compost pile every week and pour water to maintain the soil moisture.



After 4 to 5 weeks, the food wastes have decayed and become compost.

### #TIPS

Keep the compost pile outside the house to avoid smelly odours during the decomposition process.

This compost can be used as soil and fertilisers for our crops.



Practising the 3R's can reduce piles of waste materials in the environment.

#### R - REDUCE

Reduce the use of waste materials such as plastic bags.



use recycled bags

#### R - REUSE

Reuse or diversify the use of waste materials.



#### R - RECYCLE

Recycle waste materials into new products.



How can we save humans and the environment by using non-biodegradable waste materials wisely?



# Planned Management of Waste Materials

In most urban areas, domestic wastes are managed in a planned manner by the Local Municipal Authorities.

How are waste materials disposed?



Waste materials are collected and sent to a waste treatment centre.



At the waste treatment centre, waste materials are separated by types of recyclable and non-recyclable wastes.



Waste materials that cannot be recycled are burned in a high-temperature incinerator.

Wastes that can be recycled are compacted and sent to a processing plant to be made into new materials.



block of paper waste



pellets of plastic waste



block of scrap metal



waste glass powder

RECYCLING FACTORY



new paper bag



new plastic bottle



new aluminium can



new glass bottle

Wastes from incinerators are sent to landfills for disposal.

**TASK**

Use your creativity to create several bookmarks that contain ways to manage waste materials and the role of humans to manage waste materials for sustainable living.



# WASTE MATERIALS

Biodegradable



food wastes

TYPE



Non-biodegradable



glass bottle, plastic, and aluminium/metal can

Management

Bad Impacts

Planned

Practices

• pollution

• health problems

• flood

• waste of energy

Local Municipal Authorities

Waste materials are sent to waste treatment centre



Put waste materials in garbage bags and tie neatly.



Put liquid wastes in special containers.



Put waste materials according to the types of bin provided.



Produce composts using food wastes.

Waste materials are separated by type

Burned in an incinerator and disposed

Recycled

3R's Practices

R-REDUCE

R-REUSE

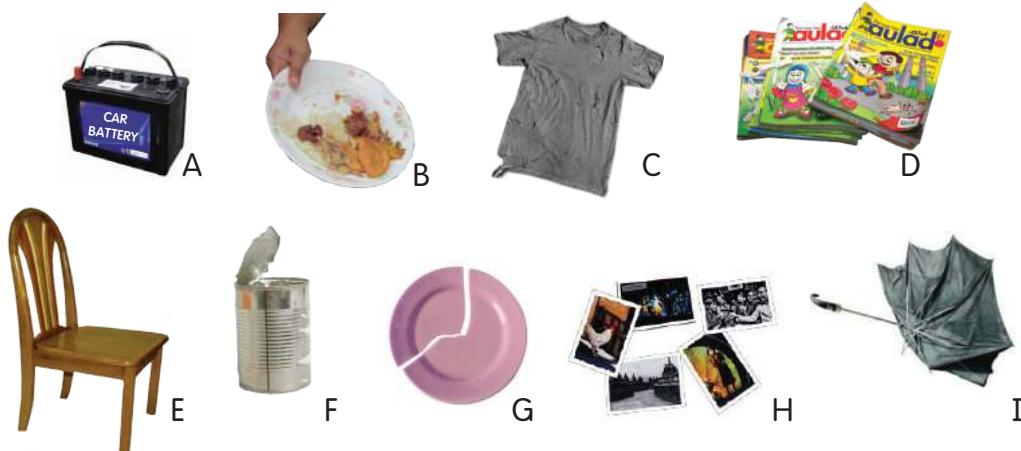
R-RECYCLE

Answer all of the following questions in the Science exercise book.

- I. Fill in the following table according to the suitable type of waste material.

Waste material	Herbicides	Milk carton	Plastic chair	Goat faeces	Banana skin	Scrap metal	Cracked mirror
Type of waste material	✓	✓	✓	✓	✓	✓	✓

2. Amir wants to throw garbage. The following are the waste materials to be disposed by Amir. Classify these waste materials into biodegradable and non-biodegradable items.



3. Arrange the steps to manage domestic wastes by the Local Municipal Authorities in the correct sequence.

- P Waste materials that cannot be recycled are burned in an incinerator and disposed.
- Q Waste materials are separated according to the types of waste at the waste treatment centres.
- R Wastes that can be recycled are compacted and sent to a processing plant to be made into new materials.
- S Waste materials are collected and sent to a waste treatment centre.

4. What are the impacts of reckless disposal of non-biodegradable wastes?

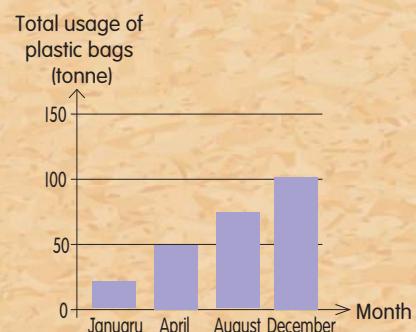
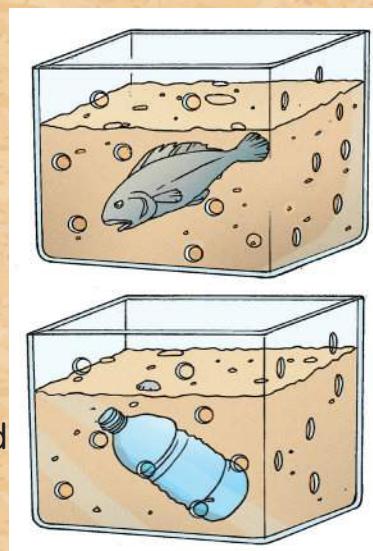
- |                      |                  |
|----------------------|------------------|
| I. Pollution         | II. Skin disease |
| III. Waste of energy | IV. Flash flood  |
- A. I and II
  - B. I and IV
  - C. II and III
  - D. III and IV

5. Anna and her friends conducted an investigation on two types of waste materials planted in a container filled with soil for 4 weeks.

- a) After 4 weeks, state what can be observed on the following waste materials:
  - i. Fish
  - ii. Plastic bottle
- b) Give an inference based on your observations in (a).
- c) What is the purpose of this experiment?
- d) What conclusion can you make from this investigation?

6. The chart shows the results of an investigation on the total number of plastic bags used in city A.

- a) State the information collected in this investigation.
- b) Write a statement to relate the two information in (a).
- c) State one bad impact on city A due to the change in the pattern shown.
- d) State one inference to explain the change in the number of plastic bags used from January to December.



The number of dengue cases in city A is influenced by the amount of waste materials produced by residents.

- e) Make a hypothesis based on the above statement.



## Let's Try

# Recycled Broom

**Aim** To make a broom using discarded plastic bottles.

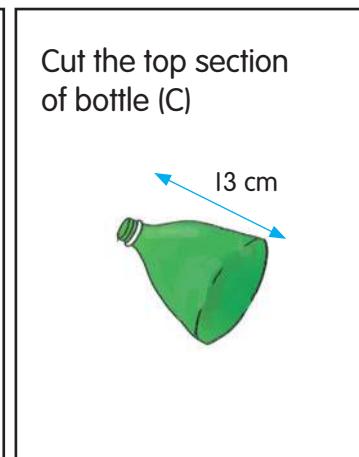
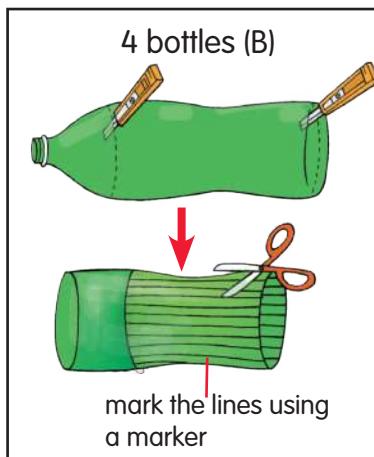
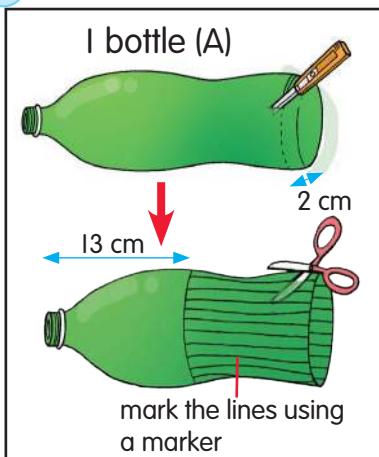
**Apparatus** Knife, scissors, nail, hammer, tapered nose pliers, and hole punch, marker, 6 plastic bottles (1.5 litre),  
**Materials** broom handle, and wire



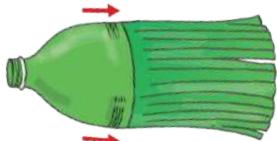
Be careful when using sharp objects.

### Steps

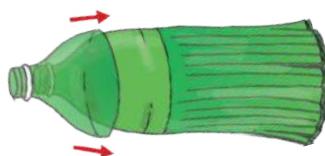
1 Cut the bottles as follows:



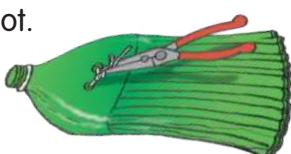
2 Fit all 4 cut bottles (B) into bottle (A).



3 Then fit (C) as shown.



4 Make two holes at the top and bottom, insert the wire, and tidy the knot.

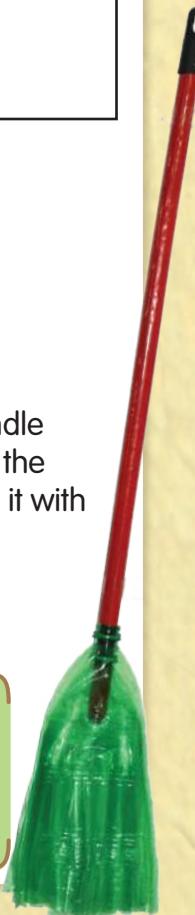


5 Fit the broom handle into the mouth of the bottle and secure it with a nail.



### Questions

1. What differentiates the Reuse activities such as the above with Recycle and Reduce activities? Explain your answer using examples.
2. How can 3R's practices save our environment?



**10**

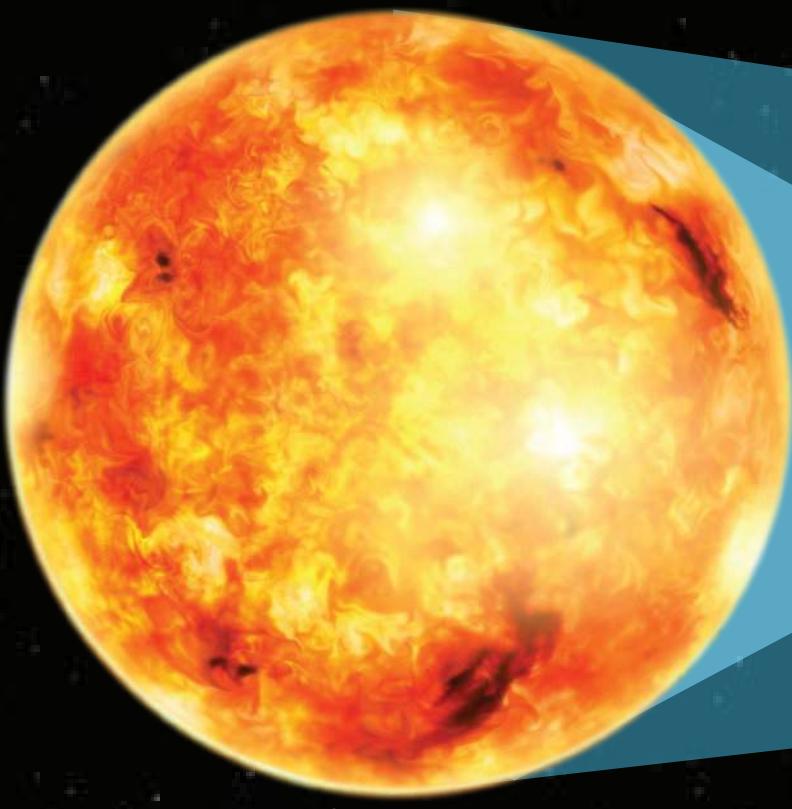
# ECLIPSES



The picture above shows a group of people on Earth during an eclipse. Look towards the sky. What happened to the Sun? Have you ever seen this phenomenon before? How does an eclipse occur?

# Eclipse of the Moon

**Eclipse of the Moon** occurs when the Earth blocks the sunlight from reaching the Moon. The Earth's shadow is formed on the surface of the Moon. Observe the positions of the Sun, Earth, and Moon in the diagram below. How does an eclipse of the Moon occur?



Sun

The Sun is a source of light in the Solar System. Sunlight travels in a straight line and cannot pass through opaque objects such as the Earth.

Lunar eclipse can occur three times a year. The duration of the eclipse of the Moon usually happens for several hours.

## #TEACHER



- The eclipse is a natural phenomenon that occurs when all or part of the sunlight is blocked by the Moon or Earth.
- The diagram above does not show the actual proportional size and distance but it was created to facilitate the pupils' understanding.
- Surf the Internet to find out an interactive simulation of an eclipse.

The Earth is between the Sun and the Moon during an eclipse of the Moon. The Sun, Earth, and Moon are in a straight line.

Eclipse of the Moon occurs at night when the Moon is in the full moon phase.



Moon's orbit

partially dark area

Moon

totally dark area

partially dark area

The Earth blocks sunlight from reaching the Moon. The Earth's shadow is formed on the surface of the Moon.



If you are a Malaysian astronaut who is on the Moon during an eclipse of the Moon, what will you see?



Why does eclipse of the Moon only occur during the full moon phase?

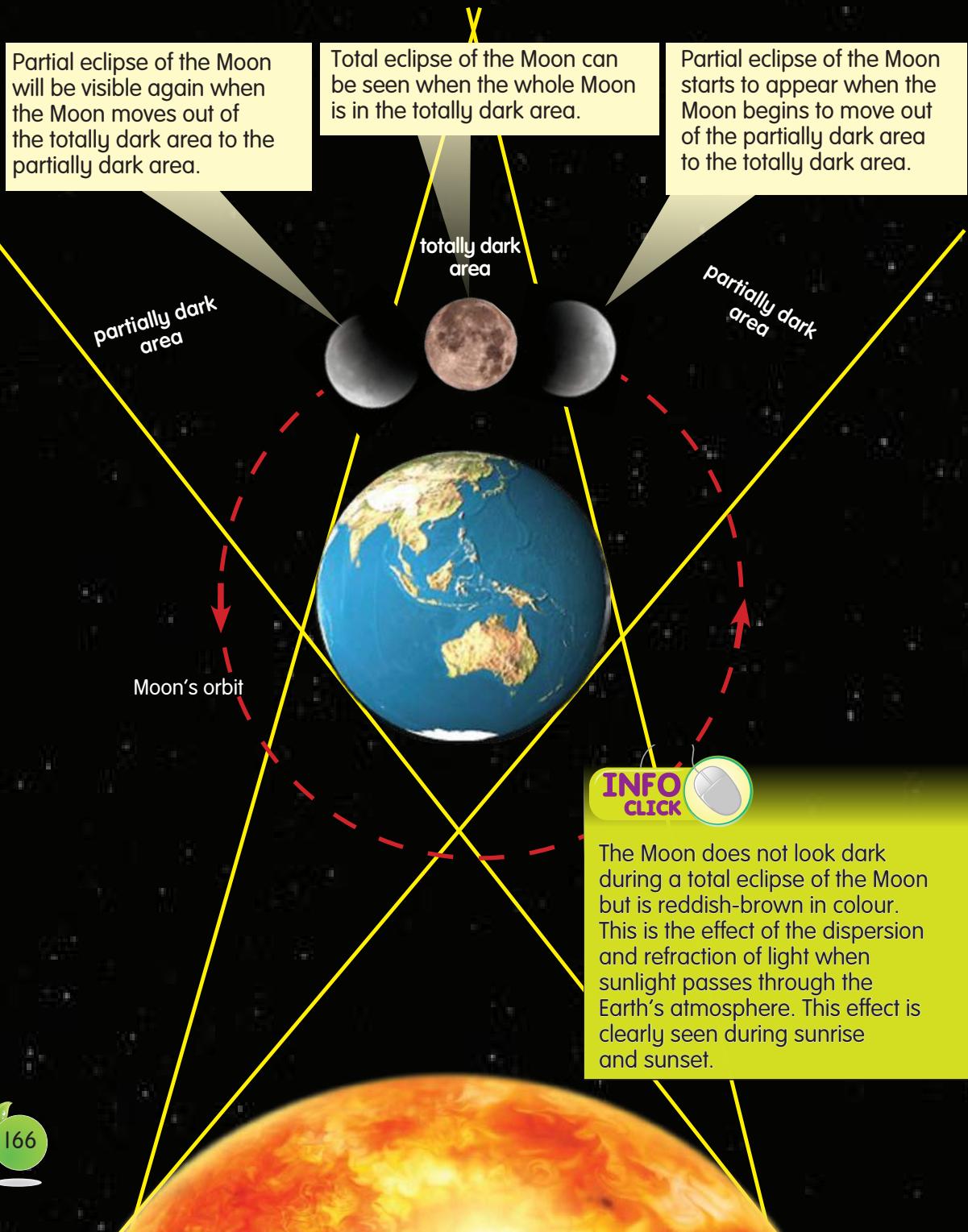


The totally dark area or umbra is an area that is totally blocked from sunlight. The partially dark area or penumbra is an area that is partially blocked from the sunlight.



## Total and partial eclipses of the Moon

The diagram below shows the stages of the eclipse of the Moon that can be seen with the naked eye. In these stages, we can see two types of eclipse of the Moon, namely the total eclipse of the Moon and the partial eclipse of the Moon. How do the stages of the eclipse of the Moon occur?





# Eclipse of the Moon Simulation

**Aim** To explain eclipse of the Moon using an eclipse simulation model.

**Apparatus and Materials** Torch, plasticine, satay stick, polystyrene plate, 10 cm cardboard roll, and 30 cm square polystyrene sheet

## Steps



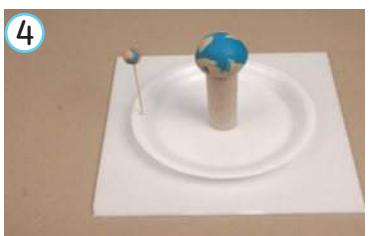
Put the polystyrene plate on top of the square polystyrene sheet.



Shape a model of the Moon and Earth using the plasticine.



Poke the model of the Moon at the end of the satay stick and place it on the edge of the polystyrene plate.



Put the model of the Earth on the cardboard roll and place it in the middle of the polystyrene plate.



Adjust the positions of the Moon, the Earth, and the torch so that they are in a straight line. Do this simulation in a dark room.



Turn on the torch and point towards the model of the Earth. Rotate the polystyrene plate and observe the Earth's shadow on the Moon's surface.

7. Sketch the model of the eclipse of the Moon made.

## Questions

- Based on this simulation of the eclipse, explain why does the eclipse of the Moon cannot occur if Earth's position is higher or lower than the position of the Moon.
- Explain the eclipse of the Moon based on the activities that were carried out.



Do other planets also experience the eclipse phenomena? Why?



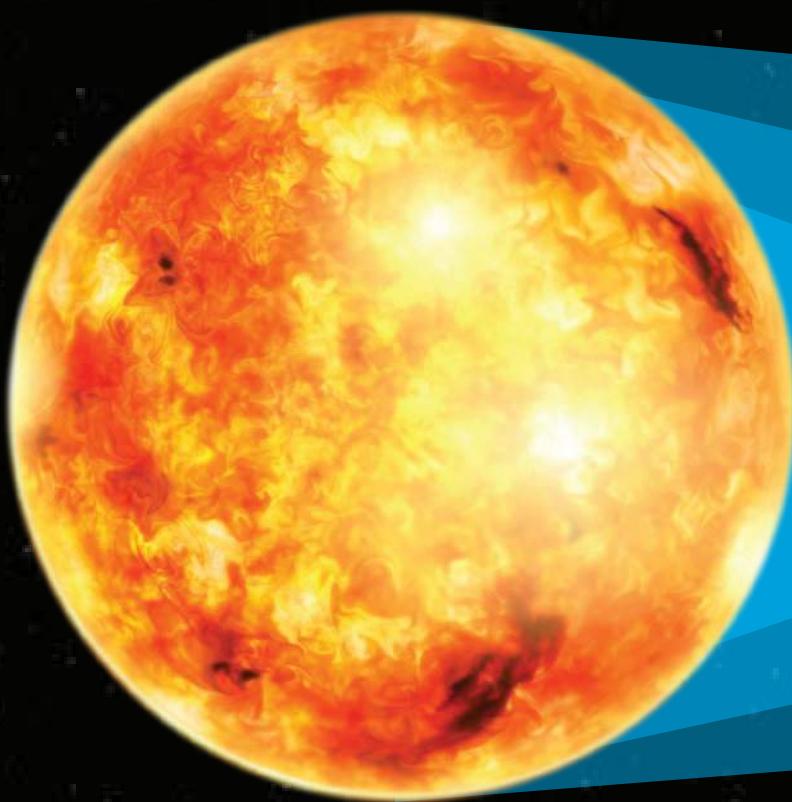
#TEACHER

The simulation using the model of the eclipse of the Moon can also be used on the eclipse of the Sun.



# Eclipse of the Sun

**Eclipse of the Sun** occurs when the Moon blocks the Earth from the sunlight either totally or partially. The size of the Moon is smaller than the Sun. Hence, the shadow of the Moon formed is small and not large enough to fully cover the Earth. This is the reason why the eclipse of the Sun can only be seen from a small area on the surface of the Earth.



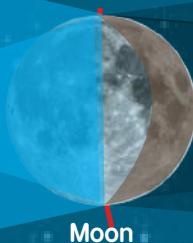
Sun

Sunlight travels in a straight line and cannot pass through opaque objects like the Moon.

**Eclipse of the Sun** can occur at least twice a year. The eclipse of the Sun usually lasts for only a few minutes.

The Moon is between the Sun and the Earth during an eclipse of the Sun. The Sun, the Moon, and the Earth are in a straight line.

Eclipse of the Sun can be seen in the areas of the Moon's shadow during **daytime** only. Eclipse of the Sun can only occur when the Moon is in the **new Moon** phase.



totally dark area

partially dark area

Earth

The Moon blocks sunlight from reaching the Earth. The Moon's shadow is formed on the surface of the Earth.



#TEACHER

Surf the Internet to find out an interactive simulation of an eclipse.

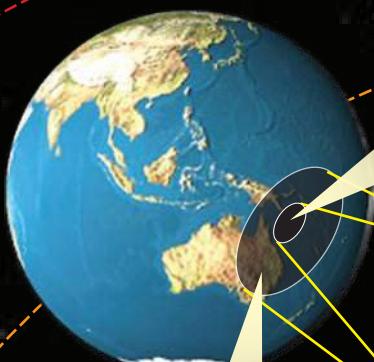
HOTS

Why is the duration of the eclipse of the Moon longer than the eclipse of the Sun?

The diagram below shows the stages of a solar eclipse observed from the Earth. During the stages, there are two types of eclipse of the Sun. They are total eclipse of the Sun and partial eclipse of the Sun.



When a total solar eclipse of the Sun occurs, the surroundings will be as dark as night. The Sun appears as a dark circle surrounded by a bright ring called a corona.



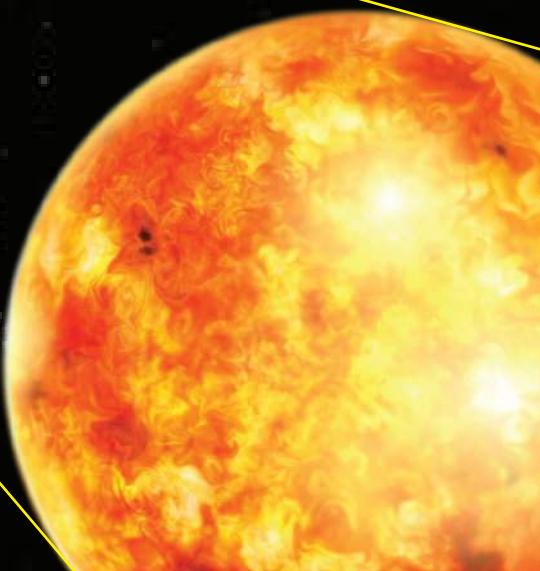
A total eclipse of the Sun can be seen from the area of the Moon's shadow that is completely dark.



Never look directly at the Sun without using a special filter as this can damage your eyes.



A partial eclipse of the Sun can be seen from the area of the Moon's shadow that is partially dark.





## Let's Test

## Solar Eclipse Camera

## Aim

To observe an eclipse of the Sun in a safe way.

## Apparatus and Materials

Scissors, knife, empty shuttlecock tube and lid, aluminium foil, white paper, adhesive tape, glue, needle, and pencil

## Steps



Cut the aluminium foil into a circle larger than the mouth of the tube.



Cover the mouth of the tube and attach the aluminium foil with the adhesive tape.



Punch a hole in the middle of the aluminium foil using a needle.



Cut and stick a piece of white paper on the lid of the tube. This white paper will act as a screen for the image of the Sun.



Cover the opening on the other end of the tube with this lid cover.



Cut out a square opening measuring 3 cm on the side of the tube at a distance of 7 cm from the end of the tube.



Observe the image of the Sun through the opening on the side of the tube.



Avoid looking directly at the eclipse of the Sun.

## Questions

- What modifications can be made on the solar eclipse camera so that the image observed is larger?
- What are other safe ways to observe the eclipse of the Sun?



The shuttlecock tube can be replaced with a long box or a few boxes that are joined together.

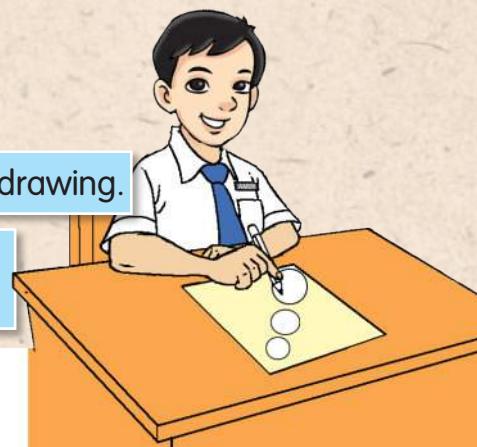


## Let's Test

# Sketching an Eclipse

**Aim** To describe the phenomenon of an eclipse through drawing.

**Apparatus and Materials** Pencil, ruler, compasses, rubber, and drawing paper



### Steps

1. Carry out this activity individually.
2. Sketch a lateral view of the positions of the Sun, the Earth, and the Moon with the correct light rays for the eclipse of the Moon phenomenon.
3. Label your sketch.
4. Mark the positions of the Moon on your sketch to show its positions during total and partial eclipses of the Moon.
5. Mark on your sketch:
  - the directions for the rotation of the Earth around the Sun
  - rotation of the Moon around the Earth, and
  - the rotation of the Earth on its own axis.
6. Repeat steps 2 to 5 for the eclipse of the Sun phenomenon.
7. Add information on your sketch about the effects of the eclipse phenomenon to life on Earth.
8. The information can be obtained on the Internet using search engines such as Google and Yahoo.
9. Present the results of your sketches to the class.

### Questions

1. Based on your sketches, name the stages of the eclipse that occurred in the correct sequence.
2. Why the eclipse of the Moon phenomenon does not occur during the day?
3. What are the distinguishing features of the eclipse of the Moon and the eclipse of the Sun?

### QUIZ

Which of the following is a total eclipse of the Sun?



P



Q



R



S



## Let's Remember

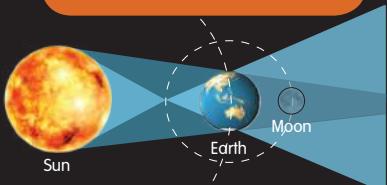
# ECLIPSES

### ECLIPSE PHENOMENA

Sunlight travels in a straight line and cannot pass through opaque objects

Positions of the Moon, the Earth, and the Sun

#### Eclipse of the Moon



#### Eclipse of the Sun



#### Total Eclipse of the Moon

- The whole Moon is in the area of the Earth's shadow that is totally dark.



#### Total Eclipse of the Sun

- The entire Sun is blocked by the Moon and can only be seen from the area of the Moon's shadow that is totally dark.



#### Partial Eclipse of the Moon

- Part of the Moon is in the area of the Earth's shadow that is partially dark.



#### Partial Eclipse of the Sun

- The Sun is partly blocked by the Moon. The Sun can only be seen from the area of the Moon's shadow that is partially dark.





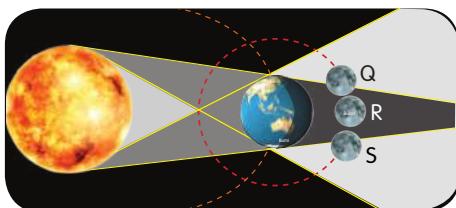
Answer all of the following questions in your Science exercise book.

- I. The diagram below shows the stages of an eclipse of the Moon.



Which arrangement of the eclipse of the Moon is correct?

- A. R, S, P, Q      B. S, R, Q, P      C. R, Q, S, P      D. S, P, R, Q
2. Which of the following statements are true about the eclipse of the Moon?
- I. The Moon blocks the sunlight.
  - II. The Earth is between the Sun and the Moon.
  - III. The Moon is between the Sun and the Earth.
  - IV. The Moon eclipse occurs longer than the Sun eclipse.
- A. I and II      B. I and III      C. II and IV      D. III and IV
3. Which of the following causes the eclipse of the Sun phenomenon?
- I. Full moon phase.
  - II. Light travels in a straight line.
  - III. The Earth lies between the Sun and the Moon.
  - IV. The Sun, the Moon, and the Earth are in a straight line.
- A. I and II      B. II and III      C. II and IV      D. I and IV
4. The diagram below shows the phenomenon of an eclipse.



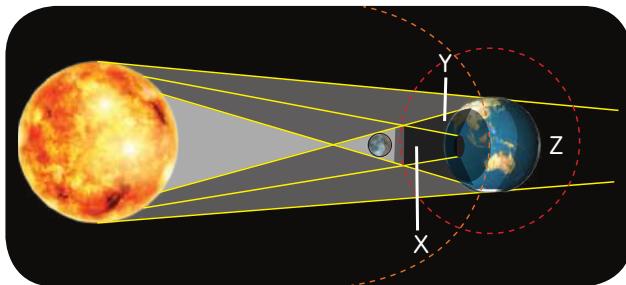
The eclipse phenomenon shown in the diagram above is \_\_\_\_\_.

At position R, \_\_\_\_\_ will happen, while \_\_\_\_\_ will happen at positions Q and S.

5. During total eclipse of the Sun, the surroundings will be as dark as night. Why?
6. Will the eclipse of the Moon happen if the Moon did not orbit around the Earth? Why?
7. A group of pupils are conducting an investigation on the eclipse of the Moon. The diagrams below show the time for the different stages of the eclipse.



- a) State the change in the brightness of the Moon during the eclipse of the Moon.
  - b) What is the conclusion that can be made from this investigation?
  - c) Predict the time the eclipse of the Moon will end. How did you make this prediction?
  - d) The Moon cannot be seen at 11.59 p.m. Give a reason based on this information.
8. The diagram below shows the phenomenon of an eclipse.



- a) What is the eclipse shown?
- b) Name the phenomenon that can be observed from the area on the Earth labelled:
  - i. X
  - ii. Y
- c) What will happen to the surroundings on the Earth during a total eclipse?
- d) Make an inference based on your answer in (c).
- e) Predict the occurrence of an eclipse if the Moon is at position Z.



## Let's Try

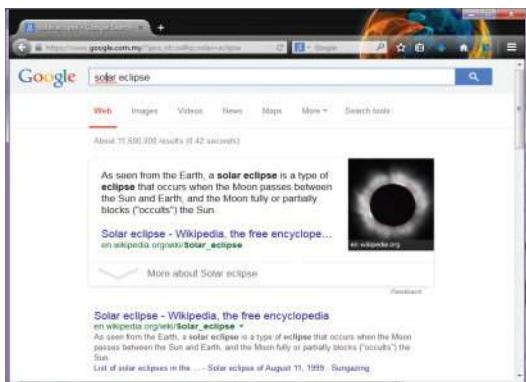
# Eclipse Project

**Aim** To search for information regarding the eclipse phenomenon.

**Apparatus and Materials** Computer, Internet, and VLE Frog programme

## Steps

1. Choose one of the two eclipse phenomena that you have learnt.
2. Search and gather information about the eclipse phenomenon you have chosen using various media including search engines such as Google and Yahoo.
3. Prepare your presentation using MS PowerPoint.
4. Send the presentation of your project to your teacher using the VLE Frog email.



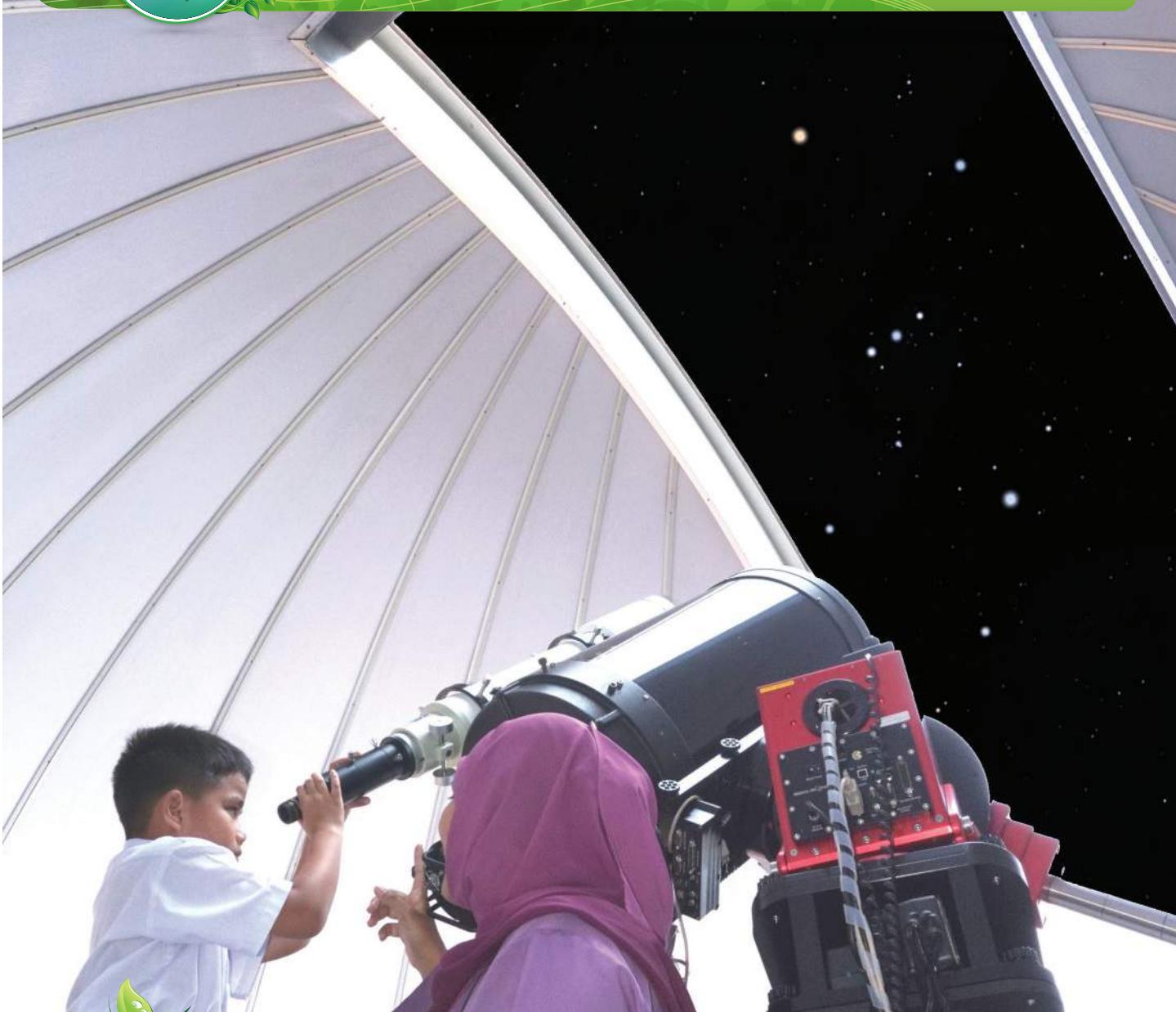
## Questions

1. What type of eclipse can you find besides total eclipse and partial eclipse?
2. Based on the information gathered, when will the next eclipse of the Moon and eclipse of the Sun happen?

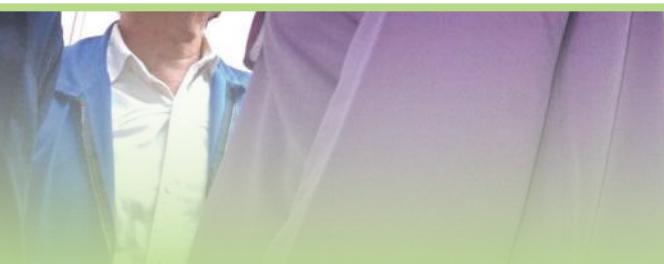


What are the safety steps when observing the eclipse of the Sun?

- Using binoculars
- Using naked eyes
- Using the eclipse of the Sun projectors
- Using thicker negative film

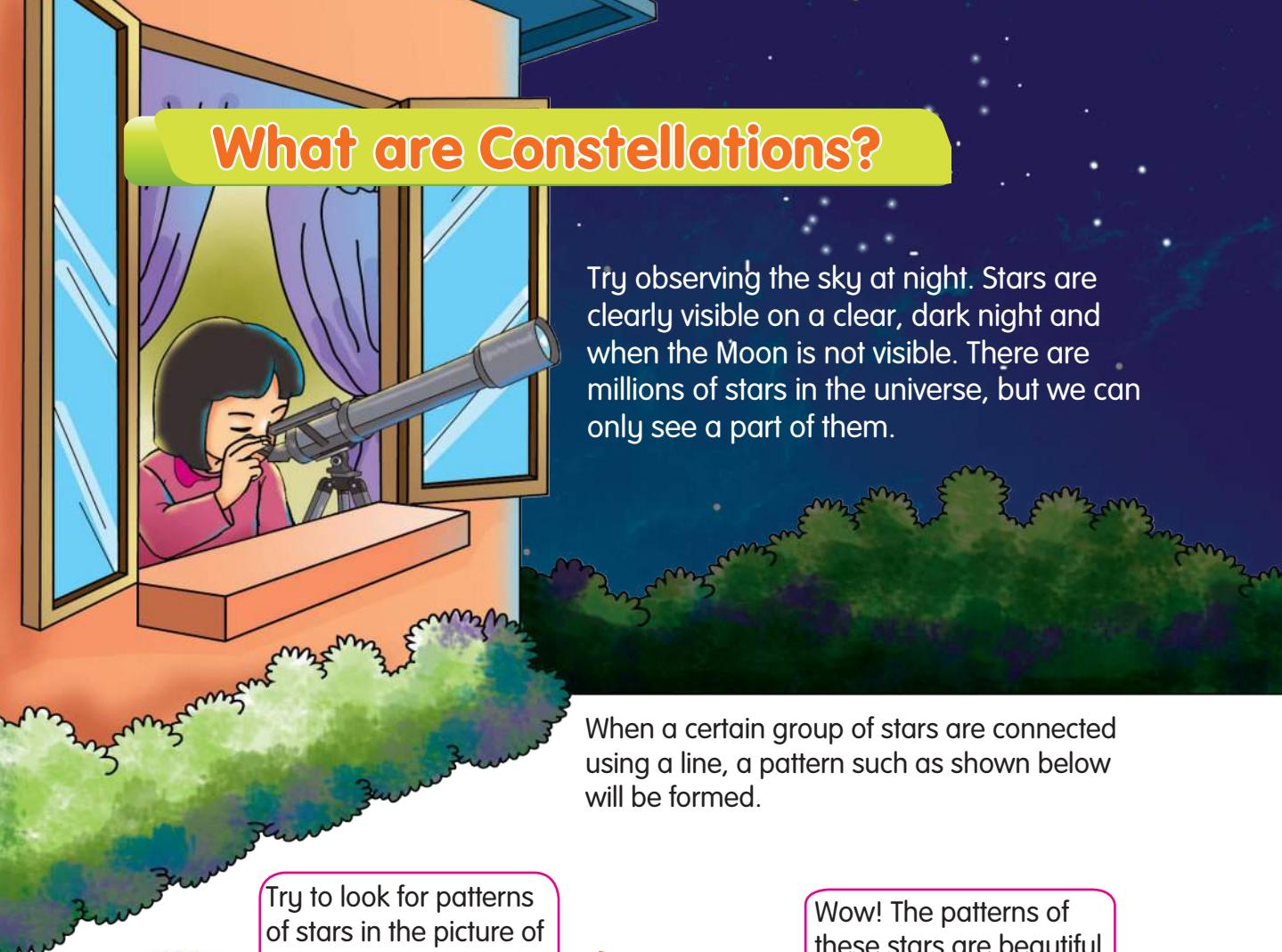


Stars appear to twinkle in the night sky. How can the position of stars in the sky be identified at night? What is the pattern of the group of stars you observe in this picture?



# What are Constellations?

Try observing the sky at night. Stars are clearly visible on a clear, dark night and when the Moon is not visible. There are millions of stars in the universe, but we can only see a part of them.



When a certain group of stars are connected using a line, a pattern such as shown below will be formed.

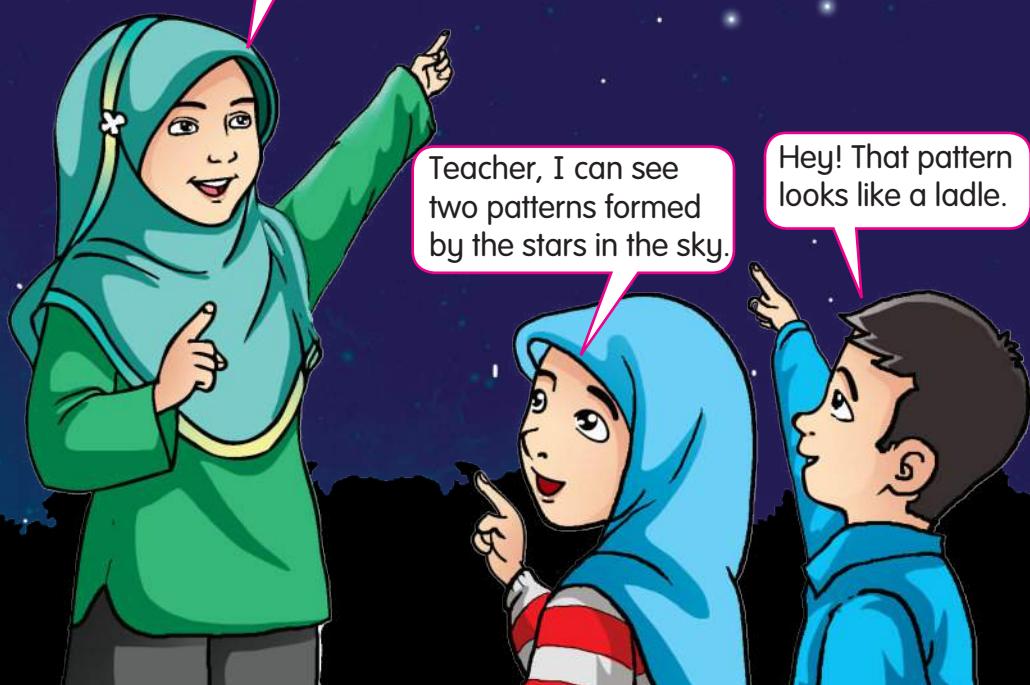
A girl in a pink hijab and dress points towards two screens displaying star patterns. A speech bubble from her says, "Try to look for patterns of stars in the picture of the sky above." Another girl in a white hijab and dress stands next to the screens, looking surprised. A speech bubble from her says, "Wow! The patterns of these stars are beautiful."

**INFO CLICK**

There are many constellations in the sky but the International Astronomical Union (IAU) has officially identified 88 constellations in the sky at night.

178

Look at the sky. Are there any other patterns?



**A constellation** is a group of stars that appear to form a certain pattern in the sky at night.



A number of star map applications such as Start Chart, Sky Map, and Stellarium can be downloaded and installed in the computer or smartphone to observe and identify constellations that will appear in the sky on certain nights.



Why do stars seem to change their positions just like the Sun and the Moon?



## Let's Test

# My Constellation

### Aim

To create my own constellation.

### Apparatus and Materials

Coloured pencils, scissors, black cardboard, plasticine (yellow), satay sticks, and adhesive tape

### Steps

1. Conduct this activity individually.
2. Observe the stars in the sky at night.
3. Mark the position of the stars on the black cardboard using coloured pencils.
4. Shape the plasticine to form a few small stars.
5. Place these small stars on the position of the stars marked earlier on the black cardboard.
6. Cut and stick the satay sticks to connect the stars to form a constellation.
7. Name your constellation.



### Question

Can you see the constellation in the day? Why?



The stars do not twinkle if we see them from outer space. However, the stars will twinkle when we see them from the Earth. Why?

### #TEACHER



Plasticine can be replaced with other objects such as beads, pushpins or star-shaped coloured stickers.

# Constellations in the Night Sky

Constellations look like stars that form interesting patterns in the sky at night. These patterns are only formed when we see them from the Earth.

These patterns do not exist naturally in outer space. Observe the sky at night. Which constellation pattern is easy to see?

Among the constellations in the sky, four constellations can be seen easily.

How do the patterns of the constellations look like?

There are so many constellations in the sky. Which constellation can be seen easily, teacher?



The Langkawi National Observatory (LNO) is a research centre under the Malaysian National Space Agency (ANGKASA) that is equipped with astronomy equipment such as the robotic telescope system.



# Knowing Constellations

Malaysia is located near the Equator. We can therefore see constellations in both the Northern and Southern hemispheres. Do you know the patterns of the constellations?

**The Orion Constellation** is one of the most obvious constellation in the night sky. Orion forms a shape like a hunter wearing a belt with a sword hanging. The Orion Constellation appears in the night sky between the Northern and Southern hemisphere.

**The Southern Cross Constellation** is the smallest constellation and is easily recognisable at night in the Southern hemisphere. It consists of a group of four stars arranged in the shape of a kite.

**The Scorpion Constellation** is a group of stars that forms the shape of a scorpion. The Scorpion constellation appears in the sky at night in the Southern hemisphere.

**The Big Dipper Constellation** is a group of seven stars. This constellation forms the shape of a water dipper or ladle with a handle. The Big Dipper appears at night in the Northern hemisphere.

**INFO CLICK**  
Big Dipper is part of a bigger constellation, namely the Ursa Major that is shaped like a big bear.

**#TEACHER**  
Surf the Internet to find out an interactive simulation about the constellations.



## Constellation Projector

### Aim

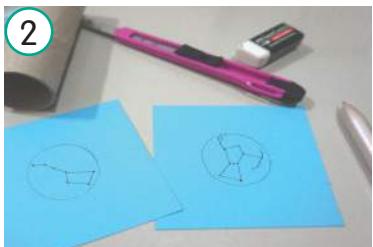
To construct a constellation projector to identify constellation patterns in the night sky.

### Apparatus and Materials

Torch, ruler, pen, pencil, scissors, needles, screen, cardboard tube, coloured paper, and rubber band

### Steps

- Conduct this activity in groups.



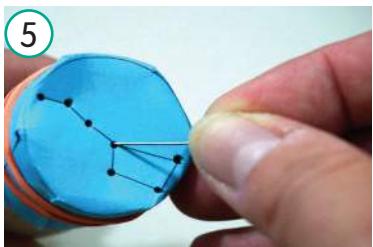
Draw a circle of the same size as the cardboard tube. Draw a constellation pattern.



Cut out the circle of the constellation slightly larger than the size of the cardboard tube.



Place the constellation circle on one end of the cardboard tube and fold it around the tube. Secure it with a rubber band.



Using a needle, poke holes on the drawing of the constellation pattern.



Insert the torch into the cardboard tube. Do this in a dark room.

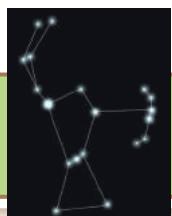


Point the constellation projector onto a screen and switch on the torch.

- Present your constellation patterns in front of the class and ask your friends to identify the image of the constellation seen.

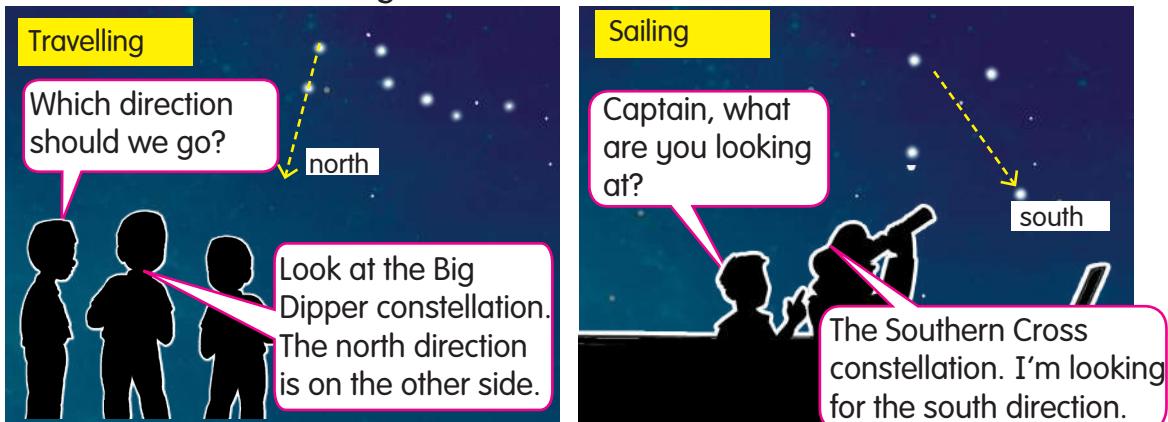
### Question

What are the constellations shown in the diagram?

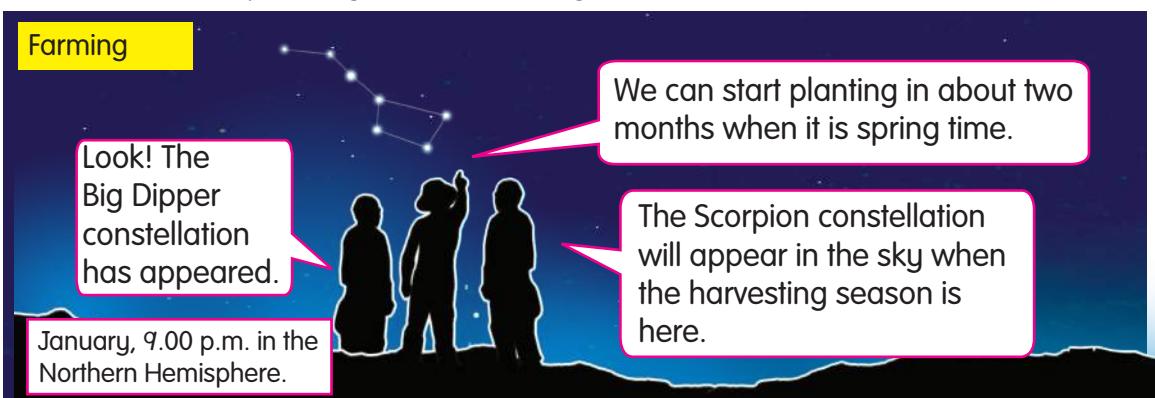


# Use of Constellations

Before the invention of the compass and calendar, humans depend on constellations in the sky for directions.



In ancient times, farmers in areas that experienced four distinct seasons depended on the constellations as **a season indicator** to predict and plan a suitable time for planting and harvesting.



## TASK

Find information on other constellations from various media. Build a model of the constellation using recycled materials. Explain the existence and use of the constellations using the additional information on the constellations.



For Muslims who wish to pray in the South East Asia region, the Orion constellation can be used to indicate the direction of the Qibla.



## #TEACHER

Surf the Internet to find out about constellations.



### Let's Remember

Guide for planting season in the Northern Hemisphere.

**Big Dipper**

north



**Constellation**  
Group of stars that is seen to form a specific pattern in the sky

**Orion**

**Use of constellation**  
Guide for direction  
Guide for planting and harvesting seasons

**Southern Cross**

south

Indicator for harvesting season in the Northern Hemisphere.

**Scorpion**



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

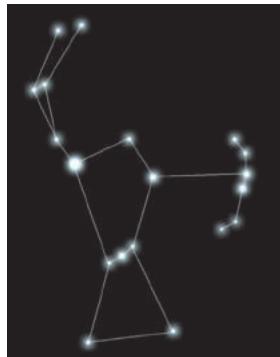
- I.
- \* Consists of seven stars
  - \* Can be observed in the northern sky
  - \* Shaped like a water dipper
- The information above refers to the
- Southern Cross constellation
  - Big Dipper constellation
  - Scorpion constellation
  - Orion constellation
2. The diagrams show three different constellations. Which of the following represents constellation X, Y and Z correctly?



X



Y

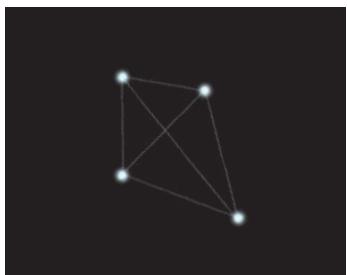


Z

- | X             | Y          | Z          |
|---------------|------------|------------|
| A. Scorpion   | Orion      | Big Dipper |
| B. Big Dipper | Scorpion   | Orion      |
| C. Scorpion   | Big Dipper | Orion      |
| D. Orion      | Big Dipper | Scorpion   |

3. A traveller was lost in the middle of a desert at night. Which of the following constellations cannot help the traveller find the north direction?
- Southern Cross constellation
  - Scorpion constellation
  - Big Dipper constellation
  - Orion constellation

4.



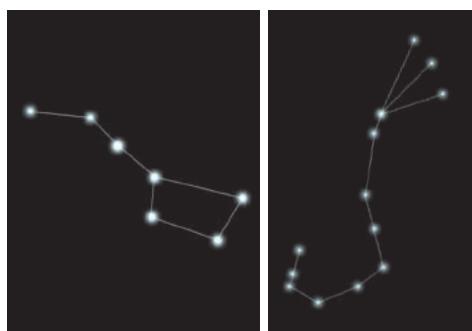
Complete the following sentences.

Constellation is a \_\_\_\_\_ of stars that form certain patterns in the night sky. The constellation on the left consists of a group of four stars arranged in a pattern like a \_\_\_\_\_. This is the \_\_\_\_\_ constellation.

5. Which of the following constellations can be observed in both the Northern and Southern hemispheres?

- A. Southern Cross constellation
- B. Scorpion constellation
- C. Big Dipper constellation
- D. Orion constellation

6. The diagrams show two different constellations.



X

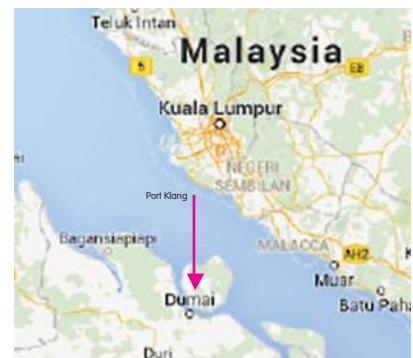
Y

- a) Constellation X is \_\_\_\_\_ and can be used to show the \_\_\_\_\_ direction.
- b) Constellation Y is \_\_\_\_\_ and looks like a \_\_\_\_\_.
- c) How do constellations help farmers in ancient times?
- d) What is the use of constellations for astronomers today?

7. The Big Dipper and Southern Cross constellations are used to determine north and south directions. How can the east and west directions be determined?

8. The map on the right shows part of South East Asia. A sailor travels from Port Klang to Dumai.

- a) Which constellation can assist the sailor to the correct direction?
- b) Make an inference based on your answer in (a).





## Let's Try

# Constellation Story Project

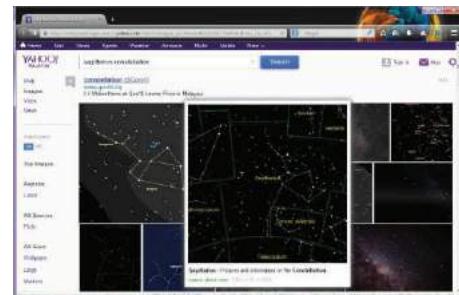
Do you know that every constellation has its own story? By surfing the Internet, find stories on constellations other than the ones you have learnt.

**Aim** To gather information about constellations.

**Apparatus and Materials** Computer and Internet

## Steps

1. Conduct this activity individually.
2. Find and gather interesting stories on constellations through various media including search engines such as Google or Yahoo.
3. Create a blog about your constellation stories using the website [www.blogspot.com](http://www.blogspot.com).



Search the information using Google or Yahoo search engines.

## Questions

1. What are the characteristics of the constellation that can be identified in your story project? Explain.
2. Do you know how many constellations are also known as a zodiac?
3. What is the difference between constellation and zodiac?

## 12

# MACHINES



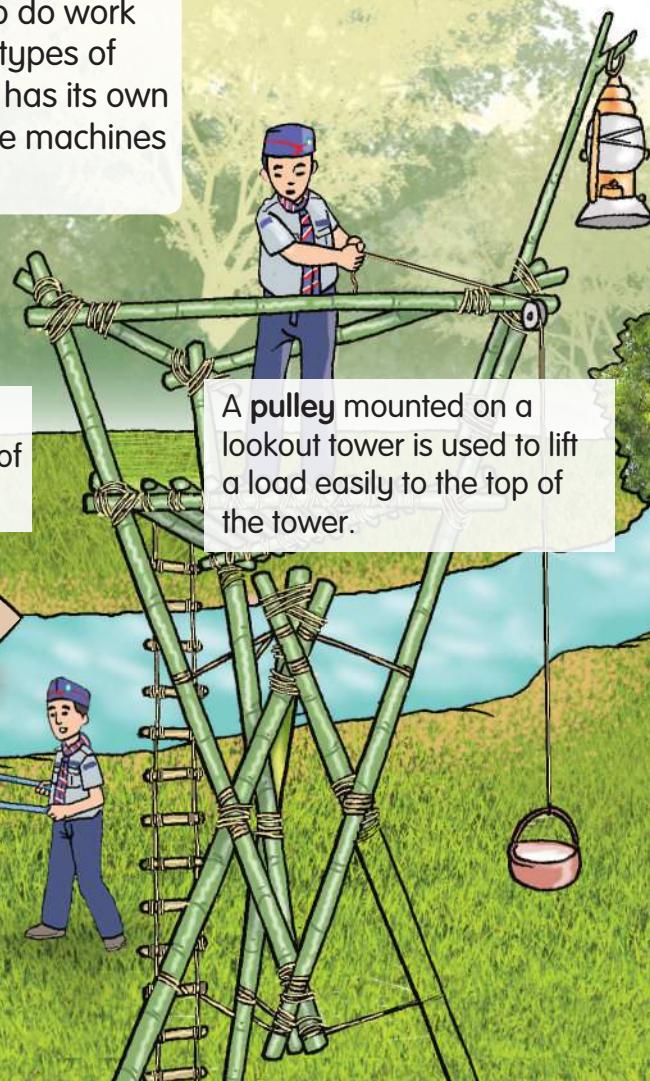
Amir, Lim, Dina, and Rani are conducting an investigation. Identify the tools used in the picture above. What are the uses of the machines in these tools?

# Simple Machines

A **simple machine** is a tool that allows us to do work more easily and quickly. There are various types of simple machines around us. Each machine has its own specific use. Observe and identify the simple machines in the situations below.



Screws are used to put together and tighten a piece of signage to a wooden pole.

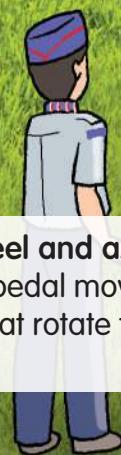


A pulley mounted on a lookout tower is used to lift a load easily to the top of the tower.

A plank is tilted to form an **inclined plane** to make the task of moving loads to different levels and height with ease.

The **wheel and axle** on a bicycle pedal moves the gears that rotate the bicycle's wheels.

Gears mounted on a bicycle are useful for moving the bicycle's wheels at different speed.



The pulley on a flagpole is used to raise and lower a flag.

Explain with examples the types and uses of simple machines found in your surroundings.

A spoon used as a **lever** to open the lid of a food can.

The **wedge** of an axe makes the task of separating or splitting logs easier.

Let's look at how these simple machines function.

## Inclined plane

An inclined plane is a slanted flat surface with both ends placed at different heights. How does an inclined plane function?



An inclined plane makes it easier for us to move and also to move a load to a higher level.



An inclined plane makes movement easier for disabled people.



stairs



meandering road

Describe the use of the inclined planes in your daily life and provide a different example.



## Screw

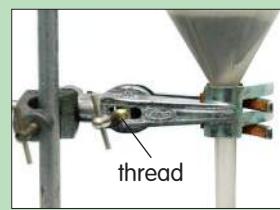
A screw is a type of simple machine with a spiral inclined plane called thread. Screws are used to attach and tighten two pieces of objects that are joined together.



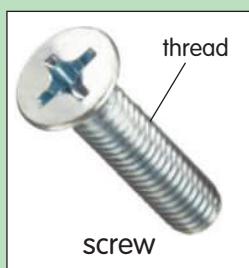
screw on a bulb



screw on a bottle



screw on a retort stand



How are screws used in your daily life? Provide a different example and explain how it is used.

## Lever



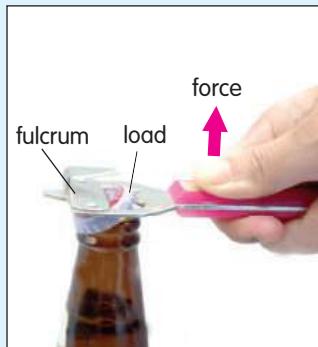
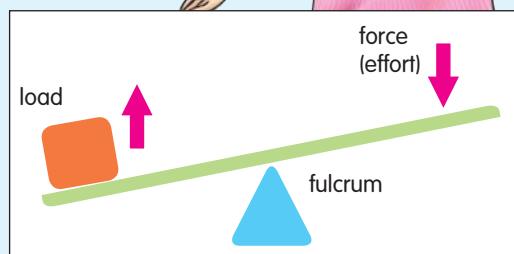
It's so hard to open the lid of this can. Help!



Well, that's easy. Use a spoon. The spoon acts as a lever to open the lid of the can easily.

The lid of the can acts as a load, the tip of the spoon that touches the lid is the fulcrum, while Rani's hand that pushes the spoon handle downwards acts as the force.

A **lever** consists of a piece of rod that moves at a fixed point called the **fulcrum**. Levers help us to lift and move objects easily. Observe the diagram on the right. Levers consist of three parts, namely, **load**, **force (effort)**, and **fulcrum**.



**HOTS**  
Our arm is a simple machine. How does our arm function as a simple machine?

The examples of levers shown above make our daily work easier. How are they used in the situations above?

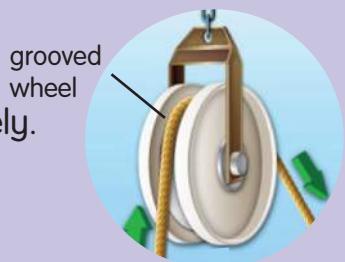
Describe a different example on the use of levers in our daily lives.



## Pulley

A **pulley** consists of a grooved wheel that can move freely.

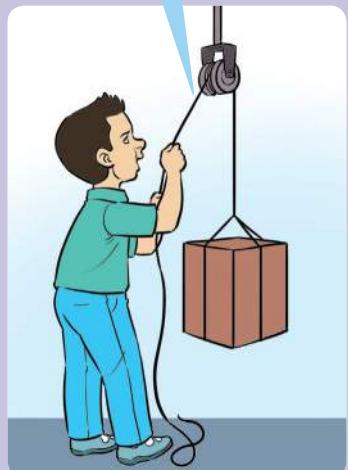
Pulleys can be used for lifting, lowering or pulling a load when a rope or a chain is passed around it through the groove. How are pulleys in the pictures below used?



pulley on a flagpole



pulley used on a sailing boat



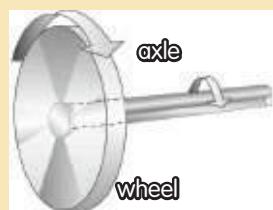
pulley to lift a load



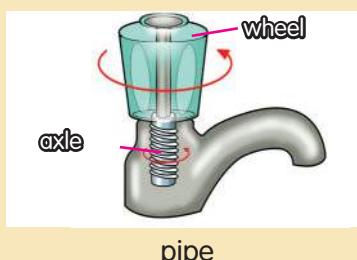
What are other examples on the usage of pulleys? Give one example and explain its use.

## Wheel and axle

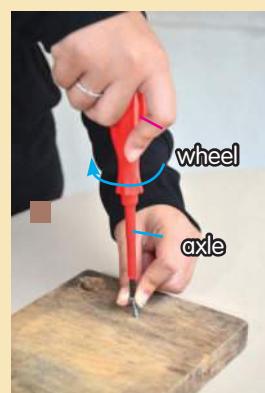
**Wheel and axle** is used to move or rotate an object. This simple machine consists of a wheel that is mounted on a rod called an axle.



spanner



pipe



screwdriver

Look at the pictures above. How are wheels and axles used? Explain the use of wheel and axle in your daily life and give one different example.



## Wedge

A **wedge** is a simple machine that has **one or two inclined planes** with a sharp edge. A wedge is used to split, cut or move, hold, and stop objects. Describe the uses of a wedge as shown in the pictures below.



hoe



door stopper



nail

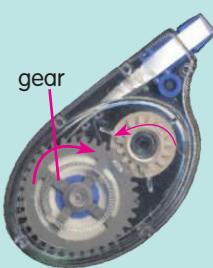
How useful are wedges in your daily life? Give one example and explain its use.



How does a tooth act as a wedge?

## Gear

A **gear** is a simple machine that consists of a wheel or cylinder with teeth. Gears function to change the direction and speed of the movement of other components in a more complex machine. Explain the use of gears as shown in the pictures below.



correction tape



wristwatch



egg beater



cog cylinder

What are other examples on the usage of gears in your daily life? Name one example and explain its use.





# Work Made Easy

## Aim

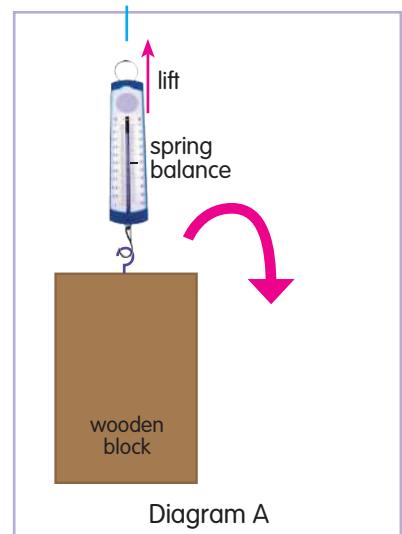
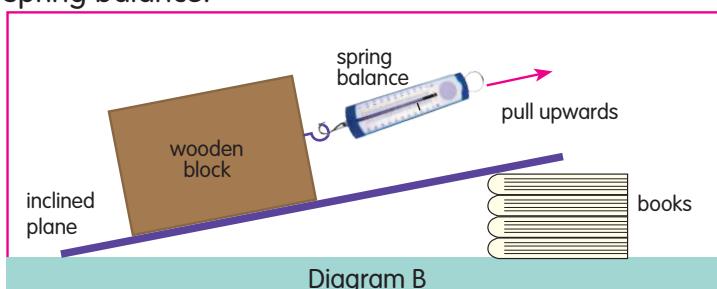
To investigate ways simple machines can make work easy.

## Apparatus and Materials

Spring balance, wooden block, plank, books, pencil, thread, and paper

## Steps

- Carry out this activity in groups.
- Set up the apparatus as shown in Diagram A.
- Lift the wooden block and take the reading of the spring balance.
- Set up the apparatus as in Diagram B.
- Pull the wooden block and take the reading of the spring balance.



- Record the readings of the spring balance in the table as shown below.
- Report the findings of your investigation.

Method of pulling load	Reading of spring balance
Inclined plane	
Without inclined plane	



If a wheel and axle machine is mounted on the wooden block in Diagram B, predict the reading on the spring balance. Why?

## Questions

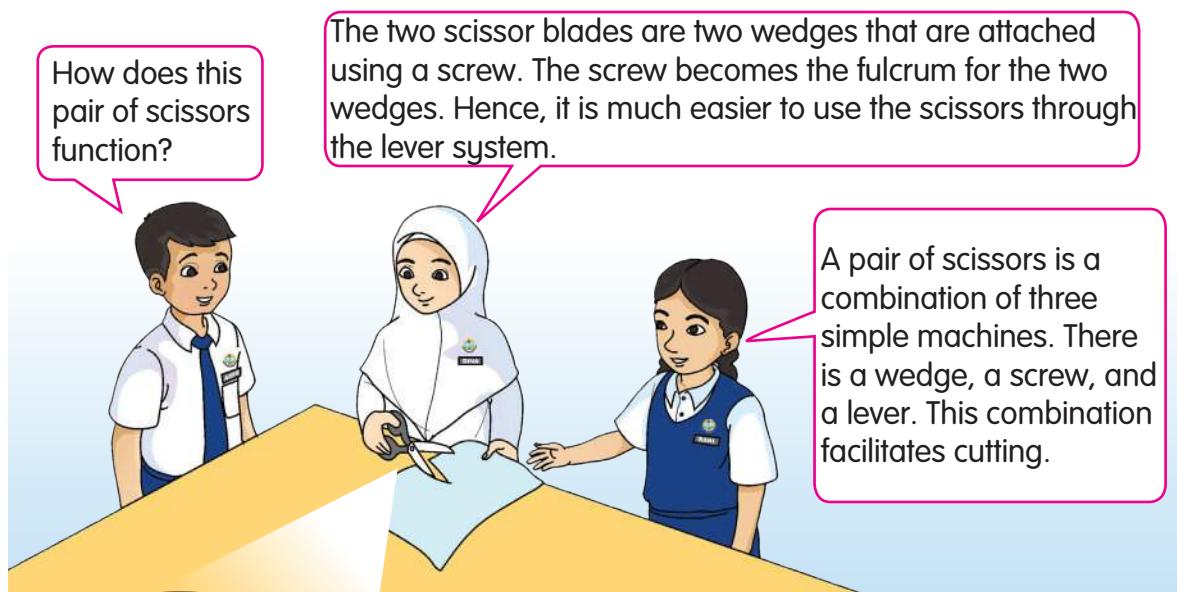
- Between the two methods in this activity, which reading of the spring balance is higher? Why?
- What is the conclusion for this investigation?

### #TEACHER

- The elongation of a stretched spring can be used to measure the force required in this activity if a spring balance is not available.
- The wooden block is pulled upwards on the inclined plane continuously at a constant speed.

# Complex Machines

Some tools are much easier to use to do work when a number of simple machines are combined. Observe the situations below.



The combination of simple machines such as the wedge, screw, and lever makes the scissors a complex machine. What will happen if the screw on the scissors is removed? Why?

Look at the pictures below. Identify the simple machines found in these tools.



pencil sharpener



compasses



toy car

## Knowing Complex Machines

Observe Lim's family working together on a weekend. What are the complex machines that you can see in this picture? Explain the types of simple machines that you can identify in the complex machines.

A wheelbarrow is a complex machine. Why?

A wristwatch requires a gear to move the needle. What other simple machines can be found in a watch?



A lawnmower is a complex machine. Identify the simple machines found in a lawnmower.

A bicycle comprises a number of simple machines. Describe the parts of a bicycle which are simple machines.

Work becomes easier and faster using complex machines.



A hedge shear is the same as a regular scissors consisting of a combination of simple machines. What are the simple machines?

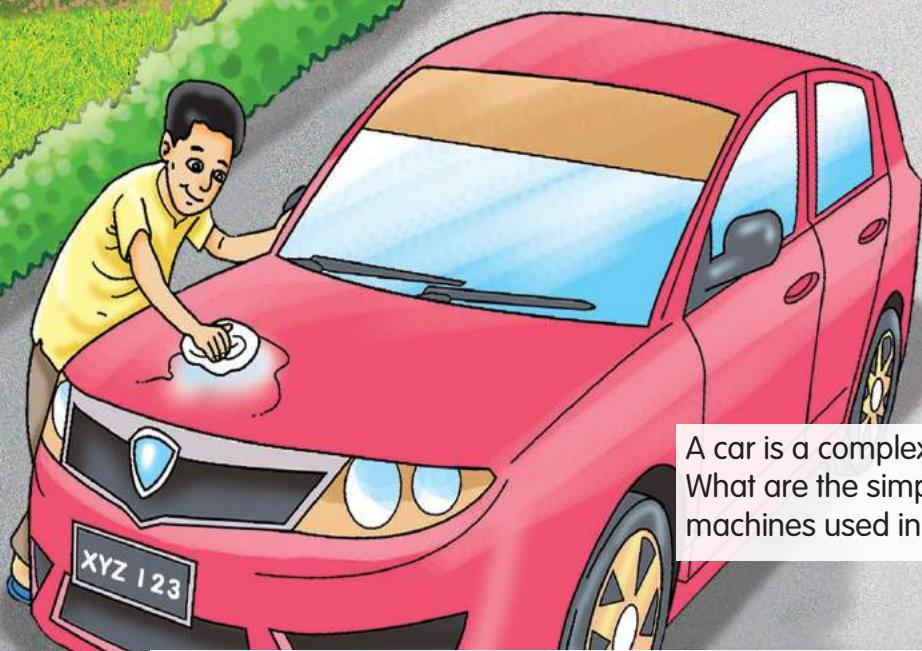


What are the simple machines found in a ladder?

Is a hoe a simple machine or a complex machine? Why?



How do the wheels of the fencing gate function as a pulley?



A car is a complex machine. What are the simple machines used in a car?

Most of the tools found around us are complex machines. **Complex machines** are tools that consist of a combination of more than one simple machine.



## Let's Test

# Machine in a Machine

### Aim

To investigate simple machines found in complex machines.

### Apparatus and Materials

Papers and stationery

### Steps

1. Carry out this activity in groups.
2. Identify a number of complex machines found around you.
3. Sketch the complex machines you found.
4. Label and state the types of simple machines found in those complex machines.
5. Report the results of your investigation.



### Question

What is the difference between simple machines and complex machines?

### QUIZ



1. What are the simple machines found in this hole punch?
  - Wedge • Inclined plane
  - Gear • Lever



2. A hand drill consists of a combination of a number of simple machines. State the simple machines found in a hand drill.

# Invention of a Sustainable Machine

Machines are invented to assist us in completing daily work.

Sustainable machines will be invented from time to time to provide more benefits to humans. What is a sustainable machine? The word sustainable means unchanged, eternal, and fixed. **Sustainable machines** are machines that are durable, not easily damaged, cost-effective, do not have adverse effects on the environment, easy, and safe to use.

Why is the invention of sustainable machines important to humans? Let's look at the situations below.



## Agriculture



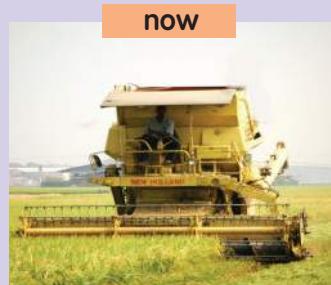
then



now



then



now

ploughing land

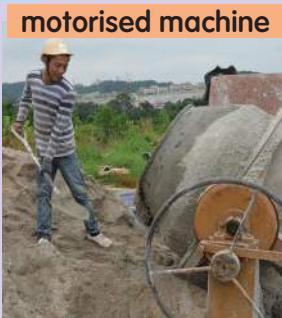
harvesting paddy

The pictures above show two methods used by farmers for ploughing land and harvesting paddy. What is the importance of inventing a land ploughing machine and a paddy harvesting machine?

## Industrialisation



manual



motorised machine

mixing cement at construction sites



manual



motorised machine

lifting loads in a warehouse

How do the machines shown in the above situations help the workers to complete their work more efficiently? Explain the importance of inventing other sustainable machines in industries.

## Daily life

simple machine



complex machine



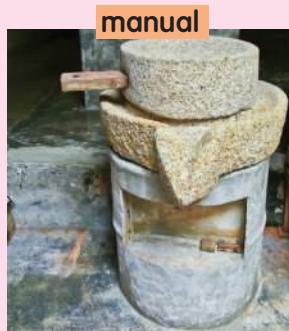
Both types of pencil sharpeners shown in the pictures have the same function. Which machine is more sustainable? Why?

A food grinder helps your mother to grind food. Which grinder is more sustainable? Why?

manual



motorised machine



motorised machine



The invention of a washing machine is important in our daily life. What will happen if the machine is not invented? Why?

Both vehicles help humans to travel to distant places. The use of which vehicle is more sustainable? Why?

manual



motorised machine



**TASK**

Choose one type of sustainable machine that you can identify around you. Find and collect information about the importance of inventing the sustainable machine. Write on the importance of that sustainable machine and make a creative scrapbook.



## Let's Test

# Sailing Boat

### Aim

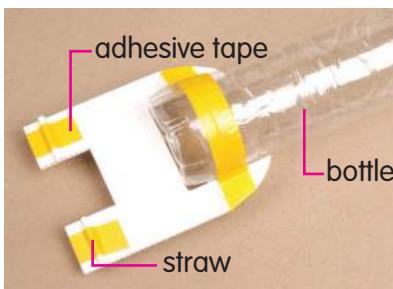
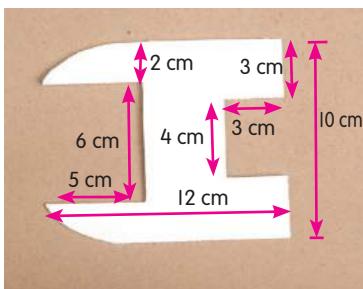
To create a model sailing boat based on several types of simple machines and science concepts.

### Apparatus and Materials

Knife, ruler, pencil, hole punch, plastic bottle (500 ml), plastic cardboard, straw, rubber band, thread, satay stick, plastic bag, bulb, AA battery, bulb holder, battery holder, wire, and adhesive tape

### Steps

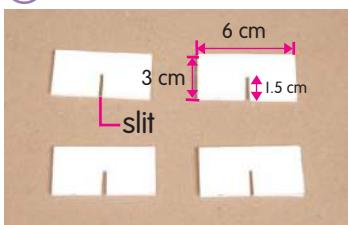
- Preparation of the body of the boat.



Cut the plastic cardboard.

Attach the straw and bottle onto the cardboard.

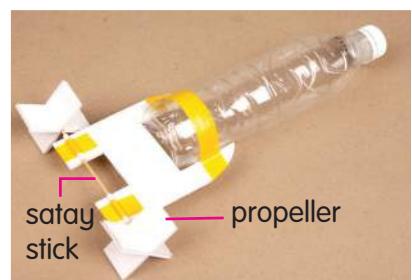
- Making and assembling the propellers.



Cut out four pieces of plastic cardboard. Make a slit in the middle.



Insert two pieces of the cardboard to form a propeller.

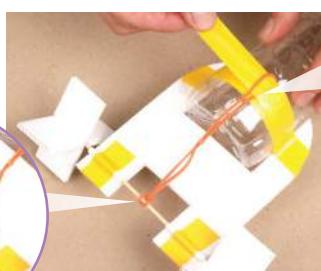
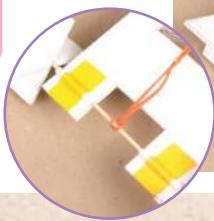


Insert the satay stick through the straw. Attach the propellers to both ends of the satay stick.

### #TIPS

The rubber band on the propellers can be made longer by joining two rubber bands together.

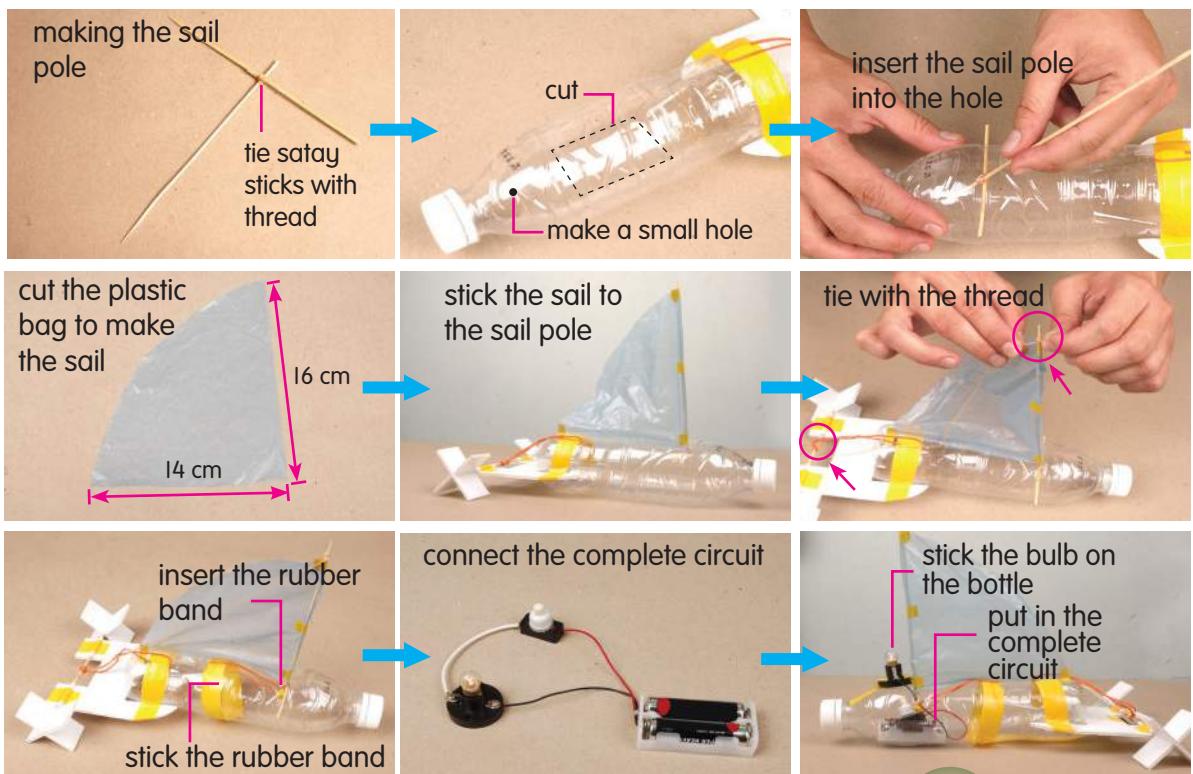
- Fix the rubber band to the propellers.



Stick the rubber band to the bottle.

Tie the rubber band to the satay stick.

**④ Assembling the sail and boat bulb.**



- 5 To move your sailing boat, turn the propellers of the sailing boat and release it on the surface of the water.
- 6 Present your sailing boat to the class and explain how the sailing boat model functions.

**Questions**

1. Identify the simple machines found on your sailing boat. Explain the simple machines found on the sailing boat.
2. Explain the science concepts applied in your sailing boat.



Predict what will happen if the propellers of the sailing boat are turned in the opposite direction. Why?



**TASK**

Based on the model constructed above, design another model that combines science concepts such as electricity, speed, light, and magnet. Present the model you invented and state the sustainability found in the model.



**#TEACHER**

- Guide the pupils on the science concepts applied and sustainability of the above model.



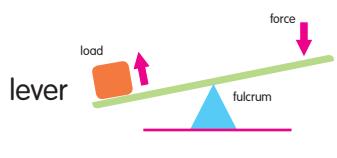
## MACHINES

### Simple Machine

inclined plane



lever



wedge



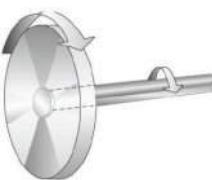
pulley



gear



wheel and axle

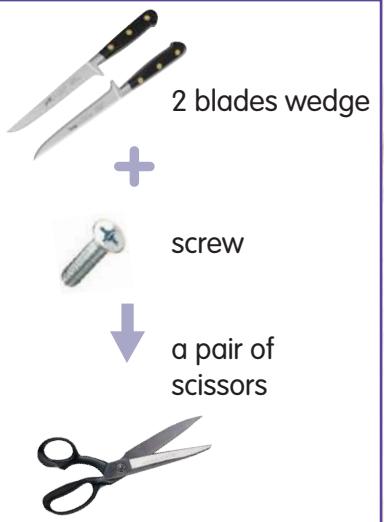


screw



### Complex Machine

Combination of more than one simple machine



### Examples



pencil sharpener



a pair of compasses



toy car

### The Importance of Sustainable Machines Invention

From the aspects of:

- materials used
- life span
- maintenance
- save cost
- environmentally friendly
- safety

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

I. What is the meaning of a simple machine? Choose the correct answers.

- A tool used to move a load.
- A tool used to lift a heavy load.
- A tool used to carry out work easily.
- A tool that allows us to use less force and makes work easier and faster.

2. Simple machines are inclined plane, \_\_\_\_\_, wedge, \_\_\_\_\_, screw, \_\_\_\_\_, and \_\_\_\_\_.

3.



P



Q



R



S

The tools above are machines. The tools \_\_\_\_\_ and \_\_\_\_\_ are simple machines, while tools \_\_\_\_\_ and \_\_\_\_\_ are complex machines.

4. The picture below shows a complex machine.

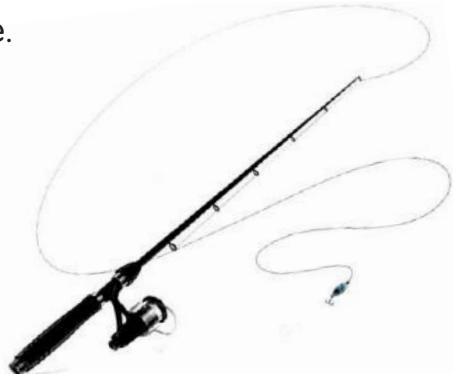
Which of the following tools use the same simple machine principles as shown in the picture?

I Knife  
III Broom

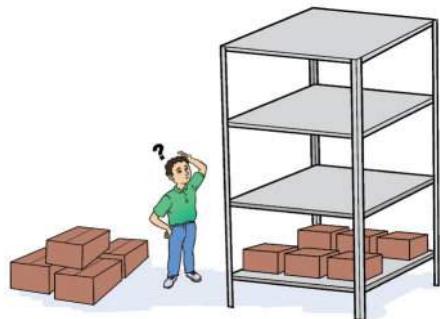
A. I and II  
C. I and III

II Screwdriver  
IV Bottle opener

B. II and III  
D. II and IV

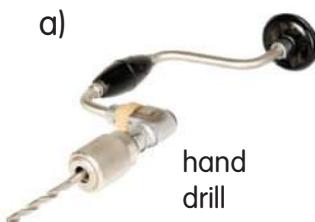


5. A worker wants to lift the big boxes to the highest shelf. Which simple machine is suitable to be used to make this work easier? Why?



6. Name the simple machines that can be found in the complex machines below.

a)



hand  
drill

b)



ladder

7. The picture shows a carpenter using a hammer to remove a nail from a plank of wood.

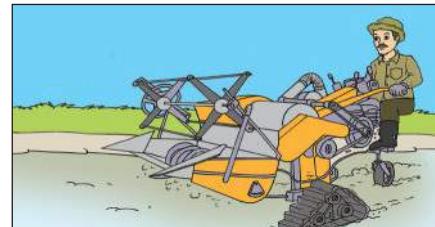
- State the type of simple machine shown.
- Sketch a diagram of the simple machine based on your answer in (a).



8. A farmer wants to plough his land. Between the two following methods, which one can help him complete the work in a shorter time? Why?



Method X



Method Y



## Let's Try

# Catapult

**Aim** To explain a lever using a catapult model.

**Apparatus and Materials** Scissors, knife, plastic ruler, hole punch, tissue box, pencil, bottle cap, paper clip, rubber band, and adhesive tape

## Steps



Cut an opening in the tissue box as shown in the picture above.



Punch a hole 3 cm from the edge of the box and 1 cm from the opening. Repeat on the other side.



Cut a small opening at the opposite end of the box near the base. Insert a paper clip into it.



Tie a pencil and a ruler in the shape of a cross with a rubber band.



Stick a bottle cap on the other end of the ruler.



Tie and stick the rubber band on the other end of the ruler.



Insert the pencil into the holes made earlier.



Pull and fix the rubber band to the paper clip.



Put a light object in the bottle cap. Pull backwards and release it.

## Question

The catapult model is a type of lever. Identify the force, fulcrum, and load in your catapult model.